Research Guru
Online Journal of Multidisciplinary Subjects (ISSN : 2349-266X)
UGC Approved Journal No. 63726
Impact Factor:4.081
Volume-12, Issue-4, March-2019 www.researchguru.net

Planning and Pattern of Domestic Water Supply and Use in Siwan District, Bihar: An Empirical Study

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Abstract: *The importance of water in domestic sector has been increasing with the changes in the physio- socio environment over the study area. The climatic component and population are the major part of Physio-socio environment. The physio-socio environment has changed the domestic water use pattern in the district. The domestic water use pattern has been observing by the rural and urban water use supply through pipe water and hand pump in the district.*

The objectives of this paper are to study about the domestic water supply, household wise domestic water use and rural and urban domestic water behaviour to identify the domestic water use pattern and planning over the study area. This study is based on secondary data which have been collected from secondary sources during 2014-15. The cartographical and statistical techniques are used to obtain the objectives of the study.

The general findings show that total domestic water supply capacity through pipe water is 11660430 litres in the district, of which 57.23 % water is supplied and used in rural blocks among 3147551 populations and 38.99 % water is supplied and used in urban blocks among 182913 populations. The rural area under district uses 971 handpumps per 1000 households. As per 1000 households, Raghunathpur and Siswan blocks have excess handpumps from the households. Along with out of 29 pipe water supplies station, 18 pipe water stations are working in rural blocks and out of 13 pipe water stations, 11 pipe water stations are working in urban blocks, which identify the different patterns of domestic water use in the district. Moreover, major findings, planning, suggestions and conclusion will be elaborated in details.

Keywords: *Climatic component, Domestic sector, Physio-socio environment, Population, Water use pattern*

Introduction

Water is essential to life for living beings and it fulfills the needs of water for agriculture, industry and domestic water sectors for social and economic development of any region. In the light of domestic water use, the World Health Organisation (WHO) has cleared the basic concept about the domestic water use. According to WHO, the domestic water is used for all domestic purposes including drinking, bathing and food preparation. The domestic water demand has been increasing faster than the agricultural demand in developing countries and global demand for water has been increasing at the rate of 1% per year over the past decades (World Water Development Report-2018). The global demand of water in domestic sector has been increasing in lieu of the climate change, population growth, living standards, urbanization and irrigation growth etc. Most of the developing countries have been

suffering from such problems which direct or indirect have influenced on the patterns and planning of domestic water use in our global society.

Moreover, at present it is estimated that the water withdrawals will increase 35% from 1995 to 2020 which will effect on the use of water in domestic sector. As fresh water, total 8% water is used for domestic sector in the world (UNESCO, 2003).

The domestic water use pattern varies from one country to another based on the physical and cultural environments. The USA uses over 420 litres per day which is the highest user country in the world while Africa uses lowest water in the world for domestic purposes (www.savewater.com.au). As water consumption, India is the second largest consumer of water in the world after China. India's water consumption is approximately 20.1% of the world consumption. The recent Report of UNO highlights that the safe drinking water is available of 75 percent of total cities of the world and 40 percent of the rural areas of the world. With this view, about 65 percent of total area of Bihar is not utilized the safe drinking water under the domestic water use (Pal, Subash Chandra, 2015, Kurukshetra, Vol. 7).

In context to study area, the climate change, population growth, urbanization, irrigation and economic growth etc. have demarcated the domestic water use pattern. It has changed with space and time in lieu of physio-socio-elements of the environment. These elements have stressed the exerting pressure on water use behaviour and supply for domestic purposes in rural and urban blocks of the Siwan district. The quantum of water is consumed by people in the rural and urban blocks of the district are not adequate. Mainly the quantum of water is consumed by groundwater source. The people of the district try to adjust with the quantity of water supplied in rural and urban blocks as per the availability of groundwater. The assessment of groundwater is essential in terms of groundwater availability to ensure the better supply of domestic water in the rural and urban blocks of the district. In this context, the highest groundwater availability is found in block of Barharia, Maharajganj, Goriakothi, Daraundha, Bhagwanpur Hat, Basantpur and Lakri-Nabiganj which falls under the critical depth zone (below 300 cm) and remaining blocks come under the shallow depth zone (300 to 500cm) in 2014(Singh, S.K. 2018). The fluctuation of groundwater level effects on the supply of domestic water in the summer season in the district. Sometimes it is seen that the people of urban areas face the problem of drinking water in the extreme hot season. These situations enhanced the consumer need which has created fatal situations in the blocks of the district, Siwan. So, it is essential to assess the domestic water use pattern and planning to fulfill the basic needs of the people as well as the management of existing pattern for domestic water use for the future generations. So, the domestic water use pattern may be assessed by the rural domestic water supply and urban domestic water supply in the study area.

