Domestic Water Sources and Supply in Kangpokpi Town, Manipur

Kashmiri Begum[1] Satgoulen Neishel[2]
[1,2]North-Eastern Hill University, Shillong, India

Abstract— The present study aims to survey and map the types of domestic water in Kangpokpi town of Manipur, India. It also aims to investigate the supply and availability of domestic water at the household level to find out water shortage or scarcity. The study is based on field work and secondary data collected from various sources. In the study it has been found that water is available in good amount though there are shortcomings in the methods of distribution and the poverty of the people to have the buying capacity. The inability of the PHED in supplying full scale water to the town as a whole can be rooted to social factors such as insurgency. If the anthropogenic activities are not stopped there will certainly be dwindling of the volume of water in the near future.

Key words: Supply of Domestic Water, Kangpokpi, Manipur

I. INTRODUCTION

Historians has palpably portended that the future World Wars will occur not over oil and oil resources or other valuable resources but over water. Water is a resource as well as a source of dispute, a hindrance and a hotspot for political and economic affinity in the world today. Taking the above matters in mind, it has become a matter of significant importance to heed to the herald of water problems and the ways and means through which it is procured, can be utilised to the optimum and thereby its management even at the local level. Hence a comprehension of the concept of water consumption, source and management has become a growing need for the progress of the society and the country at large. A first hand observation recounts that Kangpokpi, locally known as Kanggui is the principal town of Sadar Hills under Sadar Hills Autonomous District in Manipur state of India. The study area is blessed with three perennial streams which is source of water all throughout the year. Albeit this tidings, in recent years, the volume of water has dwindled. This herald of presage is given little attention to or perhaps considered as otiose by the residents of the area concerned.

II. OBJECTIVES

The present study is based on the following objectives:

- To survey and map the types of domestic water in Kangpokpi town; and
- To investigate the supply and availability of domestic water at the household level to find out water shortage or scarcity.

III. DATA BASE AND METHODOLOGY

The primary data collected are:

- The schedules that were conducted in the study area; the source of water supply, the duration of water supply on a seasonal basis, the quality of water, the amount of water utilised on a daily basis;
- The pictures taken in the study area; and
- Personal observation

The secondary data collected are:

- Abstract from the office of the Public Health Engineering Department;
- Information from the books, journals and research works.

Fig. 1(a): The Study Area

The entire work has been done on a three phase basis viz.,

1) Pre-Field Work Phase

The pre-field work phase includes the confabulations with experts on the methods to be adopted and the necessary things to be kept in mind and the necessary instruments and techniques to be employed in the field. It also includes the collection of relevant data, literature and information on the subject concerned.

2) Field Work

To obtain authentic and undoctored information on the subject as a whole and the objectives in particular, a brief schedule has been carried out in particular pockets of the study area. Household schedules were obtained from interview with the family heads and other members who were asked about various aspects of water quality and availability during the house to house survey in the study area. Besides these, personal field observations and assumptions were also made on the various aspects of water supply and distribution in the area.

3) Post Field Work

This phase includes the preparation of maps and sketches, diagrams, their interpretation and the analysis of the data.

IV. THE STUDY AREA

Kangpokpi is situated along the slope of the hill whereupon the facing hill i.e., the Kholen Moul is almost barren without trees. It has traditionally been used for agricultural purpose (shifting cultivation). The hill rises abruptly from the river with an absence of any trace of a river terrace in the study area. Residents located close to the hill experience water problems as the streams and rivulets originating from the hill is not potable. Hence, the residents in the vicinity to the hill resort to wells as a source of water.

V. TYPES AND DISTRIBUTION OF WATER SOURCES IN KANGPOKPI AREA

Before delving into the main discussion it is important to know the various types of water distribution systems. They are: -

- Water from the Public Health Engineering Department;
- Water from the private enterprises;
- Wells and tube wells; and
- Springs and streams

A. Public Health Engineering Department (PHED)

The source of water of the PHED is the Kali Khola which is a perennial hill stream. The course of the stream in its upper reaches has been diverted at a pool which is deemed to be conducive to garner the maximum volume of water. A narrow concrete channel (Plate 6) guides the diverted stream to tanks in which the water is collected (Plate 5). The tank constructed enables a proper transportation of the water by pipes which are connected to the exit of the tanks. The volume of water will also add to the velocity of the water in the pipe. Hence a construction of the tanks at the source base vital to the feasibility of the project. The pipes are connected to the main reservoir at Toribari which is about 3 miles from the source. The main reservoir has 6 tanks each measuring 12.10 X 12.10 X 3.00 metres (Plate 7 & 8)

Fig. 1: The PHED Reservoirs

The present water supply scheme was taken up to supply water at a rural standard of 40 litres/capita/ day in 1976 taking into consideration the future prospects of rising demand in water. Hence the supply of the present standard is to be upgraded to 70 litres/capita/day which is the projected rise in demand in the next 30 years.

