Dynamics of Demand for and Consumption of Water in India: A Case Study of Shimla City in Himachal Pradesh, India

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ABSTRACT

Shimla is a famous tourist destination having native population of 1,69,578 persons (Census 2011). Along with this, thousands of tourists visit this place daily. In a draft report of Town and Country Planning Department 2017, it was admitted that only 30 MLD (million liters per day) water was available against demand of 39 MLD. Keeping in view of such situation, this study was conducted to know the consumption pattern and management of water use by the people of Shimla. For this study, 3 MC wards; Sanjauli, Kasumpti and Krishna Nagar out of 34 MC wards have been selected by using purposive sampling. Form these three wards, 2% households have been selected randomly. A pre-tested questionnaire was used to get the relevant information. Simple average and Chi-Square have been used to judge that whether association between different attributes exist or not. Demand for water has been divided into seven components i.e., demand for drinking, cooking, washing utensils, washing clothes, bathing, for toilet use and for other uses.

In this study, it has been found that demand of water for drinking, cooking, washing utensils and for toilet use is free from supply of water. Use of water for washing clothes, bathing and for other use is highly influenced by the supply of water.

INTRODUCTION

India has a geographical area of 3.29 million km^2 forming 2.4 per cent of the world's land area and supported around 17 per cent of the world population. India has a population of 1.21 billion (Census 2011). Thus India has to support 1/6th of the world population with a land area of 1/50th and 1/25th of water resources. US Geological survey-2010 revealed that the earth represents 75 per cent water and only 25 per cent of land. Water is essential resource for life (Boberg, 2005). 97 per cent of the total water available on this earth is not available for drinking because of its salinity. Only 3 per cent of the total water is pure water, and about 99 per cent of pure water is in the form of glaciers and is not available for drinking. Only one per cent of the pure water is available for drinking (Kuppuraja, 2000). Due to industrialization and growing population, pure water is continuously being contaminated and pollution is making this resource dearer still. Therefore, water is now become the center of economic, political and social discussions. Water is important for human life, safe drinking water influences the quality of health and productivity. In future, that country will survive which can manage its water resources (Amitabhkant, 2012). Water not only satisfies the thirst of human beings but also gives food and sustains life of human being, plants and animals. Great civilizations settled and flourished around water sources and societies evolved their entire cultures and livelihoods based on it. India have a large resource in terms of water. However, the availability of fresh water varies from place to place based on its geo-physical set-up and natural resources in the country. At present, irrational and unsustainable water withdrawal from ground, tank and reservoirs in on increase. Water is mainly being used for Agriculture and Industrial purposes causing drinking water scarcity to the human being. Water use for drinking and domestics purposes is estimated around 7 to 9 per cent of the total

fresh water available in India. As per the estimates of national water commission, the total water requirement of India in the year 2050 will be about 973 billion cubic meters depending on its population growth (Sivaram, 2006). Water resources of a country constituted one of its vital assets. It is essential for sustaining all forms of life, food production, economic development and for general well-being. It is impossible to substitute it difficult to de-pollute, expensive to transport and is truly a gift to mankind from nature. Water is also capable of diversion, transport, storage and recycling. All these properties impart to water is great utility for human being (Rakesh Kumar 2005).

RESEARCH DESIGN & METHODOLOGY

Only a few studies were found that dealt with the use pattern of drinking water. Further, the studies on this topic are basically more concentrated on the cities of plain areas which are not a good reference point to analyze the pattern of water use in hill areas like Shimla. Since, water use pattern is influenced by a number of factors, the intensity of these factors differs from place to place. Therefore, to access the demand pattern of residents, there was a felt intense need to conduct a separate study to draw out the various dimensions of water use in a hill area. The present study is limited, as it covers only small area of Shimla city. Though, the study is limited to analyze the pattern of water supply and use thereof in small hilly city of Shimla but impact can be realized in all such cities not only in Himachal but also across the nation. The main objectives of the study were : to analyze the dynamics of demand and consumption of water in the study area and to suggest policy measures to improve the supply of water.

