

EXAMINING THE PIPED WATER SUPPLY (PWS) FOR THE AVAILABILITY OF POTABLE AND NON-POTABLE WATER IN NAINITAL DISTRICT, UTTARAKHAND

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Abstract

"We never know the worth of water till the well is dry."

-Thomas Fuller

Three fourth of the world is covered with water of which 97% is saline, 2% is ice and the remaining 1% is potable. The unequal distribution of water resources is a challenge for India as India has to nourish 16% of world population and 15% of total livestock with only 4% of water resource available. The demand for potable and non-potable water has gone up significantly with increase in population and enhanced standard of living. In the last couple of years inadequate rainfall and dry winters have aggravated water problems in the state. Hill stations in the state have witnessed acute water shortages in the recent past. In rural areas, villagers now have to travel long distances to fetch water. This dearth of water can be solved up to a certain level with Piped Water Supply (PWS). This paper is evaluating PWS with time cost of the villagers and an effort to give a comparative analysis of PWS with other water sources.

Keywords: Piped Water Supply, Distribution, Analysis of PWS, Potable and Non-potable Water.

Introduction

Water quality and its accessibility are the important concerns for most of the nations. As per the Millennium Development Goals Report, 2010, "Improved water accessibility to the people of developing world" is one of the seven key goals of the UN Millennium Campaign. Most of the developing countries have been incessantly working to provide the access of improved water source to it's' citizens. While a significant work has been done in this regard but due to the huge number of world population dependent on limited number of water resources, most of the population is still deprived of water and enhanced water resources. Believing in the figures given by WHO and UNICEF in 2008, around 884 million people all over the world are still unable to access better and improved water resources. Its consequences are not limited till here only but ironically, around 2.3 million people depart their lives due to the water related diarrheal problems, every year (Gleick, 2011). Since water scarcity is being the major concern but the mislaid facet is that, there is a need to focus on the overall water distribution schemes. Accessibility of water is only possible when there is a proper

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distribution channel for every household. However, the existing water supply methods are strongly monitored yet there is a need to have fairer methods to manage the water resources and make their water available for every individual. There may be several ways for appropriate availability of water for all and one of the ways is piped services for households where and whenever possible.

Study of Haller et al, 2007 confirms that although the installation of piped water facility is the most expensive yet it improves the accessibility of quality water and eventually the health of individuals. Although it is believed to be expensive yet allows a great reduction on water born diseases as the overall focus on hygiene. (DCP2, 2007). As per the report of Clarke and Wallsten, 2002, the number of households in rural area receiving the facility of piped water supply is far less than the number of households in urban area. Chen and Ravallion, 2007, emphasized in their report that the number of rural population is declining due to migration towards urban areas yet it is still estimated that the poor rural residents are around three quarters of the total poor inhabitants in the developing countries. Subsequently, next bigger issue is to provide piped services to them.

Literature Review

Dev Bhumi -Uttarakhand is situated in the foothills of the Himalayas. There are two regions Kumaun and Garhwal with 13 districts in typical geographic conditions. Besides the mountainous topography Uttarakhand is blessed with several natural water resources like lake, glaciers, water springs, naulas, rivers, rainfall etc. Great variation occurs in the significant features of the available resources, across several ranges and valleys as a product of the distinct ecological zones. As per the Rawat and Shah Report, 1998, the state has 8 catchments, 26 watersheds, 116 sub watersheds, 1120 micro watersheds. The social and economic lives of the residents of these areas are essentially reliant on these natural resources. Significant changes have been recorded over the last few decades caused by the mounting infrastructure development and industrialization which had deleterious impact of water resources. Consequently, water resources have been reduced to critical levels.

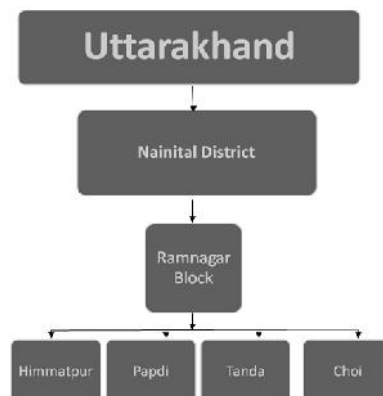
The concern has gone beyond the quantity of water but to the availability of safe drinking water not only in urban but in the rural areas too. In the report of Confederation of Indian Industries (CII) it has been mentioned that only 52% population of the state possess full access of safe drinking water. Safe drinking water with ample quantity is the main criterion for the selection of kind of water resources and their maintenance and management. According to the findings of Bureau of Indian Standard, at least 70-100 liter water per head is required for their daily domestic needs exclusive of the flushing requirements, in urban areas. Most of the basic needs have been ignored due to the increasing industrialization and infrastructure development and thus an adverse impact have been noticed. The traditional methods of water resource management were sustainable but with the increasing demand of water there is a need to maintain these old resources and to develop new one. The regular efforts in this direction will undoubtedly provide a sustainable water resource model for Uttarakhand.