Study Area: Location and Environment

The study area i.e.; District of Siwan is located in the area of 2220.51 Sq.km having 1914.84 Sq.km in rural area and 305.67 Sq.km in urban area and lies between $25^0$53'N latitudes and $84^0$0'to $84^0$47'E longitudes. The district has 19 C.D. blocks having 3 urban blocks. The district has 3330464 populations, out of it, 3147551 populations live in rural area (94.51% of T.P) and 182913 populations reside in urban

area, which is 5.49% of total population (census, 2011). Total households are 535661 covering 28606 households (5.34%) in urban area and 507055 (94.66%) households in rural areas (Census, 2011). Based on area for domestic water supply Raghunathpur is the largest block and Hasanpura is the smallest block in the study area. This study area falls under lower Ghaghara Gandak Doab, which is consisting of newer and older deposits of alluvial sails on the basis of physical features like alluvial low lands, uplands tracts and Diara lands. Geomorphology, the structure of Siwan district is covered with horizontal deposits of alluvium. This region is a part of elongated depression known as the Ganga plain section of Bihar (Ahmad, 1965). Climatologically, this region is in the realm of monsoon type of climate but naturally the climate of the district is sub-tropical to sub-humid. The district experiences severe cold during winter and extreme hot during summer season (**Figure -1).**

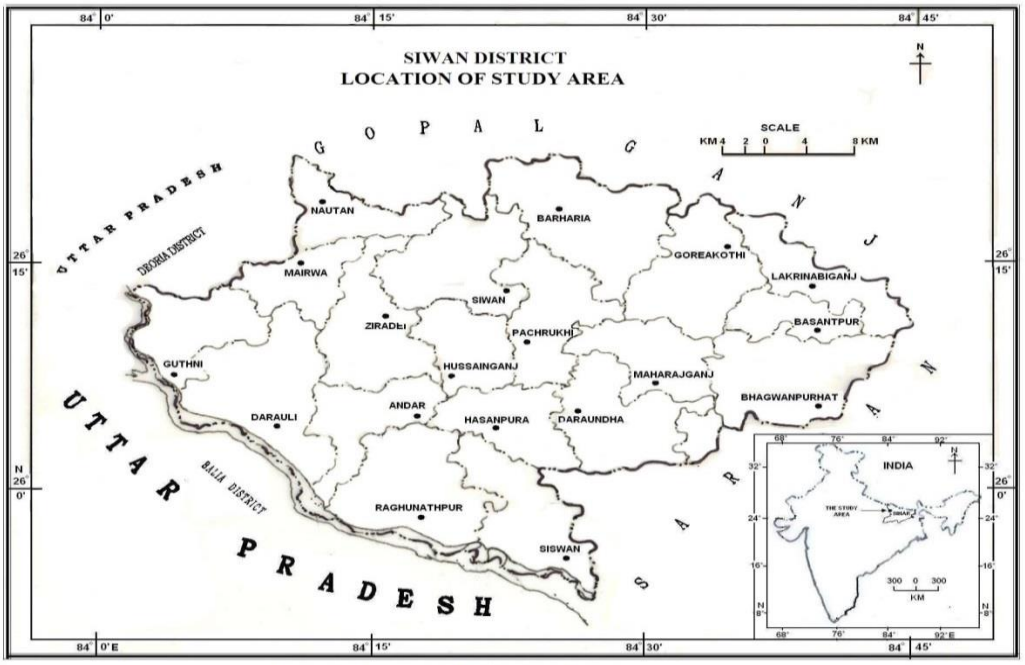

Figure1: Location of Study Area, Siwan

Objectives

1. To study domestic water use supply in rural area and urban area of the district.
2. To find out the patterns of rural and urban domestic water use supply.
3. To investigate the household water use behaviour in the district.
4. To prepare a plan and suggestions to maintain the existing domestic water use pattern in the district.

