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# **A Study of Domestic Water Management in Hill Station: A Case Study of Shimla, Himachal Pradesh**

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**Abstract** - Hilly areas of Himachal Pradesh have been considered to be important destinations for domestic as well as international tourism. Shimla is one of those major destinations which are crowded with tourist during summer season. Increase in seasonal population of such hill stations leads to increased stress on fundamental natural resources like water. Very often, the residents of Shimla suffer from acute shortage of water during dry spells of the year. Additionally, de-facto privatization in water supply system. The present paper is an attempt to highlight major issues associated with water supply system in Shimla and water management during summer season. It is found that the average annual rainfall is decreasing with time in the study area which of course can be attributed to the global climatic changes and disturbance. The population of the study area is increasing along with floating population. The availability of water per person per day decreases with increase in number of family members in the households. A major proportion of the surveyed households i.e. 84.9 % families depend upon Municipal water supply and water tankers in the study area.

**Keywords** – Domestic water management, hill station

## **I. Introduction**

In the pre-industrial era nature comfortably satisfied the needs of the people. However with the industrial revolution and advances in science and technology, a sharp rise in population figures resulted in heavy demand and pressure on natural resources.

“As urban centers increasingly grew across the world during 19<sup>th</sup> and 20<sup>th</sup> centuries, the European idea of public funded authorities managing municipal water supply and sewerage found acceptance everywhere with the costs of this being met by the concerned grants via cross subsidies and other available monetary resources since water was viewed as a public good and the requirement of safe drinking water as a basic need was recognized. But today arguments are being put forward supporting the need to price water and free the government of the responsibilities of ensuring safe and adequate water supply” (Hooja and Arora, 2007). The problem associated with urban water supply has increased substantially

during the last five decades. Among other things for the first time in history, half of world's population is living in towns and cities.

According to *Uitto and Biswass 2000*; ( *in reference it is not mentioned*) 'By the year 2025 it is estimated that more than two third of the world's population will be urban dwellers. While the fastest growth of cities is taking place in the developing world, urbanization is a global phenomenon, closely related to environmental issues. The rapid growth of urban centers placed tremendous stress on the environment and caused formidable problems of social and institutional change, infrastructure development and pollution control. Water is one of the key resources for sustainable urban development. It is needed for virtually every human endeavor from house hold use to agriculture, industries and leisure. Water is an integral part of any eco system. Provision of sufficient water and preventing pollution of water are formidable tasks. Because of the rapid growth of world population, mass consumption and increased pollution, among other factors, the availability of drinking water per capita is shrinking. It is believed that 40% of the world's inhabitants currently have insufficient supply of fresh water for maintaining even minimal hygiene. According to **MallinFalkenmark** 100 liters of water per day per capita is the minimum requirement to maintain good health which is not fulfilled in many cities in India. The present study is an attempt to understand the extent of water crisis in the tourist city of Shimla and determine the gap between demand and supply of water for domestic use.

## II. Study Area

Shimla, originally called Simla is the capital city of Himachal Pradesh. In 1867, Shimla was declared the summer capital of the British Raj in India. A popular tourist destination, Shimla is often referred to as the 'Queen of Hills' and is located in the North West Himalaya at an altitude of 2397.59 meters. The city of Shimla, draped in forest of pine, rhododendron and oak experiences pleasant summer and cold snowy winters. The city is famous for its buildings styled in the architecture of colonial era. Shimla is connected to the city of Kalka by one of the longest narrow gauge railway route which is still operating in India. Shimla is approximately 115 km away from Chandigarh, the nearest major city and 365 km from New Delhi the National Capital. There are no natural water bodies near the main city and the closest one is the river Sutlej about 21 km away (Figure 1).

The climate of Shimla is predominantly cold during winters and moderately warm during summer. Monthly precipitation varies between 24mm and 415 mm between July to November. The average total annual precipitation is 153cms. Snow fall usually take place in the month of December January and February. The people of the city of Shimla face acute shortage of water although the average annual precipitation is significant (153cms.). This is mainly attributed to the fact that the city is located in the high Himalayan region with steep slopes that drains the water downstream. Hence due to lack of natural water reservoirs and sufficiently built-up reservoirs, the city experiences water shortages. The population of the city is 1, 42,161 (Indian census, 2001) along with a floating population of 75000 which is attributed to service industries due to tourism business.

The administrative responsibility of the city of Shimla rests with Shimla Municipal Corporation. Established in 1851, the Shimla Municipal Corporation today has an elected body with 27 councilors of which 3 are nominated by the Government of Himachal Pradesh.

### III. Focus of the study

1. To study the changing nature of water availability for domestic use in the study area.
2. To identify gap between the minimum requirement and the water available for domestic use.
3. To identify the level of awareness about rainwater harvesting in the study area.

