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DRINKING WATER BUDGET OF PUNE CITY: A GEOGRAPHICAL REVIEW

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Introduction:

The climate of Pune is very healthy. There is three main season, namely summer, winter and rainy season. The temperature ranges from 15°C to 35°C. The high temperature occurs during 15th April to 20th May, and lowest temperature occurs in the month of January. The average rainfall is 70cm with more rain during monsoon period. Below give the monthly average temperature and rainfall information about Pune.

Large scales of migration to Pune city create problems of enough water. Each person cannot get enough water for every day to their domestic use as per their need. In monsoon season, due to discharge of dirty and contaminated water, there are chances of spreading of epidemics.

As per study there is total 551957 and 514663, households and tap connections respectively (Census 2011). There is shortage of 37294 tap connections, if determine to provide a tap connection to each household. The low economic class residential people could not get enough water because such areas mainly have public tap connections. High altitude part of the city does not get water, as low pressure of water.

Review of Literature:

Kalantari (in 2002) had been studied the internal structure of Indian cities and from this study he developed his own formula to eliminate the bias of size and population. Pratibha Singh worked on 'Role of NGOs for Sustainable Development of Rural area in 2005'. Danielle C. Ompad, Sandro Galea, Waleska T. Caiaffa and David Vlahon studied the social determinants of the health of urban populations. Edmund J. Zolnik (in 2004) attempt work on 'the North American city Revisited: Urban Quality of Life in Canada and the United States'. A. Giannias study 'Quality of Life in Southern Ontario in 2003' by using Scalar Method to calculate 'Environment Quality of life'. Jeffrey Zimmerman (in 2001) has been made a contribution on the 'Nature of Urbanism of the new Urbanist Frontier: Sustainable Development, or defense of the Suburban Dream. Michael Pacione (in 2003) attempt work on "Quality of life: Research in Urban Geography'. Brian J. L. Berry study on 'Efficiency Frontiers: Urbanization and Development in 2001'.

Significance of the Study:

This studies very useful for planners, researchers, government management and society also, because its gives an idea about water availability for drinking

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purpose for Pune city, and daily consumption of water require for city.

Objective:

1. To find out the sustainable development plan for safe drinking water for Pune city.

Source of data:

Primary and secondary data have been used for this section. Primary data have been collected from Pune city. Secondary data is collected from the Pune Municipal Corporation, census of India, water supply department of Pune city.

Methodology:

Various maps and graphs have been used to find out ward wise sustainability. To identify sustainable development index used indices method of K. B. Baburajan and M. Stalin (Geographic information system for planning rural development programmes, K. B. Baburajan and M. Stalin).

Study Area: Pune city situated on the 18^0 31' North latitude and 73^0 51' East longitude. It has a strategic position in the valleys of Mula and Mutha, which join each other in the Pune city. In Pune city total 177 census wards with three Cantonment Boards namely Pune Municipal Corporation, Pune Cantonment Boards and Kirkee Cantonment Boards, more than 600000 households and more than 3.2 million people (according to Pune Municipal Corporation 2006).

Analysis:

Water requirements and supply:

At present Pune gets its water supply from Khadakwasla dam about 12 km from the city through right bank canal and a closed pipeline. Three more dams i.e. Panshet, Warasgaon and Temghar have been constructed on the same river, upstream of Khadakwasla. The storage capacity of these 3 dams is 900 MM^3 whereas the present annual requirement of city is about 200 MM^3 (Million Cubic Meter). It is estimated that 80-90% of the population is connected through PMC water supply. PMC serves a water supply of 195 liters / person-day (including water losses) against standard of 135 liters / person-day.

Drinking water is supplied to Pune Municipal Corporation through New Mutha Right Bank Canal. It was to tune of 5 trillion cubic meters (TMC) up to 1997. As the population of Pune city is increasing rapidly the demand for drinking water has also increased. In water planning of Khadakwasla Project, only 5 TMC water was reserved for drinking water purpose.

