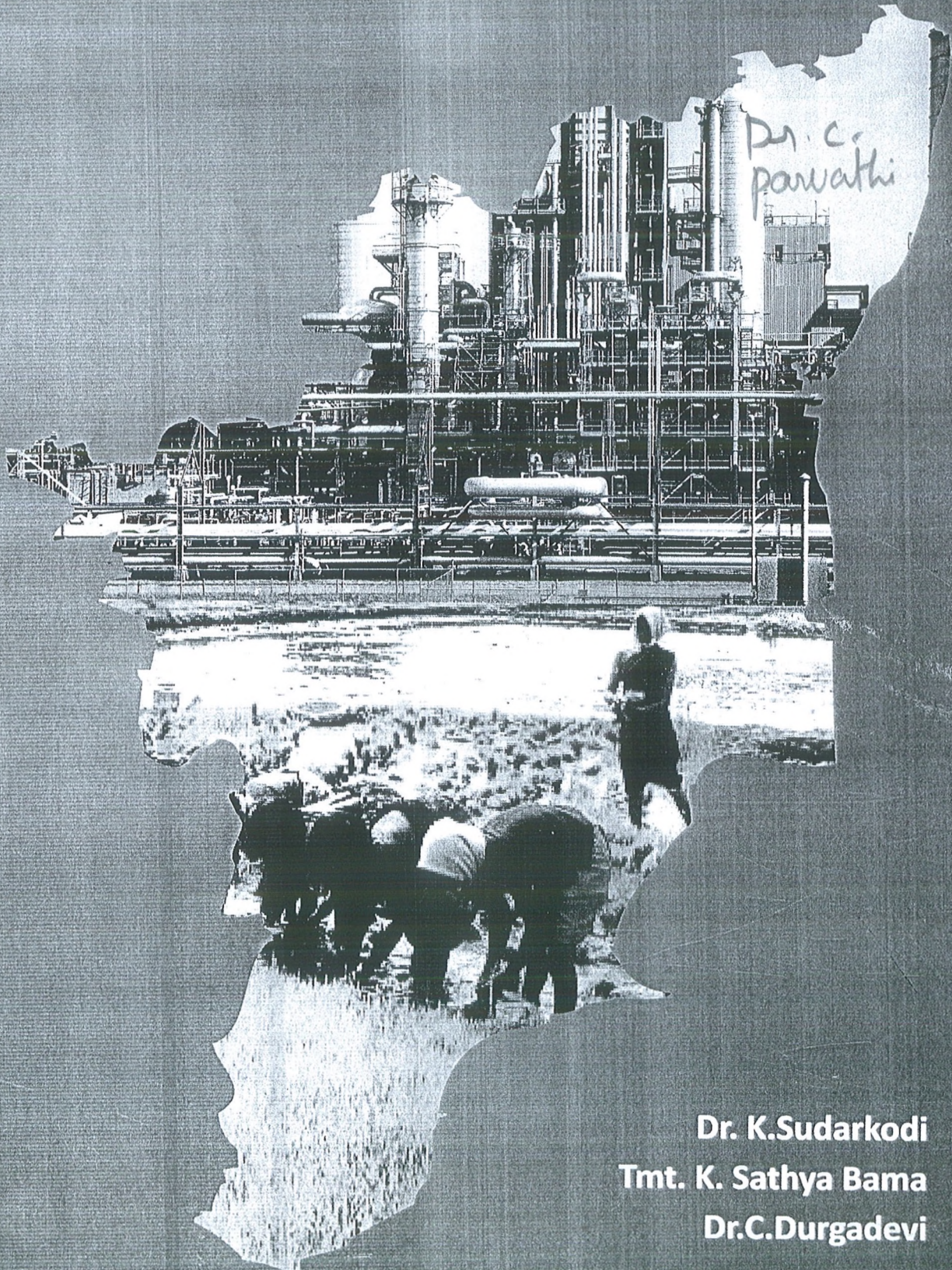


TAMIL NADU ECONOMY - PERSPECTIVES AND ISSUES



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36. EVALUATION OF WATER POLLUTION IN COIMBATORE DISTRICT: A CASE STUDY

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Introduction

Water was once upon a time a free a commodity. Slowly it became an economic resource, and now it is on the path of scarcity. All this is due to human activities. Urbanisation, industrialisation and population explosion are the main causes of water population. Water pollution is not merely a problem of India but is common around the globe. Another major factor that accelerates the severity of water problems is the climatic changes occurring all over the world. According to Global Water Supply and Sanitation Assessment Report (2000), prepared by UNICEF – WHO – WSSCC, over one billion people across the world do not have access to adequate and safe drinking water facilities. Nearly 3.4 million people in the world, most of them children die every year from diseases associated with lack of safe drinking water, inadequate sanitation and poor hygiene. (Chandrakumar.G and Mukundan.N, 2006)

Fresh water resources all over the world are threatened not only by over exploitation and poor management but also by ecological degradation. The main source of freshwater pollution can be attributed to discharge of untreated waste, dumping of industrial effluents, and run-off from agricultural fields. Water scenario is now fast changing as a result of increasing population, rising demand for irrigation to raise high

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yielding varieties of crops, rapid urbanisation and industrialisation, electricity generation, impact of global warming and erratic rainfall. (Gopal Kolkoti, 2013).