Data Base and Methodology

To achieve the objectives, data have been collected from secondary sources from Government offices i.e.; District Public Health Engineering Department (PHED), Siwan; District Statistical Office, Siwan; Census of India, India, District Agriculture Office, Siwan and books, journals and web resources. Total 42 pipe water supply stations are observed in the rural and urban areas of the district. The observation is based on purpose method. The future requirement of domestic water is estimated on the basis of the decadal growth of population from 2001 to 2011.The per/ person availability of domestic water is assessed on the basis of pipe water

availability and population of 2011. The gallon is converted into litres on the basis of the formula – 1 gallon= 4.546 litres. The collected secondary data have been compiled, processed and summarized with the help of simple statistical techniques. The cartographic techniques have been applied for the preparation of the maps, diagrams, and charts etc. through computer operations.

Results and Analysis

Pattern of Domestic Water Supply and Use

Mainly the domestic water is supplied through the pipe water and hand pump in the rural and urban blocks of the district. Total domestic pipe water supply capacity is 245500 gallon (11160430 litres) in the study area. According to total domestic pipe water supply capacity, 53.16 % pipe water supply capacity is for rural blocks and 46.84% pipe water supply capacity is for urban blocks in district in 2014-15. Total 6387130 litres pipe water is used in the district which is equal to 57.23% of the total pipe water storing capacity. Thus, the analysis of domestic water use pattern can be studied through rural domestic water supply and use and urban domestic water supply and use .

Rural Domestic Water Supply and Use

The rural area of Siwan district is 1914.84 Sq.km (District Agriculture Office). In this area there are 432583 households which provide 3147551 populations. Rural domestic water is supplied through pipe water and hand pump in the district. So far as, pipe water supply is concern, there are total 29 water tanks; out of it, 18 water tanks are used and 11 water tanks are not used in 2014-15.

Total domestic water supply capacity through water tanks are 1305000 gallon (5932530 liters) in using and not using water tanks, out of it, 990000 gallon (4500540 litres) pipe water is used in the blocks of Barharia, Goriakothi, Lakri Nabiganj, Basantpur, Pachrukhi, Hussainganj, Ziradei, Mairwa, Andar, Hasanpura, Siswan, Daraundha, Bhagwanpur and Nautan among 2423866 persons by 18 working water tanks. The highest user block is Basantpur (909200 litres), which is 20.20%% of total pipe water use and lowest user blocks are Goriakothi, Lakri Nabiganj, Ziradei, Hasanpura and Daraundha (113550 litres), which is 2.52 % of the pipe water use in the district. Average 1.89 litres water is facilitated for one person in the district. The highest water supply through pipe water in recorded in Basantpur block (5.25 litres /person) while lowest water supply is recorded in Siwan block (0.55 litres/person).

Besides, Total 315000 gallon (1431990 litres) water supplying capacity is found in 11 non- functioning water tanks. The people of five blocks like Siwan, Raghunathpur, Maharajganj, Guthani and Darauli are not using the water under pipe water supply. The highest not user block is Maharajganj and lowest not user block is Siwan, Goriakothi, Hussainganj, Darauli and Raghunathpur in these blocks.

Table 1

Pattern of Rural Domestic Water Supply and Use through Pipe Water, 2014-2015

Block	No. of Functioning and Using Pipe Water Supply Station	No. of Non-Functioning and Non-Using Pipe Water Supply Station	Water Capacity (In Gallon)					Total Water Capacity (In Gallon)	Total Water Capacity (In Litres)
			100000	75000	50000	40000	25000		
Siwan	-	**1**	-	-	-	-	**1**	**25000**	**113650**
Barharia	**1**	-	**1**	-	-	-		**100000**	**454600**
Goriakothi	**1**	**1**	-	-	-	-	**2**	**50000**	**227300**
Lakri-Nabiganj	**1**	-	-	-	-	-	**1**	**25000**	**113650**
Basantpur	**2**	-	**2**	-	-	-	-	**200000**	**909200**
Maharajganj	-	**2**	-	-	**1**	-	**1**	**75000**	**340950**
Pachrukhi	**1**	-	**1**	-	-	-	-	**100000**	**454600**
Hussainganj	**3**	**1**	-	-	-	-	**4**	**100000**	**454600**
Ziradei	**1**	-	-	-	-	-	**1**	**25000**	**113650**
Mairwa	**1**	-	-	-	**1**	-	-	**50000**	**227300**
Guthani	-	**2**	-	-	-	**1**	**1**	**65000**	**295490**
Darauli	-	**1**	-	-	-	-	**1**	**25000**	**113650**
Andar	**1**	-	**1**	-	-	-	-	**100000**	**454600**
Raghunathpur	-	**1**	-	-	-	-	**1**	**25000**	**113650**
Hasanpura	1	2	-	-	-	-	3	75000	340950
Siswan	2	-	-	1	-	-	1	100000	454600
Daraundha	1	-	-	-	-	-	1	25000	113650
Bhagwanpur Hat	1	-	1	-	-	-	-	100000	454600
Nautan	1	-	-	-	-	1	-	40000	181840
District	**18**	**11**	**6**	**1**	**2**	**2**	**18**	**1305000**	**5932530**