**Focus of the study:** The study focuses on availability of water to the households in the city of Shimla. The attempt is made to study the relationship between growth of the population and amount of water supply over the period. Besides, the study also tries to know the impact of tourist activity on the supply of water to these households. The data for the present study regarding the situation of water is confined to the years between 1981 and 2001.

### IV. Sources of data collection and methodology

The present study is based on both primary and secondary data sources.

#### (A) Secondary Sources

1. Shimla District Gazetteer.
2. Website-Shimla Municipal Corporation.
3. Reference Books

#### (B) Primary Sources

Primary data was collected with the help of a questionnaire. A Survey of 60 sample households from different localities in Shimla was conducted for collecting the information. Other relevant data was obtained by interviewing the municipal officials such as Deputy Mayor of the city of Shimla and other local people regarding the status and situation of municipal water supply.

### V. Methodology

1. Households were selected on random basis for collecting primary data. However care was taken to cover the entire city by selecting household samples from different areas.
2. The data collected has been compiled and analyzed using appropriate statistical techniques.

## VI. Discussion and Results

### Population Growth (1951-2001):

Population of the region is an important element to determine water demand. In this context the population data of Shimla was collected from 1951 to 2001 to study growth trend of population.

Table 1: Shimla – Growth of Population (1951-2001)

YEAR	POPULATION
1951	18,345
1961	46,150
1971	55,320
1981	82,054
1991	1,10,560
2001	1,42,161

(Source: Shimla District Gazetteer, Population Census)

It is evident from Table 1 that the population over the period from 1951 to 2001 is depicting an increasing trend. Within a span of 50 years the population of Shimla has increased by almost 7 times. The city of Shimla was actually planned for a population of 16,000 but today it carries more than 200,000. This continuous growth of population is creating pressure on available natural resources including water.

One of the aspects that is responsible for the increasing the population in the city of Shimla is the tourism industry. Growth of tourism and related services are the major factors responsible for this alarming growth of population in the region. The city of Shimla has approximately 450 hotels. Scarcity of water during peak season is a major problem for the hotel industry. As a result many tourists now prefer to go to Manali. This is imposing an adverse effect on the tourism industry of Shimla. Manali has relatively more water, besides the attraction of Rotang pass at 3978 meters approximately high, just 60 km from Manali where hill tops are covered with a blanket of snow.

### Major Sources of Water:

Rainfall is the primary source of water. In order to understand the seasonal variation in water supply in the study area it is essential to understand the pattern of rainfall. The average annual rainfall in Shimla is about 153 cm. However most of the rainfall occurs from June to September which receives 77.12 % of annual rainfall. During summer (March to May) the region experiences acute shortage of water. This is a peak season when tourists visit the hill station.

It is interesting to note that while on one hand over the period of study the rainfall and also the availability of water are both decreasing, on the other hand population is increasing. So it is very clear that per person water availability is bound to decrease under the given circumstances. The condition is further worsened by human activities that pollute the water resources. This clearly indicates an alarming situation in future leading to water crisis.

Population has increased over the time period whereas the annual rainfall is decreasing; this creates a major gap between demand and supply of water for domestic and other uses. According to Manmohan Singh, Director of the Meteorological Department, 11 districts in the state of Himachal Pradesh received deficit rainfall and snowfall in the year 2009. Besides, the state also experienced a relatively warm and dry winter in this period. This will naturally have its impact on the supply of natural water that is otherwise supplied by rain and melting of snow.

Further, the situation with regards to water supply gets still aggravated due to shortening of the period of snowfall and so do the melting of snow. This can be well explained through the data given in table number 4 on percentage deficiency of snowfall in the various districts of Shimla.

### Sources of Water Supply for Domestic Use:

Municipal water supply is the major source of water supply to the households followed by water tankers, hand pump and springs for domestic purposes.

In summer most of the people depend on the Municipal Corporation for water supply but Municipal's water supply is very irregular due to water scarcity in the reservoir. Hence during water crisis the local residents seek water through water tankers which constitutes 28.30% of the total water supply to the household for domestic use.

Water Scarcity has turned it into a business opportunity for few enterprising locals who fill water from private local areas and sell it at Rs 10 – Rs 15 a pot to the residents of the water scarcity area as also to the hotel industry. Moreover other sources of water such as bore well, hand pump, spring together constitute only 15.1%.

The local administration is taking sincere efforts in augmenting the supply of water through various projects undertaken by them as mentioned in Table -3.

**Table –3: Projects Undertaken by Municipality for Water Supply**

Source	Project Capacity (in Kilolitre)	Supply (in Kilolitre)
RiverGuma	18-19 Lac	14 Lac
River AshwaniKhad	9-10 Lac	03-04 Lac
River ChuratNall	5 Lac	02 Lac
RiverChaid	4.5 Lac	1.5 Lac
<b>Total Capacity/ Supply</b>	<b>36-38 Lac</b>	<b>20-21 Lac</b>

(Source: Municipal Corporation – Shimla. 2008)

However the data from table-6 reveals that the supply of water from Municipal Corporation in Shimla is not so far possible because the entire major water reservoir is not reaching its targeted amount as given in the project capacity. According to Harish Janartha, Deputy Mayor of Shimla, there is a fifty percent shortage in the daily total requirement of 42 Lac kilolitre (May 2<sup>nd</sup> 2008, -7.37 pm, ICT by admin.), during peak period.