For this study both primary and secondary data has been used. A pretested questionnaire has been used to collect required information from the sample households and reports of government has been used as a secondary source of information. Out of 34 wards of MC Shimla 3 wards namely Sanjauli, Kasumpti, and Krishnanagar has been selected on convenience bases for this study. Total 2% of households from each ward has been selected randomely. To analyze the data simple percentage has been used as the most basic tool to examine relative share. Chi-Square (χ^2)is the basic statistical tool used in the present study to judge that whether association between different attributes exist or not. If an association does exist then whether it is significant or not? (Kothari, 2013).

FINDINGS AND SUGGESTIONS

This study has revealed that in the study area 51.2 per cent households were with 3-4 family members and 31.2 per cent were with 5-6 family members. 10.9 per cent were with 1-2 family members and only 5.5 per cent households were with members more than 6 in their family.

53.6 per cent respondents fell in the age group 30-50 years, 25.4 per cent were in the age group 50-70 years and 20.9 per cent fell in the age group 18-30 years. In Sanjauli ward, highest 65.5 per cent respondents were in the age group 30-50 years.

The gender-wise analysis of respondents revealed that 44.5 per cent respondents were male and 55.5 per cent respondents were female. Highest percentage of female respondents was in Sanjauli ward and least was in Krishna Nagar ward.

Category-wise distribution of respondents revealed that 60 per cent of the total respondents fell in General category. Sanjauli and Kasumpti have the highest number of respondents of General Category.Krishna

Nagar was with more respondents of SC Category. Only 10 per cent respondents of OBC and 4.5 per cent respondents of ST were found in the study area.

73.6 per cent respondents were living in their own houses, 20 per cent were living in rented houses and only 6.4 per cent were living in leased homes. In Krishna Nagar ward 83.3 per cent respondents having their own houses, 72.4 per cent and 70.2 per cent respondents of Sanjauli and Kasumpti were having their own houses respectively. 26.3 per cent respondents of Kasumpti were living in rooms on rent.

Education-wise analysis of respondents revealed that educational level found in the study area was ranging from illiterate to Post Graduate. Highest proportion of the total respondents was with +2. 34.5 per cent of respondents were with +2 as their educational attainment. 23.6 per cent respondents were with Graduation, 21.8 per cent were Matriculates and 11.8 per cent of the respondents were Post Graduates. Only 8.2 per cent illiterates were found in the study area. The proportion of illiterates was highest in Krishna Nagar with 44.4 per cent of total illiterates. The respondents with higher education were found in Sanjauli and respondents with least education were found in Krishna Nagar.

The profession of the highest number of respondents was Government job which was the primary occupation of 36.4 per cent respondents. The second profession in which more respondents were engaged was private jobs. 27.3 per cent respondents were engaged in this profession. 18.2 per cent respondents were engaged in their own business and remaining 18.1 per cent were working on daily wages.

In proportion to total respondents of the ward, highest proportion of Government employees was in Sanjauli ward followed by Kasumpti where 36.8 per cent respondents were engaged in Government jobs. In Krishna Nagar 33.3 per cent respondents were found in Government jobs.27.6 per cent respondents of Sanjauli ward were engaged in their own business while 29.2 per cent respondents of Krishna Nagar were workers.

Income-wise analysis of the respondents revealed that more than 50 per cent respondents were in middle income group, 25.5 per cent respondents were found in low income group and 27 per cent respondents were found in high income group. In Sanjauli a large proportion of respondents was in high income group, respondents of Kasumpti have less income variation and in Krishna Nagar high proportion of the respondents was in middle and low income groups.

Demand of water for drinking purposes, cooking purpose, for washing utensils, for toilet use and for other uses were all not influenced by income of households. Such a categories statement cannot be made in respect of demand of water, because the difference between calculated value of χ^2 and table value of χ^2 at a relevant degrees of freedom at 5 per cent level of significance was small, though both calculated statistics were below the critical value. Therefore, though it is concluded that demand of water for washing cloths and bathing is not influenced by income, yet some more evidences would be required to validate the results.Demand of water for different domestic uses was found similarly independent of occupation as is the case of income. Therefore the hypotheses (H_{01}) formulated in chapter 3 that domestic water demand gets influenced by income of household stands to be rejected.

It was found that all respondents had storage facility. The range of storage capacity was from 100 litres to 3000 litres.It was found that 26 households in the study area were paying Rs. 200-500 per month in the form of water bill, 10 households were paying Rs. 500-700 and only 2 were found paying Rs. 700-100 as water bill in Kasumpti ward. In Sanjauli ward 17 households were paying 200-500/-, 4 households were

paying 500-700 and 3 people were paying 700-1000 as a water bill and in Krishna Nagar 20 households were paying 200-500 and only 8 people were found who were paying more than 500 as water bill.