Source: **District PHED Department 2015, Siwan**

This scenario shows that many households of the rural areas are not using as much water for domestic purpose as they are expected to use. The water supplying capacity as per tank varies from 25000 gallon (113650 litres) to 100000 gallon (454600 litres) in the rural blocks of the district. The highest water supply capacity is found in six rural domestic water supply stations in the block of Barharia, Pachrukhi, Andar, Basantpur, Siswan and Bhagwanpur Hat. In these blocks there are 1103911 populations, which support 182787 households. Total water supply capacity is 700000 gallon (318220 litres) in these blocks during the study area. Average 1.58 gallon (7.18 litres) water is supplied and used as per person in the block of Barharia, Pachrukhi, Andar, Basantpur, Siswan and Bhagwanpur Hat. In the major parts of the study area Siwan, Maharajganj, Guthani, Darauli and Raghunathpur blocks have no working and using pipe water supply station. Most of the people suffer from the domestic water use under the supply of pipe water in these rural blocks of the district.

Moreover, hand pump is the main source of water supply for rural region of the district. Total number of hand pump in rural area is 492370 which support 507055 households in the district in 2011, which is equal to 97.10% of the total households of

the rural area of the district. Only two rural blocks like Raghunathpur and Siswan have excess hand pump from the availability of households which shows the over uses of water in domestic sector. Eight blocks have higher supplier and user of water than the district. These blocks are Hussainganj, Raghunathpur, Ziradei, Andar, Guthani, Daraundha, Siswan and Basantpur.

Table 2 also displays the variations of hand pump in the rural block of the district. The Barharia block has highest number of hand pump (50637). It has been followed by Siwan (30276), Bhagwanpur Hat (33875), Goriakothi (35894), Maharajganj (26426), Pachrukhi (32183), Darauli (26006), Guthani (20955), Daraundha (26755), Raghunathpur (25933), Hussainganj (27488), Ziradei (24669), Siswan (27289), Hasanpura (22806), Andar (17366), Lakri Nabiganj (19982), Nautan (13636), Basantpur (16658), Mairwa (13536) handpumps in 2011. The Mairwa block covers lowest number of hand pump in the district.

As household consumption, the district has 971 hand pumps as per 1000 households. The highest as per 1000 households is found in Raghunathpur block (1018) and lowest in Mairwa block (895) in 2011.

Table 2

Pattern of Rural Domestic Water Supply and Use through Hand pump, 2011

Block	Rural Households	No. of Rural Handpumps	% of Total Households	Used for Handpumps Per 1000 Households	Used for Persons/ Hand pump
Siwan	31371	30276	96.51	965	6.80
Pachrukhi	33000	32183	97.52	965	9.70
Barharia	52271	50637	96.87	968	4.42
Hussainganj	28123	27488	97.74	977	4.69
Raghunathpur	25470	25933	101.82	1018	4.06
Hasanpura	23488	22806	97.10	971	7.28
Ziradei	25117	24669	98.22	982	8.18
Nautan	14102	13636	96.69	967	13.41
Mairwa	15521	13536	87.21	895	12.10
Andar	17691	17366	98.16	982	5.18
Guthani	21530	20955	97.33	973	6.12
Darauli	27111	26006	95.92	959	6.70
Maharajganj	27580	26426	95.81	958	4.16
Goriakothi	36982	35894	97.06	970	4.39
Daraundha	26822	26755	99.75	997	5.59
Siswan	27095	27289	100.72	1007	5.64
Basantpur	17061	16658	97.64	976	10.40
Bhagwanpur Hat	35669	33875	94.97	950	6.51
Lakri Nabiganj	21051	19982	94.94	949	4.54
Total	507055	492370	97.10	971	6.39