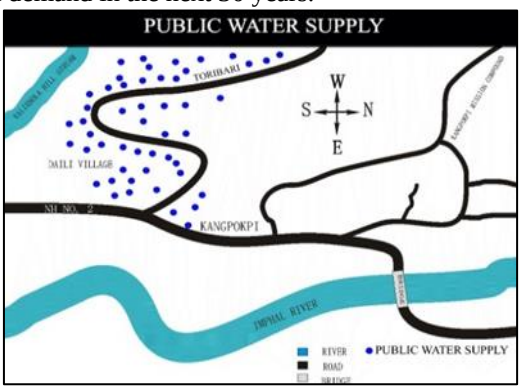

Fig. 2: A Sketch showing the areas of Public Water Supply

The water is transported by gravity and along with the water a lot of foreign materials come along and hence the water is allowed to remain still in the settling tanks to allow the foreign materials to settle at the bottom. The settling tank has a detention period of 6 hours and at the end of this when all the foreign particles have settled then the water is released for supply.

The settling tank has a capacity of 2,16,693 litres to partially meet the daily demand of 8,66,773 litres/day. Hence there is a deficit of 6,50,080 litres/day [1].

Fig. 3: A storage tank along the stream

Fig. 4: A narrow channel connects the stream to the tank

Fig. 5: A reservoir tank

This deficit is met by the several of other water sources such as water supply from the private enterprises, wells, springs etc. The areas covered by the department are the whole of Toribari i.e., both 1st Toribari and 2nd Toribari, parts of Daili Village and a handful of households in and around the I.T. Road areas.

Considering the schedule carried out in the area, it has been understood that the area is well fed by the PHED. In an average the households get water supply of about 4-5 hours daily even in the winter season when precipitation is the least.

Fig. 6: Water flows inside one of the reservoir tanks for detention

Albeit this most of the households has water conservation measures such as tanks, and other means to preserve and conserve the water. In some cases, the households resort to the nearby streams, ponds, springs or in some other cases they depend on the neighbours for relief when water becomes scarce which is seldom felt.

B. Private Water Supply

A private water supply is one which is not provided by a water company. Mostly, but not exclusively, these occur in the more remote, rural parts of the country. The source of a private supply can be a well, borehole, spring, stream, river or lake but it can also be a storage structure or tank or a private water main which receives a bulk supply from a water company. The supply may serve just a single property or it can be much larger serving many properties and businesses a network of pipes.

Fig. 7: A plastic pipe with holes pierced on the sides for intake from the river

Majority of the water supplied in the study area is contributed by the private sector enterprises with about seven such firms engaged in the supply of water to various households. The sources of water are all from the Koubru Hills on the North-Western and South Western side of the area. These hills still retain its pristine state albeit this statement may need modifications in the near future.

Fig. 8: A pipe is fixed into the pool of a stream and supported by stones from moving astray

There are various methods employed by these private enterprises to procure water. First of all, water for supply is obtained from streams. A suitable pool which can guarantee optimum volume of water during monsoons and enough volume during the dry seasons is selected. In all cases rubber/plastic pipes are used with a radius ranging from 3-4 centimetres are used. The mouths of these pipes are dragged into the pool (Plate 10). In some cases, the mouth of the pipes is sealed with a wooden cork and the sides of the pipes are pierced to allow water to enter (Plate 9). This allows water to flow through the pipe and prevents leaves, sands, stone, and other unwanted materials from entering the pipe which will deteriorate the quality of water and also prevents water jam.