In the study area in the last one year only one case of jaundice was found in Krishna Nagar.98 per cent respondents stated that they use purified water for drinking. In Sanjauli 90 per cent of the respondents were using RO to purify water. In Kasumpti 70 per cent were using RO and remaining 30 per cent were boiling water before use and in Krishna Nagar all the respondents besides one using boiled water for drinking.

Daily requirement as per the standards of the Government is 135 liters per day but in the case of study area it was found that respondents were getting less than 75 liters per capita per day. For all the respondents the main source of water was piped water supplied by Municipal Corporation. All respondents were with private water connection within their premises. Water was supplied by Municipal Corporation after the gap of one, two or three days. In summer season the problem of water supply is highest.

Water was supplied in some areas for 1 hour, in other 2, 3 or for 4 hours. Not even single evidence was found of piped water being supplied daily and for more than 4 hours.Out of total respondents 73 per cent were living in their own houses, 20.0 per cent were living in rooms on rent and only 6.4 per cent respondents were found who were living in leased in house.Highest volume of water was used in washing clothes in all the three wards followed by use for bathing and then for toilet use.

Water demand for drinking, cooking, toilet use was less elastic to the supply of water as these are basic requirements and require water at any cost. Whereas water demanded for washing clothes, bathing, washing utensils and for other uses is more sensitive to supply of water.Not even a single natural water source was found in the study area. The main source of water supply in the study area was piped water provided by Municipal Corporation.There was no rain water harvesting structure in any house of sample households.

Rs. 72.17 per capita per month water bill was paid in Sanjauli ward. In Kasumpti per capita water bill was calculated to be Rs. 218.42 and in Krishna Nagar it was 105.75 rupee per person. In sanjauli per capita per day water bill was calculated to be Rs. 2.40, for Kasumpti if was Rs. 7.28 and in Krishna Nagar per capita per person water bill was calculated to be Rs. 3.50. The water supplied by Municipal Corporation was costlier than that of its claims.

Water demanded for drinking, washing clothes and for toilet use was influenced by family size. Whereas, water demanded for cooking purposes, washing clothes and for other uses was independent to the size of family. Overall domestic demand for water was found significantly influenced by family size. This result stands the Hypotheses (H_{03}) formulated in chapter 3 accepted which shows that domestic water demand get influenced by the family size.

The two other hypotheses related to the influence of income sixe and occupation on domestic water demand stood rejected since clear evidences were found in the present study that demand for domestic water is not influenced by either income or occupation.

Suggestions

On the basis of the findings of study and the experience gained during the research work following suggestions are given to improve judicious and optimum distribution, utilization and management of water resources in the study area.

Development of new water resources is required to fulfil the demand of people of the study area.

Re-use of water is the demand of the hour therefore, the latest water purifying technologies to purify water need to be adopted and the government must take the lead in this respect.

For judicious use of water, awareness among users should be spread.

For judicious distribution of water, it is strongly recommended that uniformity in the water supply time table must be maintained.

Water pollution should be declared as a legal offence, fine should be charged from the polluters.

To check the excess use of water, billing should be done on the basis of meter reading.

To insure all citizens to enjoy all facilities of cities, it is the need of the hour to develop a well-planned city in a place where all facilities can be provided easily and then shift some of the Government offices to that city.

For meeting the requirement of water of the people of the study area in the days of water deficiency, water tankers should be started to reduce water stress.

Rainwater harvesting concept should be encouraged and promoted by the Government.

CONCLUSION

For benefiting all living organisms nature has gifted the earth with several valuable resources. Among them water is an important resource, essential for the very existence of mankind, flora and fauna. Water is manageable and renewable resources capable of being diverted, stored and recycled. Water is essential for sustaining all forms of life, food production, economic development and wellbeing of all.

The average water consumption of sample households in the selected wards for study in Shimla city was lower than the actual demand for water. Lower consumption was mainly due to supply constrains in the study area. Demand of water for different domestic purposes was independent of income as well as of occupation. Respondents were aware about the occurrence of diseases due to contaminated water, therefore, using mainly Reverse Osmosis (RO) and boiling for purifying water.

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