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Extinction of the Elixir of Life: Depletion of Groundwater Level In Chennai

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Abstract

Orientation: There has been a growing unease in depletion of ground water in Chennai due to the increase industrial population, creating difficulties in day to day operation of hotels.

Research purpose: To list out the problems with regard to water scarcity faced hotels in and around the areas of Chennai. Exhibit the practices and procedures followed by the hotels in overcome these problems.

Motivation for the study: Currently the city is facing a major water scarcity problem which is due to climatic changes, over consumption of ground water supply, lack of water saving activities etc. Hotel industries being a prime user of groundwater exerts a principal role in depleting the groundwater hereby has the responsibility in rescheduling the water conserve practices.

Research design, approach and method: A qualitative and quantitative study has been done in twenty three hotels located in and around Chennai with a well designed questionnaire as the research tool.

Findings: Presently no well planed practices or policies exist in water management at hotel industries. Still many hotels have not implemented water conservation initiatives to save groundwater. Awareness has to be created among the managements, employees and guest to minimise the water crisis. .

Keywords: *Conservation; Elixir; Hotel Industry; Water.*

Introduction

The elixir, magical or medicinal potionis a clear liquid which is sweet flavoured and can cure all illness of human kind. Of all liquids water is considered the elixir of the earth[1]. Saint poet Tiruvalluvar in his epical work Thirukkural expressed that the world evolves due to the blessing of water, the eternal liquid which makes the earth to live.[2]

Water is essential for living beings without water human being can survive only for a few days. It is essential for cellular homeostasis and life[3]. Our planet earth and the life form on it are inseparable from this simple inorganic compound[4]. The three quarter of this beautiful blue planet is covered with water in which approximately only 1% is fresh-water in rivers, lakes and in ground water.[5]

Ground water is the prime source for drinking, 85% of the rural and 50% of urban water requirements are being satisfied by the ground water. According to United Nations Educational, Scientific and Cultural Organization (2012) India stands first in copious user of ground water[6] and the usage rate is relatively high than their recharge rate. By 2020 water availability per person may even reduce to 48 litres per person per day that is comparatively lesser than the world's standard scale[7].

A survey held during the month of March 2017 in 15 areas of Chennai shows the fall in level of ground water ranges from 0.70 metres to 2.88 metres compared to the previous year.[9] The ground water in Chennai is over exploited if 100 litres seeps into the ground 90-100 litres of water is pumped out.[8]

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Beside the domestic users, industrial sectors are the major exploiters of the ground water. Among these industries hotel industry uses a major part of the ground water creating scarcity for water in their location. On an average the hotels at Chennai accommodates around 12000 to 14000 guest per day. The guest in a hotel consumes at least 750 to 900 litres of water for their daily activities, [10] beside the provision of water for the guest daily activities the hotel also consumes water for kitchen, laundry, landscaping etc for an aesthetic service for their guest or consumers.[11].

For the smooth running the hotels uses around 41% of water for the restroom and bathroom uses, 7% for kitchen activities and heating cooling facilities respectively 8% for housekeeping activities and 13% for landscape irrigations[12] The usage proportion of water depends upon the facilities provided or categorization of the property.[13]

The study gives attention to usage proportion of water at departments in hotels and the opinions of employees about the conservation measures followed by the hotel sectors to conserve water followed in the hotel which in turn reduces the ground water depletion.

Material and Method

Hotel industry has been always considered a boon in development of a nation's economy with no great collision on natural environment; beside there exist a grumble of consumption of vast amount of goods and energies especially local water reserves.[14]

A qualitative and quantitative study[15] was conducted to estimate the extent of ground water usage, practice and measures in water conservation at hotel industry. The study is qualitative as it depends more upon the conceptual knowledge of the population selected also quantitative to comprise a required number of population across the selected area.

Pilot Study: A face to face interview was conducted with officials of various hotels at Chennai, A set of questions that includes questions about the usage of water at various departments, preventive water management measures followed at hotel to reduce water usages, social responsibilities in conserving water at hotel industry.

Population and Sampling: The study population covers supervisors, executives and higher authorities from hotel sector. A purposive sampling[16], a method of selection a study population upon specific criteria for the study is adopted to target the selective people including executives and managers of departments, chief engineers, and others well versed in the practices and procedures of water measures in the selected hotels at Chennai.

The study was carried out more ethically with co-operation of the participant and confidential[17, 18] as disclosure of details may create an adverse effect to participants and their employer.

