

# Availability of Drinking Water Sources in Suketi River Basin, Himachal Pradesh: A Geographical Analysis



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## Abstract

"Thousands have lived without love, not one without water." this quotation is enough to explain the value of water. These days availability of clean and safe drinking water is a major issue. Availability of clean potable water is a fundamental indicator of human health. The availability of drinking water varies in all physical and administrative units such as mountains, plains, plateaus and villages, cities, districts, states and nations. The need of drinking water in humans vary with their age group, physical activity, climatic and environmental condition and their health also. As we all know water is an essential substance for sustaining life on earth and there is no substitute for it. The present study aims to study the availability of drinking water in Suketi river basin in Mandi District of Himachal Pradesh. For this objective the villages are divided into five categories according to their population with the interval of 0-199, 200-499, 500-999, 1000-1699 and above 1700. Eight type of water sources such as treated/ untreated tap water, well water (covered or uncovered), hand pump, tube well/ bore well, springs, river/ canal, lake/pond/tank and other sources of water are included in the study. From this study it is clear that there is a positive relation between population and water sources. As it is clear from the findings that sources of water tend to increase with the increase in population. The data reveals that all the villages have treated or untreated tap water. The study also shows that the villages having high population concentration (i.e. 1000-1700 and above) are using two or more sources of water and on the other hand the villages with less population (i.e. less than 200) are equipped with only one or two sources of water. Therefore, it can be concluded that if there is failure of any treated or untreated water supply, there might be a situation of water scarcity for many villages of the basin.

**Keywords:** Suketi River Basin, Drinking Water, Availability.

## Introduction

Water demand and availability for all purposes is affected by many natural and human factors such as topography, geological structure, climatic conditions, population structure and economic activities etc.

## Review of Literature

The availability of drinking water varies in all the physical and administrative units such as mountains, plains, plateaus and villages, cities, districts, states and nations. Singh et al (2004) conducted a study on sustainability of traditional water sources in Himachal Pradesh in which they have found that 18 percent of traditional water sources of the state are either destroyed or not in use due to natural death and poor maintenance. Haq et al (2008) studied the household willingness to pay for safe drinking water in Abbottabad, Pakistan. In his study he reveals that existing system to provide drinking water is not reliable in both terms of quantity and quality. Kumar et al (2008), comes out with the result that 70 percent of the rural population of Haryana is using water from wells, 8-9 percent from piped water supply and 10 percent from hand pumps. The study of Singh et al (2010) reveals that Himachal Pradesh is experiencing drought like conditions since last one decade. It confronts drinking water shortage in summer season. Buono et al (2015) studied the traditional water resources of India and reveals that the springs of India are under threat due to increased water demand, climate change and environmental pollution. Singh (2017) also conducted a study on drinking water in rural Haryana in which he comes to the conclusion that in the year 2001, tap water was the main source of drinking water in his study area.

The drinking water demand has grown up by 2.4 times in rural area and 6.8 times in urban areas of Himachal Pradesh (Sharma, 2007). According to Sharma (2006), Himachal Pradesh has provided piped drinking water supply to entire population. In addition, Himachal Pradesh has a number of traditional water sources such as wells, baories, springs, ponds and khatries. These all traditional sources of water are also available in Suketi river basin with uneven distribution. Dug wells and tube wells are the main sources of drinking water in Balh valley area whereas springs and bore wells are the main sources in the hilly area of the Suketi river basin. In past few years some traditional sources such as springs and small nallas in the mountainous terrain of the basin are either dried up or reduced by their discharge. It results in the form of water scarcity in the small villages and hamlets in hilly areas. The ground water table has also decreased from 5 to 35 centimeters in the state which posed a great problem of water scarcity. During the summer season Balh valley faces the problem of shortage of drinking water as the traditional sources of water become dry and the ground water level has decreased due to excessive exploitation of ground water through hand pumps. These hand pumps are

installedeverywhere and no such rule has been followed. Ironically there is no law for their installation therefore hand pumps and tube wells are not equipped according to people convenience.