Source: District Census C.D., 2011 and District Census Hand Book, 2011

It is seen in the table 2 that the pressure of population has profound effect on the use of hand pump in the different blocks of the district. The total population of rural block is 3147551 which support 492370 handpumps in 2011. As water consumption, a large variation is seen in the use of hand pump by the people of the district. One

hand pump is used by 6.39 persons in the district in 2011. The highest pressure of population is observed in the block of Nautan (13.41 persons/hand pump) while lowest is observed in the block of Raghunathpur (4.06 persons/hand pump) for the use of hand pump. Nine blocks have below pressure of population than the district. It shows the different level of consumption of water through hand pump.

Urban Domestic Water Supply and Use

The urban area of Siwan district is 305.67 Sq.km, which support 182913 populations. In urban area, there are two sources of domestic water supply such as pipe water supply and hand pumps. There are 13 pipe water supply stations, out of it 11 are using and 2 are not using in the study area.

Table 3

Pattern of Urban Domestic Water Supply and Use through Pipe Water, 2014-2015

Urban Block	Urban Population	Functioning and Using Pipe Water Supply Station	Non-Functioning and Non-Using Pipe Water Supply Station	Water Capacity (In Gallon)		Total Water Supply Capacity (In Gallon)	Total Water Capacity (In Litres)
				100000	50000		
Siwan	135066 (21223)	8	2	7	3	850000	3864100
Maharajganj	24282 (3757)	1	-	1	-	100000	454600
Mairwa	23565 (3626)	2	-	2	-	200000	909200
Total District	182913 (28606)	11	2	10	3	1150000	5227900

Source: District PHED Siwan, 2015

Note: Bracket ( ) indicates households of urban areas, Siwan

Total pipe water supply capacity is 1150000 gallon (522l7900 litres) in both working and non-working tanks. The high pipe water capacity is Siwan urban area, which has 850000 gallon (3864100 litres) while Maharajganj urban area has low pipe water capacity, which covers 100000 gallon (454600 litres) water in 2014-15. Out of total water supply capacity 1000000 gallon (4546000 litres) water is used among 182913 persons. About 86.96% water is used through pipe water supply at different pipe water supply stations in the urban areas. Siwan urban area uses 3182200 litres water under pipe water supply among 135066 populations. Siwan urban area uses 23.56 litres water by one person through pipe water which is higher user urban block of the district while Maharajganj urban area uses 18.72 litres by one person which is lowest user urban block of the district. Approximately 150000 gallon (681900 litres) water is not used in the urban area of the district due to not working pipe water supply stations **(Table 3).**

Table 4 Pattern of Urban Domestic Water Supply and Use through Handpumps, 2014-2015

Block	Urban Households	No. of Urban Handpumps	% of Total Households	Used for Handpumps Per 1000 Households	Used for Persons/ Hand pump
Siwan	21223	18010	84.86	848	7.50
Maharajganj	3757	3371	89.72	897	7.20
Mairwa	3626	3443	94.95	949	6.84
Total Urban Area	**28606**	**24824**	**86.78**	**867**	**7.37**

Source: **District Census Hand Book, 2011 and District Census C.D-2011, Siwan**

Hand pump is another source of domestic water supply in urban area of the district which concern 74472 households in the district. The highest hand pump is found in Siwan urban area (18010) and lowest is found in Mairwa urban (3443) area in 2014-15. It provides 86.78% handpumps of total households in the district in 2011. It also provides 867 hand pumps as per 1000 households in the district. The intensive pressure of population has been seen in the urban area of the district. The total population of urban area of the district is 182913 persons. The highest population is found in Siwan urban area (135066) and lowest is found in Mairwa urban area in the district. So, the highest pressure of population is found in Siwan urban area (7.50 persons/ hand pump) while lowest pressure of population is found in Mairwa urban area (6.84 persons/hand pump) during the investigation period**(Table 2).**

Planning for Maintaining the Existing Domestic Water Supply and Use Pattern

Planning for domestic water use supply is essential to maintain the existing domestic water use pattern. It consists of the fair and balance distribution of domestic water among the peoples in the rural and urban areas of the district. The objective of this planning is to attempt for optimum use of water for domestic purposes and to maintain the existing domestic water use pattern as far as practicable on groundwater availability. Population is an indicator which influences on domestic water use pattern and their planning to maintain the existing pattern for domestic water use. So, the analysis of population is important for scientific planning of domestic water use. The population of the district indicates that 3147551 peoples live in rural areas and 182913 peoples live in urban areas in 2011.The growth of rural population is 22.36 % and growth of urban population is 22.72% from 2001 to 2011. The growth of population under rural blocks varies from one block to another (**Table-5**).