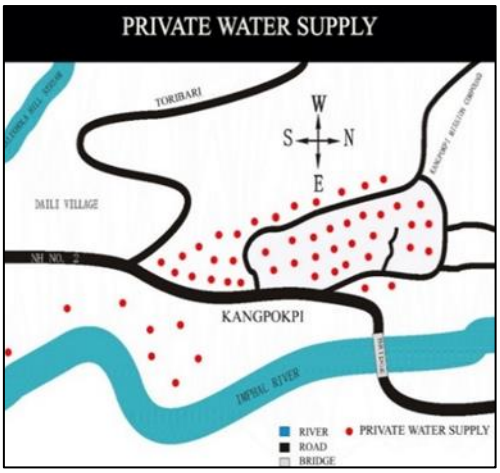

Fig. 9: Sketch showing the areas of Private water supply

In some other cases a tank is constructed which stores water and the pipe is connected to an outlet. At first the water comes to the main distributor. From thence it is supplied to various households. In certain cases, if an area has many customers the main distributor may employ another sub-distributor to distribute to avoid inefficiency and for proper maintenance.

Fig. 10: A well with the mouth close to the ground

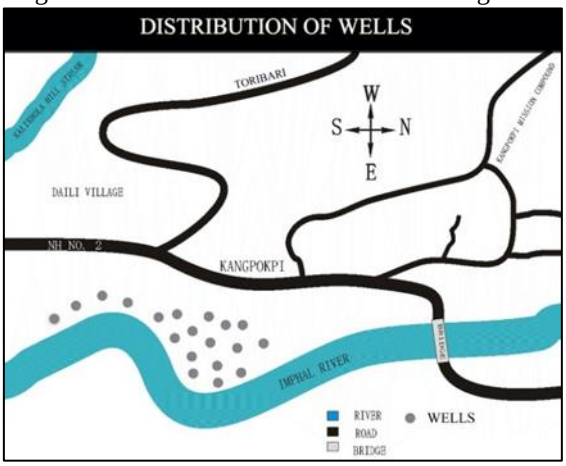

Fig. 11: Sketch showing the areas of well as a source of water supply

C. Wells and Tube Wells

In the study area, the wells are all hand dug and well-constructed. They provide a cheap and low-tech solution and may be built with a high degree of community participation or by just a handful of individuals. The average depth of the well in the study area is 14.6 feet with the deepest well measuring 20 feet and the shallowest measuring 10 feet. This shows that the groundwater table is quite deep in the area.

Wells are used only in a specific locality of the study area. As shown in the sketch this locality lies adjacent to the Gundung river. The area is characterised by an almost flat topography with the Kholen Moul (hill) which rises abruptly from the river forming a steep sloping surface.

In all cases, the reason supplied for the use of wells as a source of water is the scarcity of water in the area. The water from the Kholen Moul is not potable as it is salty and perhaps can be utilised only for household chores.

The construction of wells in this area is possible because of the following reasons:

- The flat topography of the area;
- The run-offs from the hills collects in the area and hence sufficient amount of water is percolated to replenish the groundwater aquifers from time to time.

They have low operational and maintenance costs, in part because water can be extracted by hand without using a pump. A large number of wells uses the pulley. A bucket or any other container is attached to a rope and with the help of the pulley the water is drawn (Plate 12). Very few uses the tube-wells and the hand-pumps while some others resort to electric pumps which is not efficiently utilised because of the poor electricity supply in the study area.

At this point a reader has to be apprised that it is necessity that has compelled the residents to resort to wells as a source of water supply. Water from the well needs further treatment and purification such as filtration, boiling and distillation before it is used for consumption. Some of the wells which have the mouth at the ground level or have low height are most vulnerable to pollution as water drains into the well during monsoons (Plate 11). The run-off water brings along all unwanted materials like sand, soil, garbage and worst can be the draining of sewage water into the well which will deteriorate the quality of water worst perhaps may prove detrimental to the health in consumption of such water.

Fig. 12: A well with pulley

D. Springs and Rivers

Spring water is an important source of water in the study area though the other sources discussed earlier may overwhelm its presence. There are about 6 known springs though the number may be more. Out of these six springs five are known to be seepage springs that emerges from the ground. Out of this five three are well maintained by constructing an elevated concrete wall around the spring. This prevents the contamination of the spring water from run-offs and other domestic water outlets. Hence the water remains clean and considerably free from impurities. These springs are maintained by the localities concerned.

Fig. 13: A spring with an electric pump

These spring water are potable though some may consider boiling it first before it is consumed. It is also used for bathing, washing and various other purposes. Water for household usage are carried from the spring by the use of buckets and other materials while some use the electric pumps. The electric pumps are conjoined to pipes which connects the springs to the house. Though this reduces man power it is not efficient as the power supply is very poor in the area.