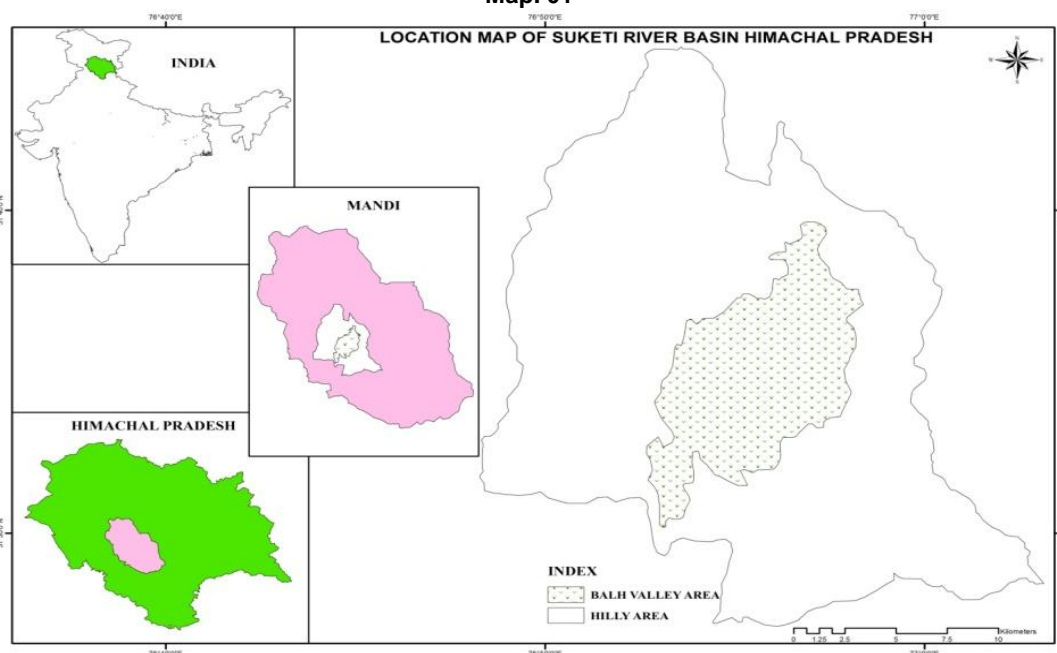
#### **Aim of the Study**

Thus, the present study on drinking water availability in the Suketi river basin is an attempt to analyze spatial pattern of water availability. The Suketiriver is a small river and tributary of river Beas and its basin is situated in lesser Himalayas of Himachal Pradesh. Broadly the sources of water are divided in two main types i.e. traditional and modern. But in this study their sub types are taken. Approximately 419 villages fall under the study area, but data related to the sub types of water sources is available for only 394 villages.

#### **Study Area**

The Suketi river basin is located in the lesser Himalayan region of Himachal Pradesh. It is located between 76°48'30" East to 70° East longitudes and 31°29' North to 31°45' North latitudes. It encompasses an area of 1710 sq. km. with an elevation of 754 m. above mean sea level at Beas Suketi confluence and 2052 m. above mean sea level at Zoomdhar, which is the highest peak of this region.

**Map: 01**



**Source:** District Census Handbook and Administrative Atlas of Himachal Pradesh, 2011.

#### **Objective of the Study**

The objective of the present study is to analyze the village wise spatial pattern of drinking water availability in Suketi river basin of Himachal Pradesh.

#### **Data and Methodology**

The present study is based on secondary data. Data has been retrieved from District Census Handbook of Mandi, Himachal Pradesh for 2011. Village has been taken as the unit of study. Eight type of water resources such as treated/ untreated tap water, well water (covered or uncovered), hand pump, tube well/ bore well, springs, river/ canal,

lake/pond/tank and other sources of water has been included in the study. SPSS software has been used for the calculation of data. To represent data appropriate graphs, tables and maps has been used. The villages have been divided into five categories according to their population with the interval of 0-199, 200-499, 500-999, 1000-1699 and above 1700.