Background of the Study

The decreasing fresh water availability is causing concern not only in India but all over the world. Protection and quality of fresh water resources has been identified as one of the main action for sustainable development in the World Summit on Sustainable Development in Rio in 1992. Realising this, the ministerial declaration at the second world water forum in Hague in March 2000 called upon the nations to work towards water security in the 21st century and make water as everybody's business. Further the Ministerial Declaration at Freshwater Meet in Bonn, 2001 placed greater commitment on agreed principles of water resources management and called upon for new partnership to create water wisdom, cleaning up watersheds, to reaching communities and innovative solutions for sustainable use, protection and management of fresh water resources.

Matters and Materials

Tamil Nadu is the eleventh largest state in India by area and the seventh most populous state. It is the fourth largest contributor (2010) to India's GDP and ranks tenth in Human Development Index. Tamil Nadu is one of the urbanised states in India. An average of 10.56 percent of business enterprises is located in Tamil Nadu and it provides employment to 9.97 percent of the population. However, water management skill is not fully utilised. It is very much lacking on account of being non-systematic. (Lakshiminarayanan.M.R, 2013). Due to ill maintenance, the waters have become brackish and hence unfit for drinking purposes. Till some years ago, many thousands of farmers were benefited by Noyyal river, particularly those living in Coimbatore, Tiruppur, Erode and Karur districts. Presently

this river is being polluted by chemicals and effluent waters from factories.

Water is finite in nature. Water should be used properly and wastage of water must be stopped. Since Tamil Nadu is facing serious water scarcity there should be some alternative option chosen for non essential activities so that water scarcity can be reduced to some extent.

With this background in the Coimbatore district households were selected and an attempt was made to analyse the “**Evaluation of Water Pollution in Coimbatore District: A Case Study Analysis**”, with the following objectives:

1. To study the current scenario of water pollution in India
2. To study the socio-economic background for the selected households
3. To study the water supply in the selected households in the Coimbatore district
4. To analyse the water pollution and changing consumer behaviour of selected households in the Coimbatore district
5. To find out the problem of water usage

Hypotheses

The following null hypotheses were tested in the course of the study

1. The usage of private water supply
2. An increase in willingness to pay and willingness to accept
3. The change in consumer behaviour
4. An increase in consumer's satisfaction
5. Change in the consumption pattern

Methodology

The present study was carried out in Coimbatore district in Tamil Nadu. From the severely affected areas, households consuming aqua guard and packaged drinking water were selected for the study. Four severely affected areas selected were Tudiyalur, Podanur, Karumbukadai and Ukkadam. From Tudiyalur 31 samples were selected. Fifty six samples were selected from Podanur, 7 from Karumbukadai and 6 from Ukkadam. A total of 100 samples were selected for the current study. Both primary and secondary data was used in the study. Multi stage sampling was used to select the samples. The sources for secondary data are:

- Coimbatore Corporation
- Tamil Nadu Water Supply and Drainage Board
- District Statistics Office Coimbatore
- Tamil Nadu Agriculture University
- Pollution Control Board Coimbatore

Primary data were collected through personal interview method from the selected household consumers. Interview schedule were used to collect details related to the study from the selected household consumers. A pilot study was conducted to understand the areas with severe water shortage. On the basis of observation during the pilot study, the interview schedule was modified (Appendix – 1) and the survey was conducted between November 2013 and January 2014.

Major Findings of the Study

Socio – Economic characteristics of Selected Household Consumers

In Tudiyalur 29 percent of the samples were males and a majority of 71 percent were females. In the city of Podanur 26.79 percent are males and 73.21 percent of the samples are

females. In Karumbakadai the males 71.43 percent and females are only 28.57 percent. Males in Ukkadam constitute 33.33 percent of the sample size. In Tudiyalur has 83.9 percent of Hindus and only 16.1 percent of Christians. The city of Podanur consists only of Muslims. Muslims in Karumbakadai constitute for 85.7 percent, while the Hindus are merely 14.3 percent. In Ukkadam the entire samples are Muslims. In Tudiyalur the 61.29 percent of the samples are employed in the private sector and only 38.71 percent are employed in the government sector. The private sector dominates even in Podanur constituting to 87.5 percent. There are 10.71 percent working in the government sector and a bare minimum of 1.79 percent works in MNC. The entire samples of Karumbakadai work in the private sector. The private sector dominates in Ukkadam also with a majority of 83.33 percent and 16.67 percent of the samples are government employees.