Fig. 14: A spring with a pipe attached to it

On the other hand, one spring is probably a fractured or a fault spring as it flows from the wall of an elevated hill. Since a proper management is not possible unlike the former, the best method utilised to optimally harness the water from the spring is to conjoin a pipe to the point where the water seeps out and allow the other end of the pipe to flow in the lower end.

There are three rivers which overwhelmingly makes their presence felt in the area. Of these, the Gundung river is the main consequent stream (Plate 15). It is also the master consequent stream and is known as the Imphal River downstream which finally empties into the Loktak Lake. It has its origin somewhere in the Changgoubung forests. The river is perennial which is supplemented by many tributary streams along its course.

Fig. 15: The Gundung River

Fig. 16: The confluence point of the Kanggui stream with the Gundung river

The river all along its course in the study area is almost free from conspicuous pollution and contamination. In an attempt to keep the river free from pollution and degradation the Autonomous District Council authorities has directed every head of all the localities to direct the residents of their respective locality to maintain proper sanitation measures and avoid to resorting to the river. This approach has been successful to a certain extent in its purpose. The river provides the people with water for bathing and washing and other sundry purposes.

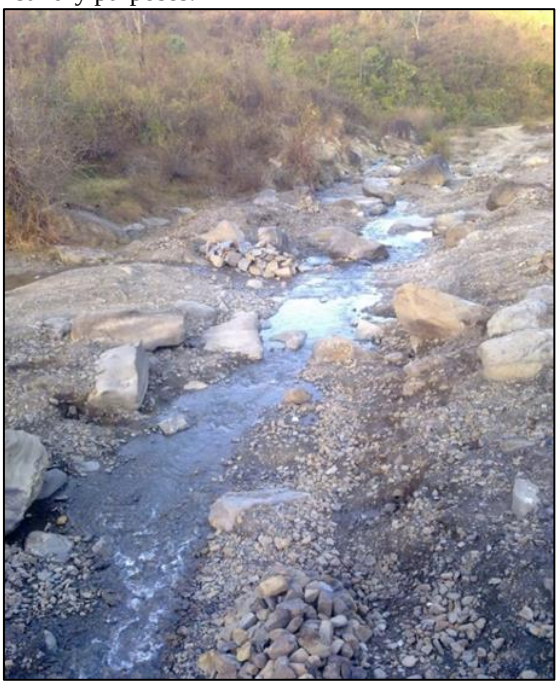

Fig. 17: The Kali Khola Stream

Another stream of significance is the Kali Khola stream which has its origin somewhere in the forest of Songtun (Plate 17). This stream is also the source of water supply for the Public Health Engineering Department of the region. The stream is of great significance because it lies above the town in the upper slopes of the region. Hence the water flows by means of gravity and it is exploited by the PHED at a vantage point of the pool of the stream where it is deemed conducive for the optimum attainment of the volume of water even during the months of scanty rainfall.

The stream is also of great significance to the people living in the periphery to the river. This trend of both the streams joining the main consequent stream signifies a trellised drainage pattern which is typical of a dome structure drainage system.

There are sundry others which is not as significant and conspicuous as the two above as these are either away from the usability of the people or perhaps are seasonal in character. Albeit this one stream may have a little more importance, i.e., the Kanggui stream because it adds to the volume of the Gundung river when it joins somewhere in the vicinity of the town (Plate 13).

VI. AVAILABILITY OF DOMESTIC WATER AT HOUSEHOLD LEVEL

The availability of water at the household level cannot be given on a general basis as it would convey a false report. This is because of the different types of the source of water in the study area and hence the availability in each of the sources also varies. To know about the availability of domestic water at the household levels, a schedule has been carried out in various pockets of the study area. In the Toribari areas, quite a number of households has been surveyed and enquired about the supply and the utility of water. And these are some of the statistics that are found about the water availability and utility [1]:

1) The average utility of water per household per day = 344.4 litres.
2) The average utility of water per person per day = 34.7 litres.
3) Average supply of water per day = 5-6 hours.

The above statistics are subject to alterations and corrections as the utility of water in some households are far above the average while in some it is far below the average. In some cases, it is as high as 700-800 litres per day for the household consumptions, while in some cases, it is as low as 250 litres per day.