#### **Distribution of Population in Suketi River Basin**

The total population of the basin is 2, 07,176 with the population density of 121 people per square kilometers. The population is unevenly distributed in the basin due to natural and human factors. The Suketi river basin comprises of the valley and hilly

areas, valley area of this basin is popularly known as Balh valley. The Balh valley is one of the most fertile valleys of Himachal Pradesh, therefore a huge number of population lives here.

As discussed above that the high concentration of population is found in valley areas as compared to surrounding hilly areas of the basin. Major agricultural crops of the basin are wheat, rice, maize and vegetables. The farmers are getting reasonable price for their produce, hence agriculture is developing rapidly in the Balh valley and it is the main reason of high population concentration in this area.

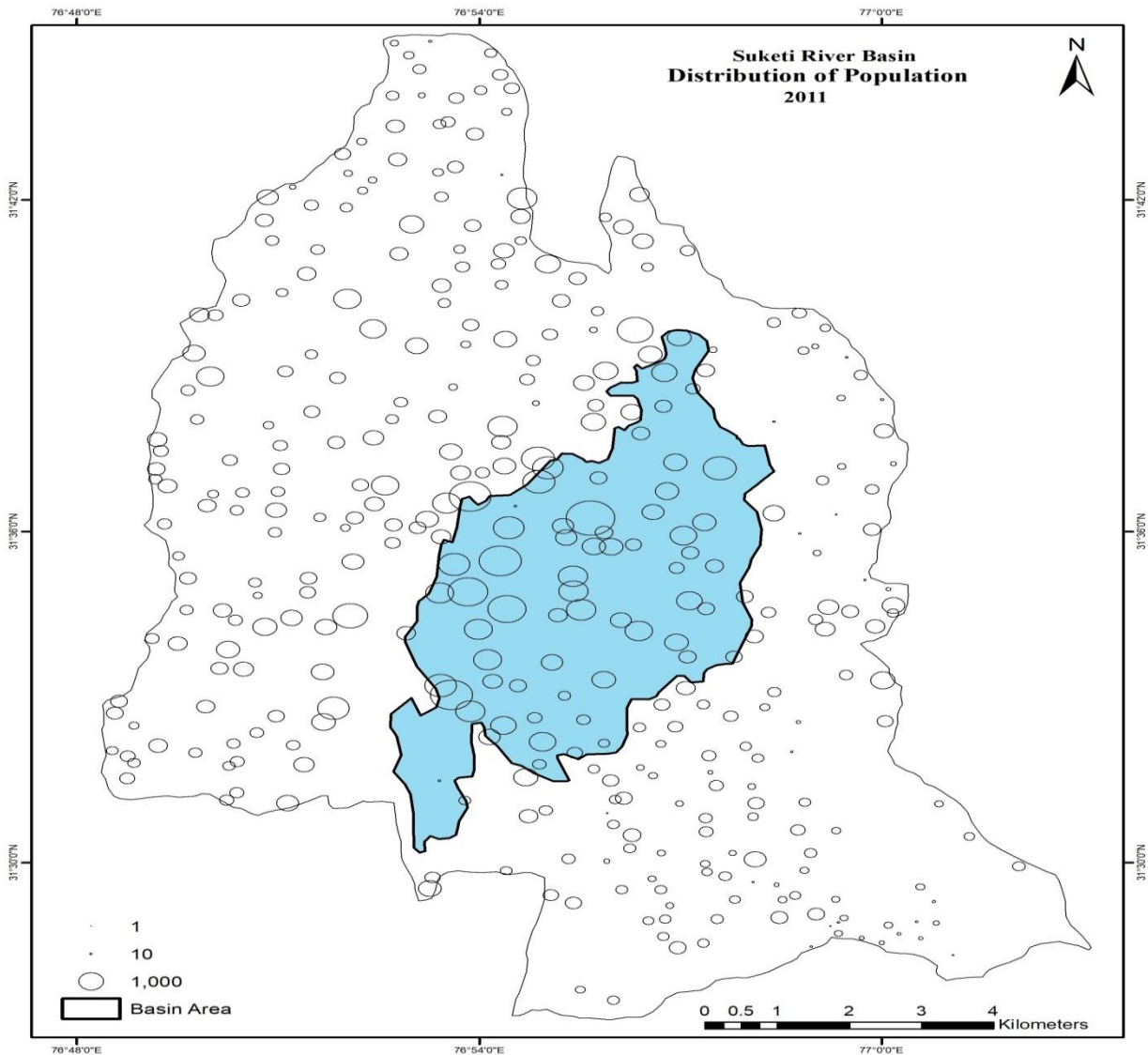
The population range according to villages under the basin is 3934, where the maximum population of the village is 3938 and the minimum population is 4. Map 02 shows that the villages with high population are concentrated in middle part of the basin whereas the areas which are less populated are concentrated in the outer areas.