In the city of Tudiyalur 6.45 percent of the samples earn an annual income 60 thousand and 2.5lakhs respectively. A minimal of 1.94 percent receives an annual income of 1.5lakhs. A majority 23.33 percent obtains an annual income of 2lakhs and above 3lakhs respectively. In the area of Tudiyalur 3.23 percent of the selected samples were educated till the primary level, 35.48 percent till the secondary level, 32.26 percent of them are graduates and the remaining 29.03 of the selected samples have done other studies. In Podanur, 3.57 percent of the samples are educated till the primary level, 46.43 are educated till secondary level, 35.71 are graduates and the remaining is educated in other areas such as diplomas. In Karumbakadai 14.29 percent of the selected samples are educated till the primary level, 57.14 of them are educated till the secondary level and the remaining are graduates. In Ukkadam the majority of the population, 66.67 percent are educated till the secondary level whereas 33.33 percent of them are graduates.

Source of Water

The study revealed that the residents of Tudiyalur depend completely on the corporation supply for water. In Podanur 64.29 percent of the samples depend on corporation water supply. A smaller amount of 8.93 percent of the samples prefer private water supply. An average of 26.78 percent of the samples has their own supplies in form of tube wells and bore wells. The majority of 57.14 percent have their own supplies while 42.86 percent of the samples depend on private water supply. In Ukkadam all the samples have access to water in form of their own bore wells and tube wells.

Use of Water

In Tudiyalur 51.61 percent of the samples use corporation water for drinking purpose whereas 48.39 percent uses the corporation water for domestic purpose. In Podanur the 71.43 percent uses corporation water for domestic use and 28.57 percent of the selected household consumers use the corporation water for drinking purpose after boiling it. In Karumbakadai the majority use the corporation water for drinking purpose after boiling it and only 14.29 percent use it for domestic purpose. In Ukkadam all the selected samples use the corporation water for domestic usage.

Frequency of Water Supply

The residents of Tudiyalur revealed that water was supplied only once a week, this leads to a lot of distress among the residents. In Podanur 16.07 percent of the samples responded to the fact that water was supplied twice a week while the remaining samples complained that water was supplied only once a week. In Karumbakadai the residents were unhappy as water was supplied only once a week. In Ukkadam 83.33 percent of the samples were of the opinion that water was supplied only twice a week while in some areas water was available only once a week.

Preference of Consumers for Purified Water Systems

A majority of 51.6 percent of the selected samples in Tudiyalur depend on packaged water for drinking needs. The remaining 48.4 percent use aqua guard. In Podanur the majority of 71.43 percent use aqua guard for purifying the water and 28.57 percent of the selected samples depend on packaged water for drinking purpose. In Karumbakadai a diminutive amount of 14.29 percent uses aqua guard while the remaining invests in packaged water. In Ukkadam all the selected samples depend on aqua guard for drinking water.

Source of Drinking Water

In Tudiyalur 12.09 percent of the samples depend on corporation supply for drinking water. The majority of 45.16 percent depends on aqua guard for good quality drinking water, while 41.94 percent purchase packaged water for drinking purpose. The majority of samples in Podanur use aqua guard (71.43 percent) while 28.57 percent depend on packaged water for drinking purpose. In Karumbakadai the majority uses packaged water (85.71 percent) and an undersized 14.29 percent use aqua guard for drinking purpose. In Ukkadam the entire selected sample use aqua guard for the drinking water.

Aqua Guard Water System

In Tudiyalur the majority of 51.6 percent does not use aqua guard while the remaining 48.4 percent depends on aqua guard. In Podanur a majority of 71.43 percent have invested in aqua guards for access safe drinking water while the remaining find alternatives due to income constraint. In Karumbakadai the majority does not depend on aqua guards (i.e. only 14.29 percent use aqua guards). In Ukkadam all the selected samples make use of aqua guards.

Packaged Drinking Water System

In Tudiyalur the majority of 51.6 percent uses packaged water for drinking purpose. In Podanur only 28.57 percent use packaged water while the remaining use aqua guards. In Karumbakadai the majority of 85.71 percent uses packaged water for drinking purpose whereas 14.29 percent have alternatives for drinking water. All the samples of Ukkadam depend on other sources for drinking water.