Though the water supply of Pune city is more than standard water supply per person, but there is large amount of waste water. This water waste due to break or to leak water pipeline, abuse of water, and use of water more than need. The total storage capacity of water is 29.05 TMC of Khadakwasla, Panshet, Warasgaon and Temghar. There is a need of water to Pune city is 14 TMC per year. But location of Pune city is east of the Western ghat, this part is under lee ward side of monsoon wind and known as rain shadow zone area. Irregular and indefinite rainfall occurs every year. Population growth is also increasing rapidly. Therefore stress on water supply in the month of May and Jun.

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6.7.2. Present condition of water storage shown in the table

Dams	Storage Capacity (in TMC)	Useful water Capacity (in TMC)
Khadakwasla	3.03	1.97
Panshet	10.96	10.65
Warasgaon	13.25	12.82
Temghar	3.72	3.61
Total	30.96	19.05

(*Source:* Water Supply Department, PMC, Pune.)

There are three main fresh water bodies i.e. Khadakwasala Lake, Pashan Lake and Katraj Lake. Khadakwasala is a moderate sized dam on the Mutha River. Water is one of the most critical services provided by Municipal Corporation. Water supply in the city, on a whole, seems to be adequate in terms of quantity and quality. There is four major dams surrounding area of Pune city, provides water supply to Pune city. High useful water capacity is available in the Panshet and Warasgaon dams. The total drinking water of these dams is 19. 05 TMC. In present, for drinking water to Pune city are 14 TMC provided by four dams. Pune Municipal Corporation serves water @ 195 / liters / day / capita. There are 17 pumping station having total of 109 operating pumps. At present there are 5 water works in Pune city.

Present Condition of Water Recovery:

Water is the most essential commodities and the city's behavior in terms of almost all development is related to the water availability and supply. There are many indicators to calculate water quality, supply and need such as water quantity, ground water resources, water availability, consumption patterns, access to safe drinking water, etc. For the evaluation water supply and water consumption has been considered.

Administrative Wards	Water Supply	WaterTax Consumption	Water Recovery
Max. Limit ⟹	70	30	100
Aundh	39	14	53
Karveroad	41	30	71
Gholeroad	28	11	39
Warje Karvenagar	34	3	37
B. S. Dholepatil Road	42	11	53
Hadpsar	27	20	47
Yerwada	39	15	54
Sangamwadi	26	3	29
Bhavanipeth	23	6	29
Kasbapeth	20	11	31
Vishrambaugwada	42	7	49
Tilakroad	36	19	54
Bibvewadi	38	14	52
Sahakarnagar	27	12	39

(Source: Water Supply Department, PMC, Pune.)