Villages which are densely populated are Kummi, Mahadev, Ner, Bhaur, Kanaid, Nagchala,

Bharjwanu and Kalahod. These villages are located in Balh valley. The population of these villages is more than 1700 per village. The Balh valley is located in the middle part of the Suketi river basin and Suketi river divides the valley in two parts. The Suketi River known as the lifeline and curse both for Balh Valley because it provides sufficient water in both summer and winter seasons, but the floods in this river during rainy season is a major problem. These floods cause huge damage to both agriculture and humans. This river is also their lifeline as it provides a fertile layer of soil every year.

The large circles on the map represent villages with large population and small circles show less populated villages. The maximum large circles can be seen in the middle part or in the Balh valley and small circles are distributed in outer hilly areas. The data reveals that about 33 percent of the total population of the basin is concentrated in Balh valley within an area of 79 square kilometers.

Map: 02



Source: District Census Handbook, 2011.

**Table: 01**  
**Distribution of Population in Suketi River Basin, 2011**

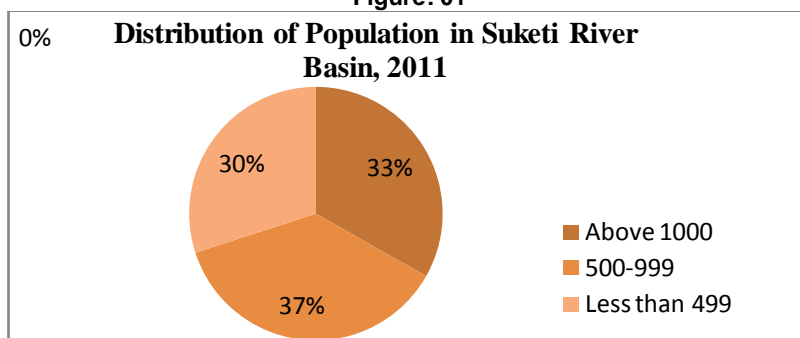
S.No.	Population Groups	No. of Villages	Percent Share	Population	Percent Share
1	Less Populated Villages (Below 499)	238	60	61959	30
2	Moderately Populated Villages (500-999)	112	28.8	76414	36.8
3	Highly Populated Villages (Above 1000)	44	11.2	68803	33.2
	Total	394	100	207176	100

Source: District Census Handbook, 2011.

According to distribution of population of the basin, the villages under the basin can be divided into three categories i.e. less populated villages (0-499), moderately populated villages (500-999) and highly populated villages (1000 and above) (Table 01). 238 villages come under first category (less populated villages) which constitutes 60 percent of total villages of the area and holds 30 percent population of the basin. The second category (moderate populated villages) comprises of 112 villages and it approximately carries 29 percent of total number of villages of the basin. The second category has 36.8 percent of the total population of the basin. 44 villages come under third category which is highly populated. It has 11.2 percent share of the total number of villages and 33.2 percent of the total population. From the

above discussion it is evident that, there is an inverse relation between the number of villages and the size of population because 238 less populated villages contribute only 30 percent of the population whereas only 44 highly populated villages contribute 33.2 percent of the population (Table 01). The single most important factor responsible for this distribution is the variation in the topography of this river basin. The highly populated 44 villages fall in Balh Valley area which has mostly plain topography, but on the other hand 238 less populated villages are located in hilly and mountainous part of the basin. These hilly areas are having lack of resources and basic facilities; therefore, population is sparsely and less distributed here.

