

SPATIAL ANALYSIS OF WATER SUPPLY IN RURAL AREAS OF SIAHA DISTRICT, MIZORAM

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Abstract

Sources of water supply in rural areas of Siaha District can be broadly classified into four categories, namely; public piped water points, village spring sources, drilled water points and rain water harvesting. Among the water sources as mentioned above; public piped water points and village spring sources constitute major sources of water supply in rural areas. The other two sources such as drilled water points and rain harvesting are less significant because firstly, rain water harvesting is done only during rainy seasons and secondly, drilled water point can be set up only in those rural areas which are either connected by national or state highway.

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It is well understood that the region owing to its tropical location and falls under the direct influence of the south west monsoon, it receives adequate amount of rainfall, besides, the region is endowed with several rivers, streams and their tributaries. In spite of the available water resources, several rural areas face acute and perpetual problem of water supply. This is mainly because several water sources are dried up mainly due to human occupation, settlement, large-scale deforestation and the impact of traditional practices like shifting cultivation.

Keywords : *Programme, Piped Water, Spring Water, Drilled Water, Village.*

Introduction

Provision of drinking water in the rural areas is the responsibility of the state government and funds have been provided in the state budget right from the commencement of the First Five Year Plan in 1951. Taking into account the magnitude of the problem and in order to accelerate the pace of coverage of villages without water supply, Government of India introduced the *Accelerated Rural Water Supply Programme* (ARWSP) in 1972-73. The states and Union Territories were assisted with cent per cent grants-in-aid to implement the schemes in villages without water supply.

In 1974-75 with the introduction of *Minimum Needs Programme*, ARWSP was withdrawn. However, it was

reintroduced in 1977-78 when it was found that the progress of safe drinking water to the villages was not as per expectation. In August 1985, the subject of Rural Water Supply was transferred from the Ministry of Urban Development to the Department of Rural Development with the objective of securing quick implementation and better integration with other rural development programmes. *The National Drinking Water Mission* was launched as one of the five societal missions in 1986. The Mission was renamed as *Rajiv Gandhi National Drinking Water Mission*.

From 1990 onwards, a minimum of 25 per cent ARWSP funds have been earmarked for provision of water supply for SC's and 10 per cent for drinking water supply for ST's. Such funds cannot be diverted for any other purpose. As a part of Dr. Baba Saheb Ambedker Centenary programme, Government of India allocated further special assistance of Rs 60 crore in 1991-92 to 24 states for the coverage of 30,000 SC\ST habitations with safe drinking water facilities.

The Government of India also provides assistance to the state under the programme of Accelerated Rural Water Supply Programmes while insisting upon State Government to provide equally matching share under Minimum Needs Programme. Under this programme, water supply to the rural habitation is provided based upon locally resource available through piped water supply scheme, installation of hand pump, tube wells, construction of rainwater harvesting tanks, improvement of village spring sources and construction of impounding reservoirs. Besides, rural schools are also to be covered with drinking water facilities under this programme.

Study Area

Siaha District is one of the eight districts of Mizoram, located in the south eastern corner of Mizoram, it covers an area of 1399.90 sq km which constitute 6.64% of the total state area and it is the second smallest district in Mizoram next to Kolasib. The location lies within 92° 30' – 92° 58' E longitude and 21° 9' – 22° 47' N latitudes. The total population was 56,574 (*Census of India, 2011*), of which male and female were 28,594 and 27,890 respectively. The density of population was 44 person sq/km. Siaha town is the capital and it is the only urban center within the district having a total population of 10,421, while the rural population constitutes 31,464. There are two rural development blocks namely Siaha R.D. Block and Tuipang, R.D. Block, the total number of inhabited villages in the district was 52 which scattered all over the district. The above figure shows that about 55 % of the total population lives in the rural areas.

Types of Rural Water Supply

Public piped water point, village spring source and drilled water point constitute the main types of water supply in rural areas of Siaha District. These are the three importance sources of water in rural areas in which water is obtained by the villagers for their daily domestic uses. Notably, among the three types of rural water supply, spring water and public piped water point are the most common sources of water supply, apart from this; drilled water point also contribute to a certain extend. During rainy season, rain water harvesting has been done on a large scale which provides

an important source of water supply for domestic consumption. Types of water supply in rural areas of Siaha District are briefly analyzed as follows:

1. Public-Piped Water Point

There are two types of public piped water points such as gravity feed system and pumping system. Gravity feed public piped water point is a simple method in which water is obtained from the nearby perennial stream or spring which are located at a higher elevation. Several G.I. pipes or polythene pipes are joined at each ends and a small dam is made across the stream or spring where water would accumulate and by connecting the required number of pipes between the small dam and the main storage reservoir, water began to flow from the dam and accumulates into the reservoir.