Data Collection: The primary data gathered using the pilot study from the officials at hotel industry are well organized and evaluated, additionally secondary data from internet sources and journals are evaluated together and a well structured questionnaire was prepared as the tool for data collection.[19] A well organized questionnaire with three sections was framed constituting open, closed, dichotomous, multiple choice and scaled question[20] to bring out the water usage proportion in departments of hotel industry, precautionary measures in water conservation the degree of acceptance of the employee and employers attitude towards water management programs.

250 Questionnaires were distributed to the respondents at major departments like Food and Beverage Production, Food and Beverage Service, Accommodation Operation, Front Office, Engineering departments the chief users of water. Questionnaire was also sent by mail to 68 respondents for their convenience. The filled in questionnaire were collected were checked whether completely filled in and validated for transcription. Among the response 239 were considered as valid responds from respondents.

Data Analysis: Validated data from the respondents are coded, entered and analysed with the statistical tool SPSS (21.0). Descriptive, one-way anova test, t-test, correlations analysis was used for the analysis of data.

Results and Discussion

The study was conducted during the month of January to April 2018 in star categorized hotels located in and around the city of Chennai, Tamil Nadu. The targeted population were hoteliers at management levels. Questionnaire were used as a tool for collection of data Table.1 shows the statistic breakup of the valid

and invalid questionnaires used for further studies. It illustrated that survey carried out by sending the questionnaire by mail is easier and the response is also comparatively accurate.

Table. 1 Validation of surveyed questionnaire

Particulars	Total		Invalid for the study		Valid for the study	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Questionnaire Circulated Personally	250	79	64	25.6	186	74.4
Questionnaire Circulated By mail	68	21	15	22	53	78
Total	318		79		239	

Reliability test: Data from valid questionnaires for the study are coded and uploaded in SPSS statistical tool (20.0) version, and checked for their reliability. The analysis result proves the data are more reliable with Cronbach's Alpha value as 0.794.

Demographic statistics of respondents: The demographic statistic, Table. 2 exhibits a picture about the respondents participated in the study. The sampling was done under purposive selection method as the study needs the respondent to be in or above supervisory level of management, works at least a year in the particular star categorized property.

Table 2. Demographic statistics of respondents

Demographic Statistics			
Demographic Factors		Frequency (N)	Percentage (%)
Gender	Male	163	69
	Female	76	31
Age	Less than 25 Years	84	36
	26-35Years	77	32
	36-45 Years	49	20
	Above 45 Years	29	12
Designation Level in Management	Supervisory Level	71	29
	Middle Level	128	54
	Top Level	40	17
Years of Experience in Surveyed Hotel	1 to 2 years	81	34
	2 Years 1 Month-5 Years	106	45
	Above 5 years	52	21
Hotel's Star Categorization	Three Star	113	48
	Four Star	87	36
	Five Star	39	16

Source of water for hotels in Chennai: The primary data from officials at hotel and secondary data from sources of internet and magazines reveals that only 40% of water requirement of a hotel has been provided by the government bodies of the city the rest has been bought from the private agencies. A hotel need 80 to 147 kilolitres of water for a day's operation, they spend nearly Rs. 800 to Rs. 2400 for 24,000 litres of water buying from these agencies.

Kendall's W test: Water is more essential for daily operations for all activities from cleaning to cooking employees been asked to rank the end use of water at various departments. The data has been analysed for their degree of agreement using Kendall's W test which ranges between 0(disagreement) to 1 (agreement) [21]. The analysis shows the agreement is strong as the Kendall's W coefficient value is (0.767) and significant at (0.00) level.

Table 3 illustrates the ranking position of opinions about water usage in hotel departments. Usage of water at guest rooms has been ranked first among other usages. Beside these usages, water is also wasted while used in cooling or heating systems, R. O plants, leakages due to poor maintenances has been ranked last.