**Figure: 01**



Source: District Census Handbook, 2011.

**Table: 02**  
**Availability of Drinking Water Sources According to Population Groups in Suketi River Basin, Himachal Pradesh**

Groups	Villages		Percentage Share of Villages in Drinking Water Availability							
	No.	Percent Share	T.U.	T.T.W.	Well	H.P.	T.W./B.W.	Spring	R/C	T/P/L
Below 199	75	18.98	18.98	3.79	4.45	0	28.57	6.46	36	7.14
200-499	164	41.52	41.52	22.78	38.80	5.27	71.43	9.68	36	57.14
500-999	112	28.35	28.35	41.79	37.91	52.63	0	45.16	20	28.58
1000-1699	32	8.11	8.11	18.98	13.40	26.32	0	29.03	6	3.57
Above 1700	12	3.04	3.04	12.66	5.44	15.78	0	9.67	2	3.57
Total		100	100	100	100	100	100	100	100	100
Percent										
Total Number of Villages	395		395	79	201	19	7	31	50	28

Source: District Census Handbook, 2011.

(T.U.T.T.W. – Treated Un-Treated Tap Water, H.P. – Hand Pump, T.W.-Tube Well, B.W. - Bore Well, R- River, C- Canal, T/P/L- Tank/Pond/Lake)

**Availability of Water Sources in Suketi River Basin**

Suketi river basin is endowed with enormous surface and ground water sources viz. tap water whether treated or untreated, wells, hand pumps, tube

wells, bore wells, springs, river, canal, tank, pond, lake and other sources like bawaries, ditches and khatries etc. These sources are unevenly distributed on the surface. As we have discussed earlier that the



basin comprises of hill and valley topography. Hence, the type of water sources also varies in thistopography. According to Pophare et al (2014), most of the drinking and irrigation water supply depends on wells and tube wells in Balh valley and on the other hand hilly and mountainous terrain depends on spring and bore well sources. In the present study all the villages are divided into five groups according to their population like (i) Below 199, (ii) 200-499, (iii) 500-999, (iv) 1000-1699 and (v) above 1700. 74 villages falls under first group, 164 villages in second group, 112 in third group, 32 and 12 villages in fourth and fifth groups respectively. The type and number of water sources varies in these groups. All the villages are equipped with treated or untreated tap water supply. But if we compare other sources then it can be seen that less populated villages are using one or two type of water sources including tap water, whereas moderately and highly populated villages are using three or more water sources.

Distribution of available sources of drinking water in Suketi river basin among various population groups:

**First Group (Population Below199)**

Less populated villagesfall in this group and covers 74 villages of the basin. Majority of the villages (58percent) in this group are using only one source of water i.e. tap water. 35 percent villages are using two sources of water including tap water and only 6.7percent villages under this group are using three water sources.

**Second Group (Population between 200-499)**

This population group holds the less populated villages and includes 164 villages.

32percent villages under this category have only one water source i.e. tap water. 51percent villages are using two sources of water and only 14.6percent villages have three sources of drinking water.

**Third Group (Population between 500-999)**

It is moderately populated group which covers 112 villages of the basin. 18percent villages of this group have only access to tap water. 43percent villages are using two sources of water, whereas 28percent villages are having three sources and only 9percent villages have four or more water sources. Contrary to all villages of the group one village of this group has six sources of water.