Table-5
Growth of Population in Rural and Urban Area of Siwan District, 2001-2011

Block	Rural Population		Urban Population		Growth of Rural Population 2001-2011	Growth of Urban Population 2001-2011
	2001	2011	2001	2011		
Siwan	**162590**	**205917**	**109919**	**135066**	**26.65**	**22.88**
Barharia	**254934**	**312292**	-	-	**22.50**	-
Goriakothi	**181549**	**223709**	-	-	**23.22**	-
Lakri-Nabiganj	**106223**	**128899**	-	-	**21.35**	-
Basantpur	**82417**	**105229**	-	-	**27.68**	-
Maharajganj	**136511**	**165935**	**20860**	**24282**	**21.55**	**16.40**
Pachrukhi	**162503**	**201759**	-	-	**24.16**	-
Hussainganj	**147932**	**182794**	-	-	**23.57**	-
Ziradei	**138078**	163752	-	-	**18.59**	-
Mairwa	**74787**	89934	**18710**	**23565**	**20.25**	**25.95**
Guthani	**107264**	128155	-	-	**19.48**	-
Darauli	**143757**	174357	-	-	**21.29**	-
Andar	**94149**	110027	-	-	**16.86**	-
Raghunathpur	**134524**	157694	-	-	**17.22**	-
Hasanpura	**130081**	149580	-	-	**14.99**	-
Siswan	**120236**	153953	-	-	**28.04**	-
Daraundha	141198	173200	-	-	**22.66**	-
Bhagwanpur Hat	172749	220651	-	-	**27.73**	-
Nautan	73378	90714	-	-	**23.63**	-
District	**2564860**	**3147551**	**149489**	**182813**	**22.72**	**22.29**

Source: District Census C.D., 2001 2011

The five rural blocks cover higher than the total rural growth of population. These rural blocks are Goriakothi (23.22%), Basantpur (27.68%), Pachrukhi (24.16%), Siswan (28.04%) and Bhagwanpur Hat (27.73%) and remaining rural blocks cover below the growth of the district. These growths fall between 14.99 to 26.65 percent from 2001 to 2011. Along with the growth of urban population is 22.72% from 2001 to 2011. The highest growth is seen in Mairwa (25.95%) urban area and lowest is observed in Maharajganj (16.40%) urban area from 2001 to 2011. So, these growths have increased the demands of water for domestic use in rural and urban areas of the district.

Apart from it, use of old machines, tools and lack of proper domestic water supply have created the intensive pressure on domestic water use supply both in rural and urban area of the district. Hence, it is prime important to control over the problems and conditions for balance supply of domestic water in rural and urban areas of the district. The purpose of such control is to check the water supply activities like leakage of pipe water, condition of hand pump, overflow of water tanks, proper supply of water, mis-use of water, abuse of water supply etc. Indeed, the data for water use information and existing pattern of domestic water use supply in the rural and urban areas transparently provide base from which a development plan on domestic water supply is fabricated for the sake of the future use of water and to maintain the existing water use pattern in domestic sector.

To maintain the existing pattern of domestic water use a large volume of water and water supply infrastructure will be required for future generation. These are as follow:

1. The rural pipe water supply capacity should be 7280400.82 litres in the district in 2021.
2. The urban pipe water supply capacity should be increased 6393198.91 litres in 2021.
3. Total 604236.46 handpumps will be required in the rural area of the district.
4. In urban area, total 30357.27 handpumps will be required in the district.
5. As per person 8.32 litres water will be required by rural pipe water supply in the district.
6. In urban area, total 127.8 litres water will be required as per person in 2021.