This system comprises of conveyance main storage reservoir, distribution network and several taps stands to the consumers' end. Pumping system is the method of lifting water from the river or stream through high lift pump driven by power in which water is transported to the storage reservoir. The location of reservoir is selected at the higher elevation and distribution point is also selected at convenient place from where water is distributed to the consumers.

Table-1

Coverage of Village by Public Piped Water Point, Village Spring Source and Drilled Water Points in Rural Area of Siaha District, 2016

Sl. No.	Name of Village	No. of Public Piped water Point	No. of Village Spring Source	No. of Drilled Water Point	Total
1	Tuisih	4	1	-	5
2	Theiri	1	1	-	2
3	Serkawr	4	2	1	7
4	New serkawr	1	1	-	2
5	New Latawh	4	4	-	8
6	Tuipang L	6	2	-	8
7	Tuipang V	9	2	4	15
8	Tuipang Diary	5	2	2	9
9	Siatlai	4	1	-	5
10	Zawngling	2	10	-	12
11	Chheihlu	4	1	-	5
12	Chakhang	4	5	1	10
13	Siasi	1	4	1	6
14	Mawhre	2	1	-	3
15	Chapui	-	8	-	8
16	Khopai	1	1	-	2
17	Ahmypi	2	1	-	3
18	Kaisih	2	2	-	4
19	Maisa	3	3	-	6
20	Lohry	-	2	-	2

21	Lawngban	1	1	-	2
22	Lodaw	-	2	-	2
23	Phura	6	1	-	7
24	Vahai	6	1	-	7
25	Tongkalong	1	1	-	2
26	Miepu	2	2	-	4
27	Laki	2	2	-	4
28	Supha	1	1	-	2
29	Lomasu	2	5	-	7
30	Bymari	-	3	-	3
31	Lope	-	1	-	1
32	Lungpuk	5	1	-	6
33	Khaikhy	-	2	-	2
34	Phalhrang	-	4	-	4
35	Romibawk	1	2	-	3
36	Riasikah	-	1	-	1
37	Tuipuferry	3	3	-	6
38	Zeropoint	1	3	1	5
39	Maubawk 'L'	6	2	1	9
40	Maubawk 'Ch'	4	1	-	5
41	Kawlchaw E	2	3	1	6
42	Lower Theiva	1	2	2	5
43	Lungbun	4	1	1	6
44	Ainak	4	2	-	6
45	Siata	4	2	-	6
46	Phusa	4	1	-	5
47	Tuisumpui	5	1	-	6

48	Thingsen	1	1	-	2
49	Niawhtlang-I	2	1	-	3
50	Niawhtlang-II	-	3	1	4
51	Chhualung-I	-	1	-	1
52	Chhualung-II	1	1	-	2
	Total	128	112	16	256

Sources: Calculated from Block Level Statistics, 2008-2016

a) Coverage of Village by Public Piped Water Points

Public piped water points; both gravity feed and pumping system constitutes one of the important source of water supply in rural areas of Siaha District. As the name implies public piped water points were installed at a convenient place in a village and the villagers collect/drew water for their domestic uses. The total number public piped water point for the whole district in 2015 was 128, indicating that out of the three water supply sources, piped water points accounts for 50% of the total water sources in rural areas of this district. From the above table it can be observed that the total number of villages covered by public pipe water point in 2015 was 42 villages and the remaining 10 villages have not been yet covered by this facility. Village-wise coverage by public piped water points shows that more than two-third of the villages was covered by public piped water point. The overall coverage indicated that majority of the villages i.e. 80.764 % of the villages in this district were covered by public piped water points. Considering the overall coverage of villages by public pipe water point the achievement in this district was quite remarkable.

In spite of the fact that majority of villages in Mizoram including this district are located on hill top and ridges with a few exceptions, it is extremely difficult to install pipe water supply especially pumping system to every village, especially those located at the hill top far away from a nearby river or stream.

b) Coverage of Village by Spring Water

By far the most important source of water supply in rural areas of Mizoram is spring water and Siaha District is also no exception. Spring water constitutes the main sources of water supply in rural areas since time immemorial. It is largely used for drinking; cooking, cleaning and washing as such spring water sources are the most important asset and the main source of livelihood for the rural inhabitants. Water is collected manually from the spring by using bucket or by any other convenient materials available. Generally, young men and women including children up to 12 years and above took the responsibility of collecting water and the frequency of fetching water depends on the size of the family members; usually 4 to 5 times a day. The dependence on village spring water is very high especially during summer when the water sources become dry. The number of spring water varies according to the size of the village and population.