The availability and consumption was calculated in terms of the utility by a single person in a day. And the figure obtained from a single person is then multiplied with the total number of household members. The basic criteria/ features on which the consumption was calculated were on:

1) Toilet uses
2) Washing (utensils, clothes, etc.,)
3) Cooking
4) Drinking water
5) Bathing
6) Gardening
7) Floor mopping
8) Miscellaneous such as water for animals and others that has not been included in the above.

The annual basis of water availability at the household level can be calculated from the water supplied per day. Hence the figures are as follows:

- Average utility per household = 344.4 x 365 = 125706 litres/year
- The average utility per person = 34.7 x 365 = 12665.5 litres/per/year
- The average availability of water = 5 x 365 = 1825 hours/year/house

As stated earlier, these figures are subject to alterations as the availability of water during the monsoons and the winter draught are quite conspicuous. The figures will definitely be more during the monsoon, nevertheless, the quality of water depreciates as well.

The schedule was conducted during winter when precipitation is the least. The decrease in the precipitation results in the diminishing volume of water. Hence the decrease in the amount of water or the duration of water supplied is expected. In spite of these facts and expectations the duration of water supply comes to an impressive 5-6 hours. The irony is that the amount of water supplied is varying and not uniform in various parts of the area.

Residents around the main reservoir receive less flow of water from the pipes whereas the houses located in the lower reaches far away from the main reservoir the flow of water from the pipe was considered to be reasonable and efficient.

Houses located between the stream and the main reservoirs are engaged in the illegal use of water as they bore a hole from the main PHED pipes and to obtain water. These households thus enjoy water supply 24x7 at the cost of the others downhill (Plate 18).

Fig. 18: Illegal stealing of water from the PHED pipes

During monsoons the quality of water depreciates. This is because torrential rain brings along with it a lot of debris such as mud, sand, leaves, insects and other unwanted materials. Hence, water is kept in storage tanks or containers to allow these materials to settle, and the water is used only when it becomes clear enough to see through it.

The inability of the PHED to provide water to the whole town gives the impetus to some individuals to start their own business of supplying water in areas void of it. Water from the private sources are obtained by a monthly payment of a fixed amount of money. Normally a sum of rupees 200-300/hour is charged on a monthly basis. The hour of supply is in proportion to the amount of money paid. In other words, the more the hour of supply, the more the amount of payment. From a schedule and personal observation conducted, an hour supply of water from the private water supplies can fill up a water container of 700-800 litres. This is the case of the winter conditions when rainfall is scanty. During the monsoons, when precipitation is at the peak, water from these sources can fill a container of 1000 litres and more.

In the areas where private water supplies are in operation, water conservation measures are quite conspicuous and important. Tanks, water containers, and other measures are used in large scale to conserve and preserve water in these areas. These statistics can mean:

- The consumption level of water is very high in the area
- The supply of water is not uniform and uneven, hence considerable measures are taken to preserve water.

Water shortage is felt the most in the areas around the PhaichamVeng. This is because of the unavailability of springs and less private water supply. Hence the residents of these areas has resorted to using wells to serve their purpose. In almost all cases, the well water is utilised when the other sources become deficient. The well water is used for household chores and other utilities. In some households, it serves all the purposes, even for consumption. Albeit this the water needs further purification before it is used for consumption.

The wells located near the river have low water level as the water gets drained into the river. Though the area is closed to the Kholen Moul, the water of the stream flowing from the hill is not potable as it is salty in taste. This adds to the dismay of the plight of the residents. From the schedule conducted, it has been found that the quality of water becomes good during monsoons while it is brackish during winter. Private water supplies operate in the areas which is a relief measure to the people of the area. A considerable conservation and preservation measures are adopted which conveys that the area is prone to or perhaps a water scarce area.

VII. MAJOR FINDINGS

The results of the study are as follows:

- Water is available in good amount though there are shortcomings in the methods of distribution and the poverty of the people to have the buying capacity.
- The inability of the PHED in supplying full scale water to the town as a whole can be rooted to social factors such as insurgency.
- Well water is deep. Ground water is replenished during the monsoons and hence the quality of the water ameliorates during such. Whereas during the winter, the water becomes brackish as the mineral content of the water becomes higher.
- There will certainly be dwindling of the volume of water in the near future if the anthropogenic activities are not stopped.

REFERENCES

[1] Abstract from the Public Health Engineering Department, Imphal.
[2] Taher, M, and Ahmed, P., Geography of North-East India, Mani Manik Prakashan, Guwahati, 2007.