Table 6

Proposed Plan to Maintain the Existing Pattern of Domestic Water Use and Supply Capacity in 2021

Block	Rural Domestic Water Supply Capacity				Urban Domestic Water Supply Capacity			
	Pipe Water Supply (per/person) in litres in 2014-15	Required/ Growth of Pipe Water Supply (per/person) in 2021 in litres	No. of Hand pump 2011	Required/ Growth No. of Hand pump in 2021	Pipe Water Supply (per/person) in litres 2014-15	Required/ Growth of Pipe Water Supply (per/person) in 2021 in litres	No. of Hand pump 2011	Required/ Growth of Hand pump in 2021
Siwan	0.55	2.07	30276	38344.55	28.61	125.04	18010	22130.69
Barharia	2.03	9.03	50637	62030.33				
Goriakothi	1.44	6.21	35894	44228.59				
Lakri-Nabiganj	1.25	5.87	19982	24248.16				
Basantpur	5.25	18.96	16658	21268.93				
Maharajganj	3.10	14.38	26426	32120.82	18.72	114.15	3371	3923.84
Pachrukhi	1.46	6.03	32183	39958.41				
Hussainganj	3.53	14.96	27488	33966.92				
Ziradei	0.56	3.03	24669	29254.97				
Mairwa	1.39	6.85	13536	16277.04	38.58	148.67	3443	4336.46
Guthani	2.31	11.84	20955	25037.03				
Darauli	0.65	3.06	26006	31542.68				
Andar	5.05	29.98	17366	20293.91				
Raghunathpur	1.08	6.27	25933	30398.66				
Hasanpura	2.05	13.71	22806	26224.62				
Siswan	2.95	10.53	27289	34940.84				
Daraundha	0.76	3 .35	26755	32817.68				
Bhagwanpur Hat	2.06	7.43	33875	43268.54				
Nautan	0.99	4.21	13636	16858.19				
District	**1.89**	**8.32**	**492370**	**604236.46**	**28.58**	**127.82**	**24824**	**30357.27**

Source: Compiled by Author based on Table 1, 2, 3, 4.

Conclusion and Suggestions

The above findings of the study explains not only the domestic water use pattern of Siwan district but also the significant development and patterns that can be achieved by adopting the planning with the available water and water use infrastructures. The population growth has increased the demand of water use in both rural and urban areas of the study area. The level of domestic water use pattern is not uniform in rural and urban areas of the district. The analysis of pipe water supply in rural areas highlights that the demand of pipe water use is higher than the other rural blocks of the district. The Basantpur block uses 20.20% of total pipe water use while five blocks like Goriakothi, Lakri Nabiganj, Ziradei, Hasanpura and Daraundha use lowest in the form of pipe water use. These pipe water supplies differs from one rural block to another ranging from 2500 gallon (113650 litres) to 100000 gallon (454600 litres).The highest pressure of population on pipe water supply is seen in the block of Siwan (0.55 litres/person) while lowest is in the block of Basantpur (5.25 litres/person) in the rural areas of the district.

Besides, the analysis of rural domestic water use through hand pump shows that one hand pump is used by 6.39 persons in the district. The highest pressure of population is observed in Nautan block (13.41 person/ hand pump) and lowest population pressure is observed in Raghunathpur block (4.06 persons/hand pump).The maximum households are facilitated by the handpumps. About 97.10% the total households of the district are facilitated for using the water in domestic sector in rural area. Total rural hand pump is 492370 which supplies among 507055 households in 2011. Along with the district has 971 handpumps as per 1000 households in rural area. The highest as per 1000 households is recorded in Raghunathpur (1018) and lowest in Mairwa (895) in 2011.

An observation of urban domestic water supply can be assessed through the pipe water supply and hand pump in the urban areas of the district. As pipe water supply, total 52217900 litres water holding capacity in 13 water tanks , out of total water tanks,11 are in working and using position and 2 are not working and using position. The highest pipe water capacity is recorded in Siwan urban area (3864100 litres) and lowest is recorded in Maharajganj urban area (454600 litres). Above 86% water is used through pipe water supply at different pipe water supply stations in the urban area of the district. As water consumption in urban area of the district, Siwan is higher user urban block (23.56 litres/ person) and Maharajganj is lower user block (18.72 litres/ person).A lot of water quantity (681900 litres) is not used by the people of urban area due to not working of pipe water tanks. On the whole, we can say that the special attention is required on the proposed planning for maintaining the existing pattern of domestic water use and proper supply of water. The pipe water supply stations which are not in use. These should be repaired for the use. An equal pattern of pipe water supply and hand pump based on use and need should be developed for the long time use and maximum benefit among the peoples of the district.

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