Cost of Purified Water Systems

Aqua guard Water System

In Tudiyalur 33.33 percent of the people spend 5 to 10 thousand for the purchase of aqua guard, 66.67 percent of the selected samples paid 10 to 15 thousand for aqua guard. The total numbers of aqua guard users are 15 that account for 24.19 percent of the sum total users. In Podanur 7.5 percent of the selected samples paid up to 5 thousand, 30 percent of the samples invested 5 to 10 thousand, 60 percent paid 10 to 15 thousand for the purchase of aqua guards and 1.25 percent spend up to 20 thousand. In Karumbukadai 33.33 percent of the selected samples paid up to five thousand, 16.67 percent paid 5 to 10 thousand, 33.33 percent readily paid 10 to 15 thousand and the remaining was comfortable in paying up to 20 thousand for fitting the aqua guard. Under the variable cost maintenance cost was taken. A yearly estimate was made to simplify the analysis. In Tudiyalur 6.67 percent of the samples paid up to 1 thousand, 13.33 percent of the people paid up to two thousand, a majority of 53.33 percent paid 2 to 3 thousand and the remaining 26.67 percent paid 3 to 4 thousand on an yearly basis for the maintenance of the machine. In Podanur 12.5 percent of the people paid up to 1 thousand, 27.5 percent paid 1 to 2 thousand, a mainstream population of 37.5 percent spent 2 to 3 thousand whereas another 22.5 percent paid 3 to 4 thousand yearly. Of the total aqua guard

users Podanur constitutes of 64.54 percent. In Karumbukadai there is only one aqua guard user who pays 3 to 4 thousand for maintaining it. In Ukkadam 33.33 percent of the users pay up to thousand, 16.67 percent pay 1 to 2 thousand, another 16.67 percent of the users pay 2 to 3 thousand and 33.33 percent of the selected samples readily paid 3 to 4 thousand for the maintenance of the appliance.

Packaged Drinking Water

In Tudiyalur 31.25 percent of the selected samples purchased up to 5 packages a month, 18.75 percent bought 5 to 10 packages and the majority (50 percent) purchased up to 15 packages. In the current study Tudiyalur packaged water drinkers accounted for 42.11 percent of the total packaged water drinkers. In Podanur 25 percent of the samples purchased up to 5 packages, 12.5 percent procured 5 to 10 packages monthly, a majority of 37.5 percent obtained up to 15 packages while another 12.5 percent were satisfied with 15 to 20 packages a month. The remaining 12.5 percent of the selected samples acquired more than 20 packages in a month. Podanur accounted for 42.11 percent among the total packaged water. In the city of Karumbukadai 50 percent of the samples purchased 5 to 10 packages a month, while 16.67 percent of the samples bought up to 15 packages. The residual one third of the selected samples purchased above 20 packages a month. Karumbukadai contributed 15.78 percent to the total packaged water drinkers. In Ukkadam there were no packaged water drinkers. In Tudiyalur one fourth of the people spend up to Rs.200 on packaged drinking water, 18.75 percent of them spend Rs.200 to Rs.400, while a the majority of the selected samples expend Rs.400 to Rs.600 in a month for packaged water. The remaining 6.25 percent of the selected samples in Tudiyalur paid up to Rs.800 for drinking water. In Podanur 31.25 percent of the samples spend Rs.200 for water, while 18.75 percent paid up to Rs.400. The majority of 37.5

percent of them fell in the category of Rs.400 to Rs.600. The reminiscent 12.5 percent put in up to Rs.800 per month. In Karumbukadai one third of the selected samples spend Rs.400 to Rs.600, while 16.67 percent of the samples devoted Rs.600 to Rs.800 and Rs.800 to Rs.1000 respectively. The remaining one third of the selected samples readily invested more than Rs.1000 in a month for packaged drinking water. Taking the cost of packaged water, 23.68 percent of the total users paid up to Rs.200 and 15.79 percent of them put in Rs.200 to Rs.400 in a month. The majority (42.11%) invested Rs.400 to Rs.600 monthly, whereas minorities of 10.53 percent, 2.63 percent and 5.26 percent of the total selected samples devoted Rs.600 to Rs.800, Rs.800 to Rs.1000 and above thousand respectively for the acquirement of packaged water in a month.

Correlation between Cost and Income for Purified Water System

In Tudiyalur both cost and income are positively related under both Pearson's and Spearman's correlation test. Pearson's test is significant at 1% level whereas Spearman's test is significant at 5% level. The same condition is repeated in Podanur also; both income and cost are positively related. In Karumbakadai Spearman's study shows a stronger relationship in comparison to the Pearson's test. However in the city of Ukkadam both the tests reveal that income and cost are indirectly related.