Department of Drinking Water is responsible for the overall supply and management of drinking water in the state. Uttarakhand Jal Sansthan (UJS), Peyjal Vikas Evam Nirman Nigam (UPJN) and Swajal Project are the major concern of this department. Wherein currently 13 Project Management units are working in the whole state i.e. one in all 13 districts. 31915 and 8459 hand pumps has been installed by UPJN and UJS respectively in year 2013-14 as per the report of Directorate of Economics ad Statistics, Dehradun. Various other national and state level policies and schemes are undergoing in the state for the availability of fresh water for domestic use. Whereas trusting on the figures many other schemes have not yet been implemented up to 50% in comparison to their target standards. Therefore there is gap in policy formulating and policy implementation.

Urbanization and other developmental activities have led to drying up of various water resources in Uttarakhand especially in Kumaun region. With the increasing deforestation the number of naulas is disappearing and also the people/ local residents are least bothered to form new naulas. *Ratan Singh Bisht is among the very few people who construct these naulas today and the oldest functioning Naulas is the Badrinath-naula which has being formed way back to 7BCE (Usha Dewani & Chicu Lokgariwar, 2016).* It is found that the number of Naulas in Dwarahat, Almora district has been declined from 360 to the remaining functioning 36 only today (Rawat, 1998). These naulas had constant supply of water but now completely vanished. Furthermore, with the extinct water resources it has been observed that the facility of Piped Water Supply (PWS) is not appropriate especially in poor rural areas.

Objective and Area of the Study

This study is concerned with the availability of water in households through pipelines. The objective is to contribute an empirical literature focusing on the providing access of improved potable and non potable water to the rural community. The sample population is from the four villages of Ramnagar block in Nainital District.



Sample Size

The results of the census 2011 were used to calculate the appropriate sample size from each village. In each village approximately 40% households were randomly selected for interviews and discussions with the help of structured questionnaire where as per the need, the questions were administered by the researcher at site and observations were also carefully

recorded in observation form. So as per the estimation the sample size was total 385 households from the target area. The following table summarizes the calculated sample size:

District	Block	Village	Total Population	No. of Households	Sample Population	Cumulative Sample Size
Nainital	Ramnagar	Himmatpur	1290	289	120	120
		Papdi	253	47	20	140
		Tanda	2810	493	200	340
		Choi	491	101	45	385

Data Collection

With the help of structured questionnaire where as per the need, the questions were administered by the researcher at site, the primary data has been collected and observations were also carefully recorded in observation form. Another set of interviews were carried out with other stakeholders primarily government officials associated with water supply and developmental activities. Interactions with engineers from Jal Sansthan, Jal Nigam, Irrigation Department, Tube well Department, Villages development officers, Block Development Officers provided information and details about government activities and plans regarding water supply.

Secondary data has been procured from Jal Sansthan, Jal Nigam, Irrigation Department and Tube well department. Publications and websites have also provided useful information. Though, all care have been take care by the researcher to ensure genuineness of information and feedback and the choice of study area as a true representation of the state of Uttarakhand it is possible that the nature and quantum of issues may vary in other parts of the state.

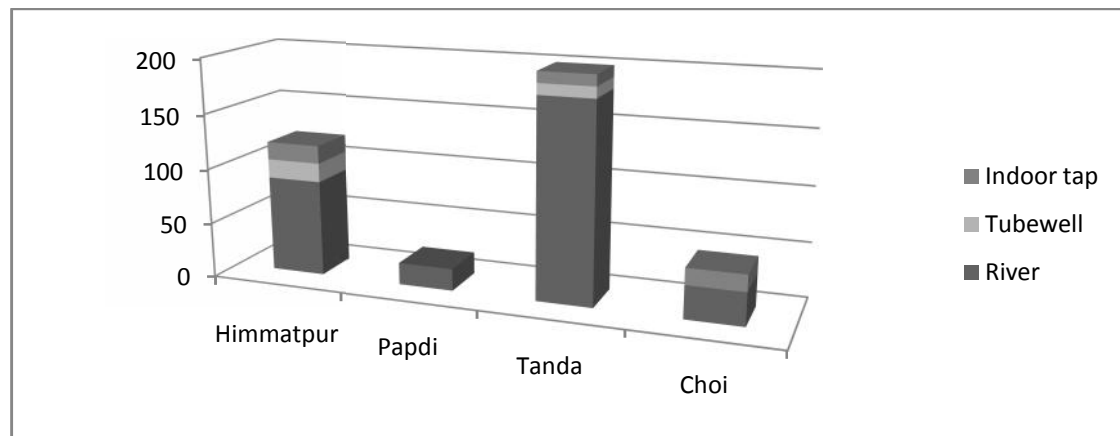
Scope of the Study

This research will be based on "Potable & non-potable water availability and demand in the state of Uttarakhand". As per the previous records it is evident that Uttarakhand has ample water resources but it has also been observed that these resources are fast disappearing due to negligence, migration, increased standard of living, lack of interest of the local community etc. Not only rejuvenating the vanishing water resources but to check the availability of water at doorstep is one of the major concern of this research.

Findings of the Study

The following table shows the total number of survey households and the kind of water resources they are dependent on.