With the onset of planned development and the introduction of several programmes towards rural areas development, improvement and construction of spring water source nearby or within village has been undertaken by the State Govt. under

National Rural Water Drinking programme and it has been named as Improvement of Village Spring Source (IVSS). The system of construction consists of RCC or stone masonry structure in rectangular shape with GCI roofing. In 2015-16, according to the report on Village Level Statistic published by Directorate of Economic and Statistic; the total number of village spring source in the entire rural areas of Siaha District was 112.

Out of the three water supply sources, spring water accounts for 43.75% of the total water sources in rural areas of this district and the total number of village spring sources was 112. Village-wise coverage by spring water shows that 52 (100%) village were covered by spring water in 2016 this shows that the overall coverage indicated that cent per cent of the villages were covered by village spring source.

c) Coverage of Village by Drilled Water Point

The ground water exploration and extraction is being conducted by Public Health Engineering Department (PHED) for the entire Mizoram since 1987 by using drilling rig mounted on a truck. Bores are drilled up to an average of 50 meters depth and Indian mark-III is installed for lifting ground water from the bore hole. The record shows that 2,889 nos. of bore holes were drilled so far out of which 1806 nos. of bore holes are successful and fitted with hand pump. Thus, the success percentage have been achieved satisfactory that is more than 60 % and it is useful and important in the field of water supply system in Mizoram and having significant contribution of water supply level.

However, it could be assumed through field investigation and observation that bore hole, wells drilled and construction of hand pumps in Siaha District of Mizoram were shallow tube well mainly controlled by localized potential with secondary structure possessing of independent parameters. Therefore, it is difficult to arrive at any relevant conclusion regarding the nature and thickness of aquifers, depth of the ground water table, yield etc. So, it can be understood that any information that can be tapped in hilly region and mountainous region like Siaha District is bounded to produce only limited yields. But somehow, it is sufficient to supplement domestic water supply.

As compared to the other two sources of rural water supply source, drill water point account for only 6.25 % of the total water sources in this district and the total number drill water point was only 16. Apart from this, only 11 villages were provided by this facility which constitutes only 21.15% of the total village. This may be attributed to various factors like inaccessibility, lack of infrastructure, hilly terrain, depth of ground water table and so on. Besides, bores cannot be drilled in those villages which are not connected by truckable road because bores are drilled by using drilling rig mounted on a truck. Most of the drilled water points are found in those villages which are connected by either National Highway or State Highway.

Table-2

Share of Village Water Sources / Household and Persons, 2016

Sl. No.	Name of Village	No. of Water Point	Total Population	Total Households	Share / person	Share / Household
1	Tuisih	5	878	196	175.6	39.2
2	Theiri	2	626	131	139.57	65.5
3	Serkawr	7	977	258	325.66	36.85
4	New Serkawr	2	144	37	72	18.5
5	New Latawh	8	603	123	75.37	15.37
6	Tuipang 'L'	8	652	140	81.5	17.5
7	Tuipang 'V'	15	1655	306	110.33	20.4
8	Tuipang Diary	9	1120	238	124.44	26.44
9	Siatlai	5	335	74	67	14.8
10	Zawngling	12	1630	302	135.83	25.16
11	Chheihlu	5	530	101	132.5	20.2
12	Chakhang	10	1333	285	133	28.5
13	Siasi	6	344	74	57.33	12.33
14	Mawhre	3	540	98	180	32.66
15	Chapui	8	1045	205	130.62	25.62
16	Khopai	2	631	137	157.75	68.5
17	Ahmypi	3	247	42	82.33	14
18	Kaisih	4	442	96	110.5	24
19	Maisa	6	244	52	40.66	8.66
20	Lohry	2	269	55	134.5	27.5
21	Lawngban	2	607	119	202.33	59.5
22	Lodaw	2	259	60	129.5	30
23	Phura	7	1068	231	178	33
24	Vahai	7	826	148	137.66	21.14
25	Tongkalong	2	478	107	239	53.5
26	Miepu	4	423	95	105.75	23.75
27	Laki	4	1012	182	253	45.5