Willingness to Pay and Willingness to Accept for Purified Water Systems

In Tudiyalur 84 percent changes in the cost of packaged water was caused by the selected variables whereas in the purchase of aqua guard the selected variables played a comparatively insignificant role. In Podanur the explanatory variables played a trivial role in determining the cost of the package water; in contrast the same variables played an

important role in the cost of aqua guards by 68 percent. All the selected samples of Karumbakadai were aqua guard users as a result 99 percent of changes in the cost of aqua guard were determined by the selected explanatory variables. In the case of Ukkadam 35 percent of the changes in the cost of packaged water was caused due to the selected explanatory variables. In the case of aqua guards in Ukkadam the results were less satisfactory as only 25 percent of changes in the cost were caused due to the selected explanatory variables the remaining changes were due to the unaccounted factors. Satisfactory results were achieved in the cases of packaged water in Tudiyalur ($R^2 = .843$), aqua guard in Podanur ($R^2 = .683$) and aqua guard in Karumbakadai ($R^2 = .989$)

Packaged Drinking Water System

According to the study in Tudiyalur income and cost of packaged water are negatively related wherein for one unit change in cost the income decreases by 41.765 units. Education and cost of packaged water are positively related, here for a unit change in cost education increases by 33.904 units. Occupation and cost are also positively related which shows that for a unit change in occupation the cost increases by 23.846. Age and cost are positively related and for a unit change in age cost increases by 1.05 units. In Podanur income and cost are positively related wherein for a unit change income the cost increases by .91 units. Education and cost are highly related, here for a unit change in education, cost increases by 52.12 percent. In Podanur occupation and cost move in opposite directions, for a unit change in occupation the cost decreases by 53.87 units. Age and cost are also negatively related, for a unit change in age the cost decreases by 3.11 units.

Aqua Guard Water System

In Tudiyalur income and cost are positively related. For a unit change in income the willingness to pay increases by

1026.63 units. Occupation and cost are negatively related where for a unit change occupation the willingness to pay decreases by 472.52 units. Education and cost are also negatively related. Here for a unit change in education willingness to pay decreases by 148.96 units. In Podanur income and cost are positively related, for a unit change in income the willingness to pay increases by 607 units. Education and cost are negatively related, here for a unit change in education willingness to pay decreases by 673.87 units. Age and cost are positively related wherein for a unit change in age the willingness to pay increases by 28.45 units. In Karumbukadai income and cost are negatively related, where for a unit change in income willingness to pay decreases by 145.43 units. Here education and willingness to pay are strongly related as for a unit change in education the willingness to pay increases by 203.88 units. Age and cost are also positively related as for a unit change in age the willingness to pay increases by 18.978.

Conclusion

Water is basic to life and scarce too. But unfortunately we prefer to ignore this simple fact and use it wastefully. Our careless attitudes, lack of responsibility on the part of industrialist and lack of ethics on the part of powers that be, the precious resources of water get polluted day by day and it has come to an almost irreversible in our country. Water is the essence of life, there is no life without water. Water was once upon a time a free a commodity. Slowly it became an economic resource, and now it is on the path of scarcity. The finding of the study reveals that there is a significant change in the consumer behaviour due to excess of water pollution. The selected household consumers are ready to pay the price for their welfare. Therefore “willingness to pay” plays a vital role in deciding the consumer behaviour of the selected household consumers. Consumers play a vital role in any economy. A consumer is defined as the end user of any commodity i.e. the

one who gains utility from the commodity, consumers are welfare oriented. Generally consumer has a 'utility maximising behaviour'. The current study reveals that the consumers are willing to pay for the purified water as their satisfaction level is higher with the consumption of purified water. The consumers in the selected areas are highly satisfied with the water colour, taste, quantity, quality and purity. Hence they attain maximum level of satisfaction from the usage of aqua guard purified water systems. The study also reveals that the selected sample area household consumers have gained high level satisfaction from the consumption of purified water. The study proved that consumer behaviour is determined by their taste and preferences irrespective of the cost. Hence the study satisfies the cardinal approach using the deductive method.

Suggestions

- To provide purified regular water supply by the Corporation before supplying it
- Monitoring and supervising of cleaning of overhead tanks to be done regularly
- Ward wise awareness to be created about water saving
- Water association to be created using Public Private Partnership where youngsters must be made the volunteers

Recommendations

- Ensuring pollution free water supply
- Removal of toxic materials from civic water bodies
- Ensuring adequate water supply by recycling water

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