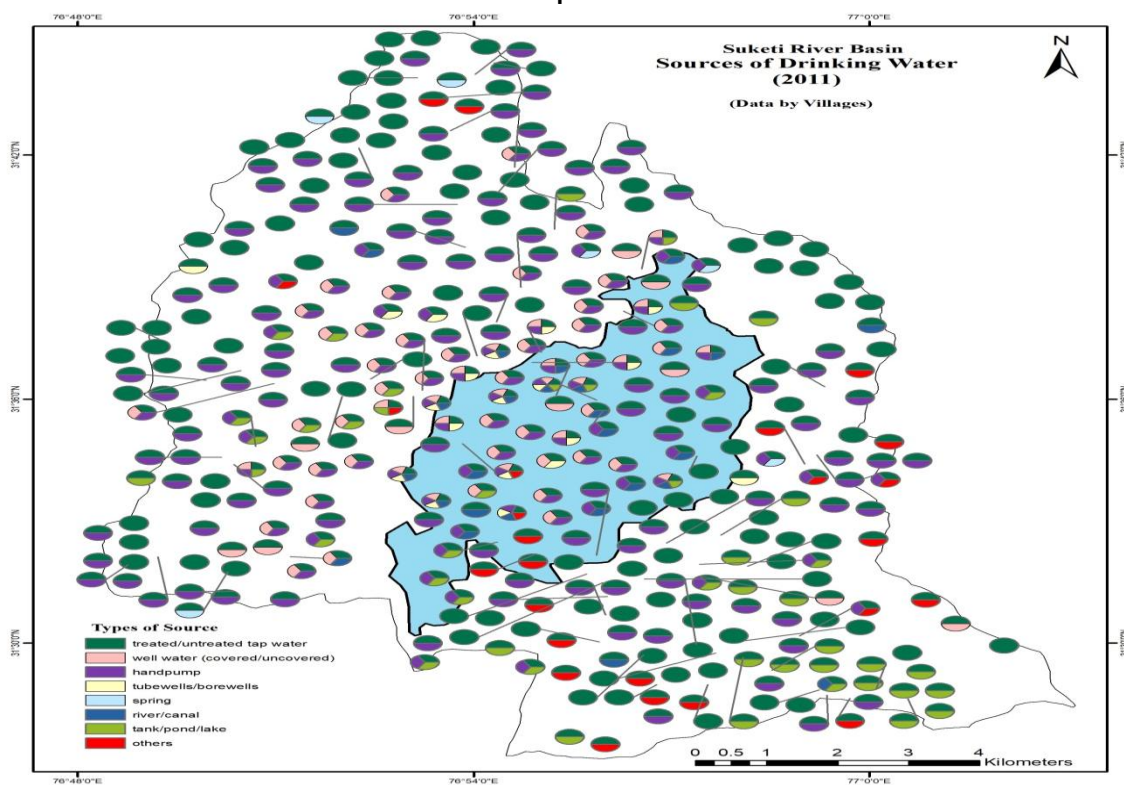
**Fourth Group (Population between 1000-1699)**

This group is endowed with highly populated villages and 32 village falls under this category.in this category there is no such village which is dependent on one source of drinking water, they have two or more water sources. 31percent villages are using two sources of water, 43.8percent villages are having three sources and more than 20percent villages are using four or more water sources. It is also interesting that all the villages of this group fall under Balh valley area.

**Fifth Group (Population of Above 1700)**

This group has highly populated villages which covers 12 villages of the basin. These villages also fall in Balh valley. There is also no single village in this category which is dependent onsingle source of water. All the villages have two or more sources. 25percent of the villages of this group are using two sources, 33percentthree sources, 16.7percent four sources and 25percent are using five sources.

**Map: 03**



Source: District Census Handbook, 2011.

**Source Wise Availability of Drinking Water in Suketi River Basin among the Population Groups. Treated/Untreated Tap Water**

All 394 villages are equipped with treated/untreated tap water. 41.52percent of the villages are located in second group, 28.53percent in third group, 18.9percent in first group and 8.11percent and 3percent in fourth and fifth group respectively. Map 03 clearly depicts that the treated tap water sources are distributed in the whole basin area.

**Well Water (Covered/Uncovered)**

Well water is available for 79 villages in the basin. 41.79percent villages with well water availability falls in third group, 22.78percent in second group, 18.98percent in fourth group and 12.6 and 3.7 percent villages lies in fifth and first group respectively. Map 03 shows that the maximum well water sources are located in Balh Valley area and in its surroundings.

**Hand Pump**

Total 201 villages are equipped with hand pump water supply in the basin. Out of these nearly 39percent villages come under second group, 38percent in third group, 13 percent in fourth group and 5percent and 4percent in fifth and first group respectively. Hand pumps are used both in valley and hill area of the basin as it can be seen in Map 03.