28	Supha	2	58	15	58	7.5
29	Lomasu	7	329	82	47	11.71
30	Bymari	3	455	113	151.66	37.66
31	Lope	1	58	15	58	15
32	Lungpuk	6	1074	223	214.8	37.16
33	Khaikhy	2	151	36	75.5	18
34	Phalhrang	4	377	73	94.25	18.25
35	Romibawk	3	450	103	150	34.33
36	Riasikah	1	133	36	133	36
37	Tuipuferry	6	236	58	39.33	9.66
38	Zeropoint	5	759	155	151.8	31
39	Maubawk 'L'	9	599	122	66.55	13.55
40	Maubawk 'Ch'	5	252	56	63	11.2
41	Kawlchaw 'E'	6	1071	239	214.2	39.83
42	Lower Theiva	5	551	135	110.2	27
43	Lungbun	6	799	167	159.8	27.83
44	Ainak	6	559	132	93.16	22
45	Siata	6	867	179	144.5	29.83
46	Phusa	5	200	34	50	6.8
47	Tuisumpui	6	395	69	79	11.5
48	Thingsen	2	328	57	164	28.5
49	Niawhtlang-I	3	772	151	257.33	50.33
50	Niawhtlang-II	4	909	169	227.25	42.25
51	Chhualung-I	1	851	174	283.66	58
52	Chhualung-II	2	313	56	156.5	28
	Total	256	31464	6541	122.95	25.55

Sources: Calculated from Block Level Statistics, 2009-2015

a) Share of Village Water Sources / Household

While analyzing the distribution and availability of water sources in rural areas of Siaha District; a micro level study

has been taken into consideration for a better understanding. In 2016, the total population of the Siaha District was 56,574, out of the total population; rural population comprises 31,464 which accounted for 55.61% of the total population of the whole district at the same time the total number of household found in rural areas was 6541. The total number of village water sources in the whole rural areas of Siaha District was 256 (public piped water point: 128, spring water: 112 and Drilled water points: 16). On an average one village water source was shared by 25.55 households. A micro level study of the availability of village water sources / household differs significantly from one village to the other; for instance, one village water source was shared by 68.5 households in Khopai village; on the other hand, it was only 6.8 households at Phusa village. An overall analysis of share of village water sources reveals that 28 (53.84%) villages has a higher share than the overall average i.e. 25.55 households while it was lower in 27 villages.

b) Share of Village Water Sources / Person

From the above given table, the share of village water sources per person show that on an average one village water sources were share by 122.95. A detail study of the availability of village water sources per person shows that it differs quite significantly from one village to the other. In 2015, the highest share was recorded by Serkawr village where one village water sources were shared by 325 persons, while it was only 39.33 persons in Tuipuferry village. An overall analysis shows that out of the total village 19 (36.53%), villages registered a lower share than the overall average (122.95 persons); at the same time, it was higher in 33 villages. Therefore, it must be noted that the share of

village water sources was overwhelmingly high; for instance, in 8 villages the share of village water sources was above 200 persons.

Conclusion

In rural areas of Siaha District provision of water supply and sanitation in rural areas is undertaken by the State Public Health Engineering Department which was set up in 1990's. The main objective is to provide safe water supply and sanitation facilities to all citizens in the State of Mizoram. Field investigation by conducting proper survey, planning and design, construction of dams, impounding reservoirs, rain water harvesting tanks etc. and quality control, operation and maintenance are the responsibilities of this Department to achieve its specific objectives.

As already stated, Siaha District had undergone several administrative changes in the past, therefore, it is not possible to present the achievement of the previous programmes and projects with reference implementation of rural water supply mainly due to lack of proper records, data and relevant information. The rural development programmes such as ARWSP, Swajhaldara and others, though it was introduced and implemented in the district but lack of records and information hinders to examine and bring out the implementation and achievement of rural water supply under various centrally sponsored schemes. The only available and relevant information is the latest and the present programme known as 'National Rural Drinking Water Programme'.

An important measures implemented under NRDWP includes installation of hand pump, construction of rainwater harvesting tanks,

and construction of impounding reservoirs. Besides, planning and design, construction and quality control, operation and maintenance, creating awareness among the local people regarding safe and clean water supply in rural areas of Mizoram also comes under NRDWP to achieve its specific objectives.

Finally, the present study only endeavors to bring out the availability and sources of water supply in rural areas. It is hoped that this study will provide basic materials for an in-depth study towards ways and means for the improvement of adequate water supply in the rural areas. Nevertheless, there is enough scope for improvement upon the present work and this required further research and detailed field study covering every nook and corner of the state.

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