Municipal Commissioner of Shimla Shri.A. N. Sharma reports that the water requirement of the city is more than 45 million liters per day, but it receives a supply of only 37 million liters per day, i.e. there is a water deficit of 8 million liters per day. The civic body is thus stressed and water is supplied on alternate days to the residents of the area. From the field survey it is learnt that water shortage conditions are faced frequently by the residents.

The problem of water shortage is so acute that children do not bathe for days. The tanker comes once in four or five days. This situation has been persistent for the past five years as reported by Surajlal, a resident. To quote Raksha, a resident of the area about water situation, “We all are facing a severe water problem here. Tankers that come here are quite small and do not carry sufficiently enough water quantity to meet the demands to the residents. They should either ensure an equal water supply through the taps or deploy tanker on a regular basis. This is the ninth consecutive day without water”.

### **Size of Family and Water Availability per person per day:**

Water availability and consumption determines health and hygiene conditions. Data related to water availability has been collected and tabulated.

The data and graph clearly shows that average water availability per person decreases with increase in the number of family members. Of the total surveyed 60 households, only 33% people get sufficient water for domestic use whereas 67% people get very less share of water than their requirement as per the standard norms given by **MallinFalkenmark**. This clearly indicates falling hygienic conditions as the size of family increases.

Table-8: Availability of Water per Person per Day in Liters (2008-2009)

<b>No. of Members in the Family</b>	<b>Current water supply (lpp/d)</b>	<b>Requirement according to the norms ( lpp/d)</b>	<b>Surplus/Deficit (lpp/d)</b>
<b>2</b>	<b>187</b>	<b>135</b>	<b>+52</b>
<b>3</b>	<b>125</b>	<b>135</b>	<b>-10</b>
<b>4</b>	<b>94</b>	<b>135</b>	<b>- 41</b>
<b>5</b>	<b>75</b>	<b>135</b>	<b>-60</b>
<b>6</b>	<b>62</b>	<b>135</b>	<b>-73</b>

lpp/d - liters per person per day

(Source Field Data)

### **Water Literacy- Awareness about RWH**

One of the significant measures to cope up with the problem of water crisis is awareness among the residents. In order to identify the level of awareness among the residents in the study area, the data related to awareness about RWH has been compiled and tabulated.

Nearly 68% of the total respondents are not aware of the concept of rainwater harvesting, where as only 32% people are aware about it. It would be very interesting to know whether those people who are aware of RWH, actually use rainwater-harvesting methods. It is found that out of 38 respondents who are aware of the concept of rainwater harvesting; only 06 respondents have implemented this technique to avoid future water



shortage. This implies the need for further awareness and promotion of the concept and implementation of rainwater harvesting methods to tackle the water scarcity problem.

## VII. Major Findings

- It is found that the average annual rainfall is decreasing with time in the study area which of course can be attributed to the global climatic changes and disturbance.
- The population of the study area is increasing along with floating population.
- The availability of water per person per day decreases with increase in number of family members in the households.
- A major proportion of the surveyed households i.e. 84.9 % families depend upon Municipal water supply and water tankers in the study area.
- The data related to awareness about Rain Water Harvesting shows that 63% respondents are aware and 33% are not aware which implies the need for increasing awareness with regards to water literacy and rain water harvesting mechanisms.
- Out of a total of 38 families who are aware of RWH mechanisms, only 3 families have implemented Rain Water Harvesting methods in their home which is negligible.

## VIII. Suggestive Measures

The city of Shimla is facing acute shortage of water for domestic use as a result of population growth as well as due to tourism and allied activities. In addition there appears to be a marked decrease in rainfall. Lack of awareness and lack of optimum use of water etc. In order to assure adequate water supply and to avoid future water crises in the study area, following measures are suggested: -

- College/university students in association with NGO's can organize water literacy programme.
- Media can play major role in increasing awareness of this concern.
- Small check dams can be constructed and water reservoirs at appropriate places.
- Towards Blue Revolution – Management of fresh water through optimization of use should be encouraged.
- Water meters should be installed and introduce rationing of water system.
- Subsidies on water should be removed.
- Construction of Rainwater Harvesting plants with monetary support from local Municipal Authorities should be promoted.

- Reduce, recycle, and reuse of water should be practiced.
- Water contamination problems should be dealt with- since fresh water is a limited resource, its pollution by human activity should be minimized.
- It therefore calls for urgent attention to deal with pollution problem.

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