**Tube Well/Bore Well**

There are only 19 villages in the basin which are having availability of tube wells and bore wells. Approximately 80percent of these villages falls under third and fourth group. However other villages fall under first, second and fifth group. Maximum Tube wells and bore wells are located in Balh valley because this valley has shallow groundwater table.

**Springs**

Minimum number of villages are dependent on spring source for their water demand. Only 7 villages in the basin are using spring water. All these villages falls under first and second group which clearly means that less populated villages are using spring water. These villages are located in hilly areas of the basin.

**River/Canal**

Rivers and canals also have influence on the sources of drinking water in the Suketi river basin. There are 31 villages in the basin which have access to river or canal water. Nearly 75percent of these villages falls under third and fourth group and about 25 percent villages in remaining groups. All these villages are located in Balh valley.

**Tank/Pond/Lake**

These sources are available in 50 villages of the basin. 92percent of these villages come in first, second and third group and 8percent villages in fourth and fifth group. Majority of these villages are located in southern hilly area of the basin.

**Other Water Sources**

Other sources like khaties, ditches and bawaries etc are also available in the Basin. These sources of water are available in 28 villages of the basin. More than 85percent of these villages falls within second and third group which are using these sources and nearly 15percent villages come under

remaining groups. A small number of these sources are located in Balh valley and majority of these sources are located in hilly areas of the basin.

**Conclusion**

The findings of the study shows that all the villages of the basin are well equipped with treated/untreated tap water. It is the most reliable source of drinking water in the basin. Hand pump are the second most reliable source of drinking water. However, well water has been ranked third most reliable source of drinking water in the basin. There is a huge variation in the availability of water sources in hilly and valley area of the basin. Hand pumps, well water, rivers and canals are the major sources of drinking water in Balh valley area whereas tank/pond/lake springs and other sources are available in hilly area. Around 115 villages of the basin with hilly terrain and less population are using only one source of water i.e. tap water and there is no other water source available in these villages. The villages with the availability of three or more sources are highly populated and located in Balh valley. Therefore, it is evident from above discussion that there is a positive relationship between number of water sources and population size of the village. The data shows that the villages with less population size are having a smaller number of available water sources, whereas highly populated villages are using more water sources.

The problem of drinking water availability in Suketi river basin become serious in summer season. According to a news published in Dainik Jagaran on 27 May 2018, the villages of Balh Valley like Rewalsar, Riur, Samlonkothi, Leda, Barswan, Kothi Gehri, Dusra Khabu, Halyatar and Sidhyani etc are facing the problem of severe water crisis and the hand pumps in these villages are drying up whereas the discharge of traditional water sources has also been reduced and the problem is becoming more severe day by day. The initiative to provide water in summer season to the basin has been taken by Irrigation and Public Health department of Himachal Pradesh through installation of new hand pumps and water tanks, but these steps are not enough for sustainable water supply.

**Suggestions and Recommendations**

1. Village wise watershed level water budgeting should be done in the Suketi river basin.
2. Training and awareness camps related to water harvesting should be organized in institutional and village panchayat level.
3. The provision of more than one water supply system should be done by local authorities for every village, so that if one source of water gets interrupted due to any reason then second source can fulfil the water demand of the village.
4. Government should formulate some rules and regulations regarding tube wells and hand pumps excavation, because currently there is no law related to excavation of wells and hand pump.
5. Traditional water sources should be revived with the participation of local communities and their participation in decision making process should be prioritized.

6. Only water availability is not enough but permissible quality and easy access to water sources should be provided to all the villages, as there are number of villages in the basin which are using traditional water sources without any test of water quality of these sources.
7. Valley areas are more populated and using more ground water sources, so sustainable use and maintenance of these sources is essential. Thus, rainwater harvesting structures such as check dams, community tanks and rooftop rainwater harvesting structures should be constructed. These actions can help to increase the ground water level.
8. Hilly areas are using traditional sources of water like bawaries, springs, and wells, but these sources are drying or reducing their flow of water, thus regular maintenance and surveillance should be done so as to maintain sustainability of these sources.

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