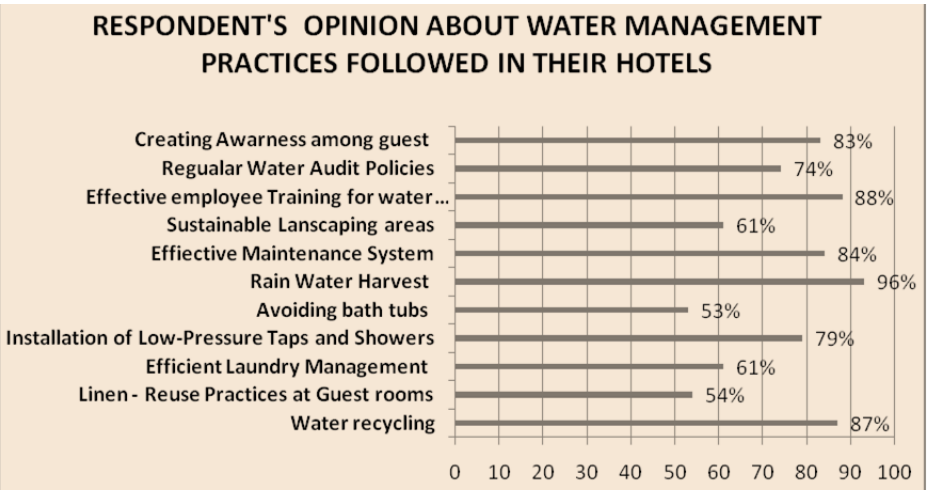
Table 3: Ranks

Particulars	Mean Rank
Landscape	3.35
Public area toilets/ lockers	2.94
Laundry	3.71
Guest rooms	1.98
F & B Production & Service Activities	2.05
Swimming Pool	4.11
Wastage	4.84

Test Statistics: Kendall's Coefficient of Concordance = 0.767 significant at (0.00) level.

Respondent's Opinion about Water Management Practices followed in their Hotels: The questionnaire constitutes a section of questions covering all technical facts and personal responsibilities of employees to observe the opinion about water management and conservation practices in their hotels[22,23]. Figure. 1 illustrates the opinions of employees employed in the surveyed hotels about the practices and procedures in water management and conservation. According to the study (96%) of the respondents feel confident that their hotels have been equipped with rain water harvesting. Around 83–88% of employees are aware that their hotels are creating awareness among the guest with regard to water conservation, hotel posses a well planned maintenance system, Effective water recycling plants and provides effective training for the employees.

Figure 1: Respondent's opinion about water management



Anova-test: Anova is an ideal method of statistical analysis to analyze the significance relation of variances.[24] One-way anova analysis is done among the variables effective water management, star categorization and employee training. The analysis (Table. 4) shows that there exist a significant relationship between the variables Effective water management and Training provided for employees (F = 24.268) and between the variables Effective Water Management and Hotel's Star Categorization (F = 16.784) at a significant value (< 0.5) level.

The analysis concludes that the effectiveness in water management depends upon the grade or

categorization of the hotel and also the efficiency of well trained employees.

Table. 4 One-way Anova test

Variables	Training for employees		Hotel's Star Categorization	
	F-Value	Significance	F-Value	Significance
Effective Water Management	24.268	(<0.5) Level	16.784	(<0.05) Level

One sample *T*-test: Factors that obliterate and deplete the ground water level are analysed using t-test Table.5 shows that these factors are significant and main causers for the ground water pollution and depletion.

Table 5. One Sample T-test

S.No.	Ground Water Depleting Factors	T-Value	Significance Level
1	Employee unawareness and irresponsibility	77.11	(0.00) level
2	Nonexistence of appropriate recycling plants	53.09	(0.03) level
3	Usage of eco-friendly cleaning equipments and agent.	83.71	(0.021) level
4	Effective drainage facilities and garbage clearance	78.03	(0.033) level

Conclusion

The study analyzes the qualitative and quantitative information from the employees of hotel industry elaborates that hotel itself faces more crucial crisis with regard to water needs. Practice and procedures by reduce the wastages of water; enhancement of conservation certainties and personal responsibilities has to be adopted to overcome the groundwater depletion. Possible steps have to be taken by the hoteliers to enhance the ground water level.

Suggestions: Chennai city faces a high water crisis at all seasons; ethically recuperation of ground water has to be considered a prime role by the hoteliers. The study proposes few suggestions by consolidating respondent's opinions for employees and employers at hotel sector. Employees have to be well trained in water management, an effective recycling plant to be installed, Enhance self responsibility among employees, refuse usage of toxic chemical and agents, organized an effective maintenance team, display signs and boards to create awareness among employees and guests, reduce the usage of linens, planning appropriate drought plants and landscape areas, reduce concreting the floors around

Limitation of the Study: The core of the study depends upon the response of the employees at hotels; the busy schedules of the employees, unawareness about the water management practices, employee's loyalty and disclosure of policies are main limitations for the study.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: Nil

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