Village	Source of household water supply			
	River	Tube well	Indoor tap	Cumulative Households
Himmatpur	87	17	16	120
Papdi	20	0	0	20
Tanda	180	10	10	200
Choi	30	0	15	45



The table above shows the survey findings for three types of water resources namely river water, tube well and indoor tap water (Piped water) in four different villages in Ramnagar block. It is evident from the survey data that piped water supply yet to be reached to many households in rural area. Choi, with 33% of the total surveyed households, has a better picture in the number of indoor tap water supply, Himmatpur is with 13%, Tanda has an availability of 5% whereas the houses of Papdi a small village is still waiting for indoor tap water facilities (availability of indoor tap water is somewhere negligible in the poor rural people). Although these areas are not prone to water scarcity yet a few number of water scarcity episodes have been witnessed, whether for few hours or days, in these villages. But surprisingly these events have been occurred in the households with piped facilities. Another aspect which has come into consideration is the time consumption. Households with piped water supply have to spend very less time in comparison to the households which are dependent on river and tube well water for potable and non potable use.

Proposed Suggestions for Piped Water Supply

Focusing on the real scenario of water availability and its supply and also keeping in mind the distance of the water resource from the household, the researcher, after referring to several literatures and their practical feasibility, suggests "Piped Water Supply (PWS)" to reach every household.

Here are some of the key areas to plan for PWS:

- Decide distribution area
- Way to reach them whether through single-village schemes or multi-village scheme
- Demand estimation and deciding the supply based on Liters per Capita per Day (LPCPD)
- Selection of the Water source
- Deciding the pipe material, design, design life
- Once the demand and supply relation has been established then decide the radius of the pipe (which is based on the number of households and the distribution time) to cover the entities.

- One important aspect which can be necessarily added is “Water Meters”, with each water connections if these water meters are also given then it can contribute to minimize wastage of water.
- Measures to monitor

Points to Ponder

- **Decide Distribution Area**

The villages are usually selected as per the norms of Water Supply and Sanitation Department - Government Resolution (WSSD GR) dated 27th July, 2000. As per the norms the habitations deprived on even source within 1.6 km in the plains and in hilly areas habitations in 100 m elevation are selected on a priority basis. Furthermore, the priority is given to the SC/ST villages which are facing a problem of water quality.

- **Way to reach them whether through single-village schemes or multi-village scheme**

From 2013 onwards, with the approval of Gram Sabha/ Gram Panchayat, all kinds of piped water supply whether it is a single-village supply or a multi-village supply are being planned, implemented and monitored and the overall supervision goes on under the Village Water and Sanitation Committees. Therefore it should be minutely observed and analyzed, with which PWS the project should be taken care of.

- **Demand estimation and Deciding the supply based on Liters per Capita per Day (LPCPD)**

To estimate the demand, the general formula used by the government professional is Daily Demand = (Forecasted Domestic Population * Domestic Demand Norm) + (Floating population * Floating Demand Norm) + (Institutional Demand). According to the 2013-14 report of Ministry of Drinking Water and Sanitation (MDWS) the water delivery norm is 55 lpcd for some states. Therefore the Rural water supply Schemes (RWSS) is designed for 15 years with a water delivery norm of 55 lpcd which was earlier 40 lpcd. Generally demand estimation for water is based on two factors a) LPCD norms b) Forecasted population

- **Selection of the Water Source**

Source selection is based on some of the important factors such as quality, yield, distance from the target area and elevation difference between source and the target area.

- **Deciding the Pipe Material, Design, Design Life**

Deciding for the pipe material is one of the crucial decisions as poor selection may lead to the failure of project. There are various metallic and non-metallic pipes available in the market and are wisely selected as per the location of supply, cost factor, environment and site condition. The commonly used pipes are PVC and HDPE. Due to the low cost, easy installation and universal availability of PVC it is much preferred than others. HDPE is best used to control any kind of leakage but installation is much costlier than PVC. Besides these GI is another pipe which is also one of the choices for PWS.

- **Radius of Pipe**

Keeping in mind the demand-supply relation and site condition another important factor to be taken care is the radius of the chosen pipe.

- **Installation of Water Meters**

Nothing can be more appropriate for water conservation than installing a water meter to measure the volume consumed by the households. Most of the developing countries are adopting water meters but still some of the states and its' villages are deprived of it therefore researcher has highly recommended installation of these meters to make every individual realize the importance of water by paying a certain amount on their monthly/ bimonthly/quarterly consumption.

- **Measures to Monitor**

Merely bridging the demand-supply gap is not sufficient but it also needs a regular monitoring for its proper and continue functioning. Therefore a team of professionals should monitor these projects in a fixed interval and immediately report and discrepancy.

Conclusion

Networking is an imperative aspect for ensuring availability and quality. Piped Water Supply system or Indoor Tap Water is a solution for achieving it. Though the initial cost of installation is huge, it can be wisely managed for its long term returns and benefits. Meticulous planning and design is necessary for proper implementation of PWS projects and will ensure sustainable performance in water conservation.

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