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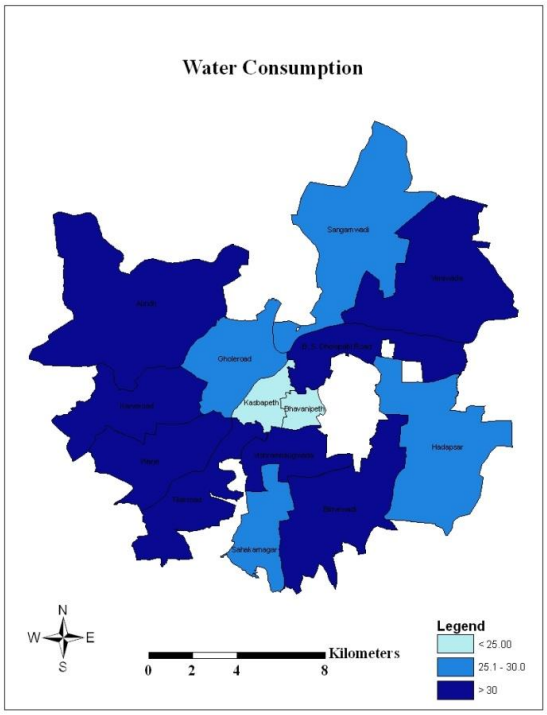
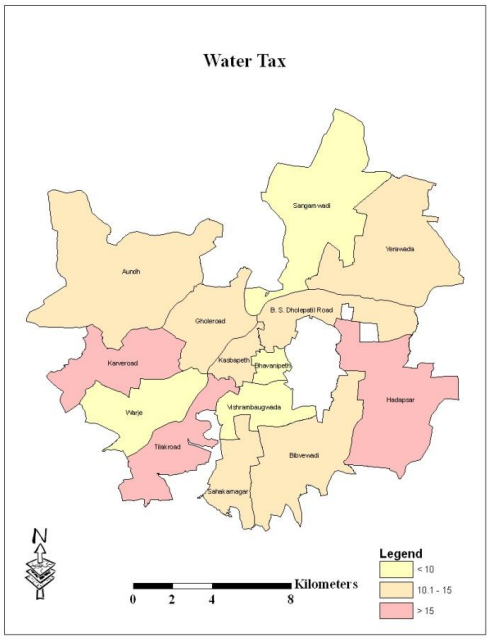
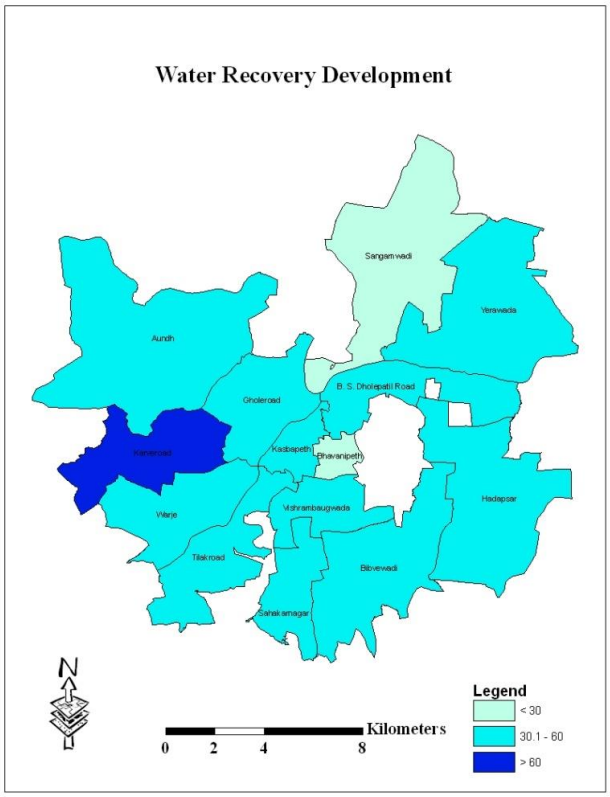
Though the quality of water much more important indicator than the quantity, the report of quality of water, says uniformity of every wards, because same water distributed all over Pune city.







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Conclusion:

After observing the ranking mechanism of water supply, it is clear that the water distribution is not uniform across the all Pune city, the city such that almost 50 percent of the wards are being over supplied of rater excess consumers whereas the other may have under standard consumption. The water consumption is high in the western part of the city and Yerwada, B. S. Dholepatil Road and Bibve. For the water tax point of view Sangamwadi, Bhavanipeth, Vishrambaugwada and Warje- Karvenagar are less than the other wards. The reason of that, these parts are having more slum population.

Thus, B. S. Dholepatil road, Yerwada, Bibvewadi and Sahakarnagar have over consumption with higher tax recovery whereas, Sangamwadi, Warje, Karveroad and Hadpsar are intermediate when compared to Aundh, Tilakroad and Gholeroad that require higher intervention as opposed to Vishrambaugwada ward showing major concern.

Sustainable Development:

Pune city is one of the old cities. Though the water supply per person of Pune city is higher than standard level, water leakage and water wastage is very high. There are old service lines of pipes, inadequate water distribution, high proportion of slum area and poor water demand management system.

Pune city need water for 24 hours for seven days in a week. This scheme can be implemented today's water volumes. There is no need of extra water or extra pumping station. There is a requirement of water audit, metering, leakage correction, rehabilitation of distribution system, construction of new water treatment plants, meter of every tap and refurbish the existing water distribution system. Water supply should be even in the every ward and every house. Water must be purifier and safe for drinking in every season including rainy days.

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