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Availability of Potable Water (A Case Study of Nimbahera City)

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Abstract:
Despite good rains and several ongoing projects to protect the city's beauty infinite, Nimbahera, Rajasthan, with a population of about 50.000 in the Mewar region, suffers from a general scarcity of water and a lack of potable water in particular. However, the availability of portable water (water that can be taken from one site to another, such as river water) does not solve the problem of potable water (water that can be stored and utilised for drinking purposes), because potable water must meet particular standards with permitted limits. Because of the good rains, the portable water supply in Nimbahera is adequate, but the problem is a lack of drinkable water in comparison to the population.
This is raising alarm among planners. Based on primary and secondary data, this article illustrates the disparity between the demand and availability of potable water in Nimbahera city in connection to increasing population, urbanisation, and industrialization. Data is displayed by graphs and maps made with Arc GIS 09, Coral, T.N.T. Lite, and Adobe Arcade.

Key Words
mld - Million Litres Per Day
lpcd - Litres Per Capital Per Day
llpd - Lakh Litre Per Day
bcum - Billion Cubic Metre
mbgl - Metres Below Ground Level

I. INTRODUCTION

Water abounds, but there isn't a drop to drink. The name "Blue Planet" is due to the fact that water covers three-fourths of the world. Fresh water accounts for only 2% of total available water. There is 68.7% in the form of glaciers and snow, 30.1% as underground water, and 0.9% as surface water.

Many countries, including India, have encountered a "water crisis" in recent years. In India, the two most major sources of fresh water are rain and snow. The average annual rainfall in India is 4,000 billion cubic metres, which is irregularly distributed both physically and temporally. The majority of the rain falls between June to September, during the monsoon season. In recent years, there has been a "water crisis," with precipitation ranging from 100 millimetres per year in Western Rajasthan to over 9,000 millimetres per year in North Eastern Meghalaya.

Rajasthan has a distinct geographical location, topographic structure, climatic conditions of continual high temperatures, low humidity, drier desertic conditions, environmental, ecological structure, and water-related problems. Unfortunately, Rajasthan lacks a single perennial river. Water is a limited resource, but it is necessary. Rajasthan is India's largest state by area and tenth by population. Rajasthan, on the other hand, barely has 1% of India's accessible water resources.

WATER:

Nearly 97.25% of all water is in oceans and about 2.05% is covered under ice, while only 0.70% is available for our direct use of which 0.60% as ground water and 0.10% in lakes, rivers and as vapour in the atmosphere above the available water nearly 70% is polluted, due to over population. The extensive use of the available water resource along with ground water has led to decrease in the availability of water. Many parts of the globe suffered from water scarcity at the time of need.

At global level even the highly industrialized countries of Temperate latitudes, which can be categorized as 'water surplus regions, tend to suffer from scarcities caused due to higher level of drinking water consumption rates and the very high rate of its use in three main industrial purpose of cooling, processing and steam generation. The majority of third world countries, located mainly in the Tropics and Sub Tropics tend to

suffer from water scarcity usually and more fundamentally by natural factors whereas their ever-growing human number and its influences have also contributed towards this problem only recently.

As a consequence of the activities of over fertilization, excessive application of berbicides and pesticides, under the intense pressure of green revolution, changing ideas of hygienic living, increasing rate of industrialization and urbanization, changing cropping pattern from food grains to commercial items for economic gains, greater water demand has accounted not only to the ever increasing scarcity of water for drinking and problems of salinity, alkalinity and drainage in canal irrigated areas but the more serious concern is the steepened rate of underground water table of which Nimbahera is no exception.

In India the major source of water is rain and snow. India receives an average annual rainfall equivalent of about 4.000 billion cubic metres (bcm). This sence of water is unevenly distributed both spatially as well as temporally. Most of the raintail if con of the rainfall if confined to the monsoon season from June to September and levels of precipitation vary from 100 mm a year in Western Rajasthan to over 9,000 mm a year in North Eastern Meghalaya.

With 3,000 bcm of rainfall concentrated over the four monsoon months and the other one thousand bcm spread over the remaining eight months. India's rivers carry 90% of water during June to November and only 10% of the river flow is available during the other 6 months. It is estimated that around 700 billion cubic metre of water soaks into the ground, 1150 billion cubic metre flows as surface run off

Spatially, the utilizable resource availability in the country varies from 18.417 cubic metres in the Brahmaputra valley to as low as 180 cubic metres in the Sabarmati basin, Rajasthan, with 8.5% of the country's population has only 1% of the country's water resources.

The fresh water demand for agriculture. Industry and fast growing urban centes is expected to double by 2025 .In the rural areas, where the majority of India's population lives ground water resources account for 80% of domestic water supply 50% of the urban & industrial water demand is met by ground water and 50% of all irrigated area is fed by this source. Moreover, in drought ground water is the prime one of water for irrigation Rain water by itself has been found to be inadequate to meet the domestic needs. Even areas with heavy rainfall Cherrapunji, for example face water scarcity. Owing to deforestation, soil erosion -, the rain water does not percolate in the ground to feed the spring

India will be a "Water stressed nation by 2017. This signifies that it will face acute water shortages for prolonged periods. There is also the risk of water pollution in cities as they generate approximately 2,000 crore litres of sewage per day and treat only 10% of it, the rest flows out to merge with ground water or even surface water which results in drastic increase in water borne diseases and deaths. The Central Ground Water Authority says that in various districts of the differ states of India the water level has fallen more than 4 m since 1982. The situation is serious regarding the quality and quantity of fresh water in states

IMPORTANCE OF THE PROPOSED PROBLEM

The surface water available in the Nimbahera region whole and sole depends on the amount of rainfall humidity conditions and temperature. In the Nimbahera region the trend of rainfall has been decreasing since 1990 when it was 111.60 cm and in 2001 it was 77.23 cm.The Urban town is facing severe potable water problems. Our impressive gains in technological capabilities to find transport and conserve fresh water may not be able to meet ever increasing demand of it.

The water available for agriculture and non-agricultural purposes is not only surface water but even the underground water is exploited to such a great extent that the water table is going deep down, having an adverse impact directly on the quality and quantity of water and indirectly on human health. The availability of water and specially drinking water is becoming a major issue of discussion in the region because neither the qualitative nor the quantitative distribution of it is sufficient enough along with the time of supplying it.

The present paper deals with the problem of conservation and management of the available water in the Nimbaheraregion of Chittaurgarh district . In the present context keeping its historical background in view and giving planning strategies of the problem to make study helpful to the planners, the departments of water management and above all the people of Nimbahera who at present are facing a severe potable water problem for which they have to wait for very long time and then also they have to compromise with quality of the water available to them. Keeping in view concept of sustainable development, which is defined as a strategy that meets the needs of the present without compromising the ability of future generation to achieve their own requirement.

OBJECTIVES

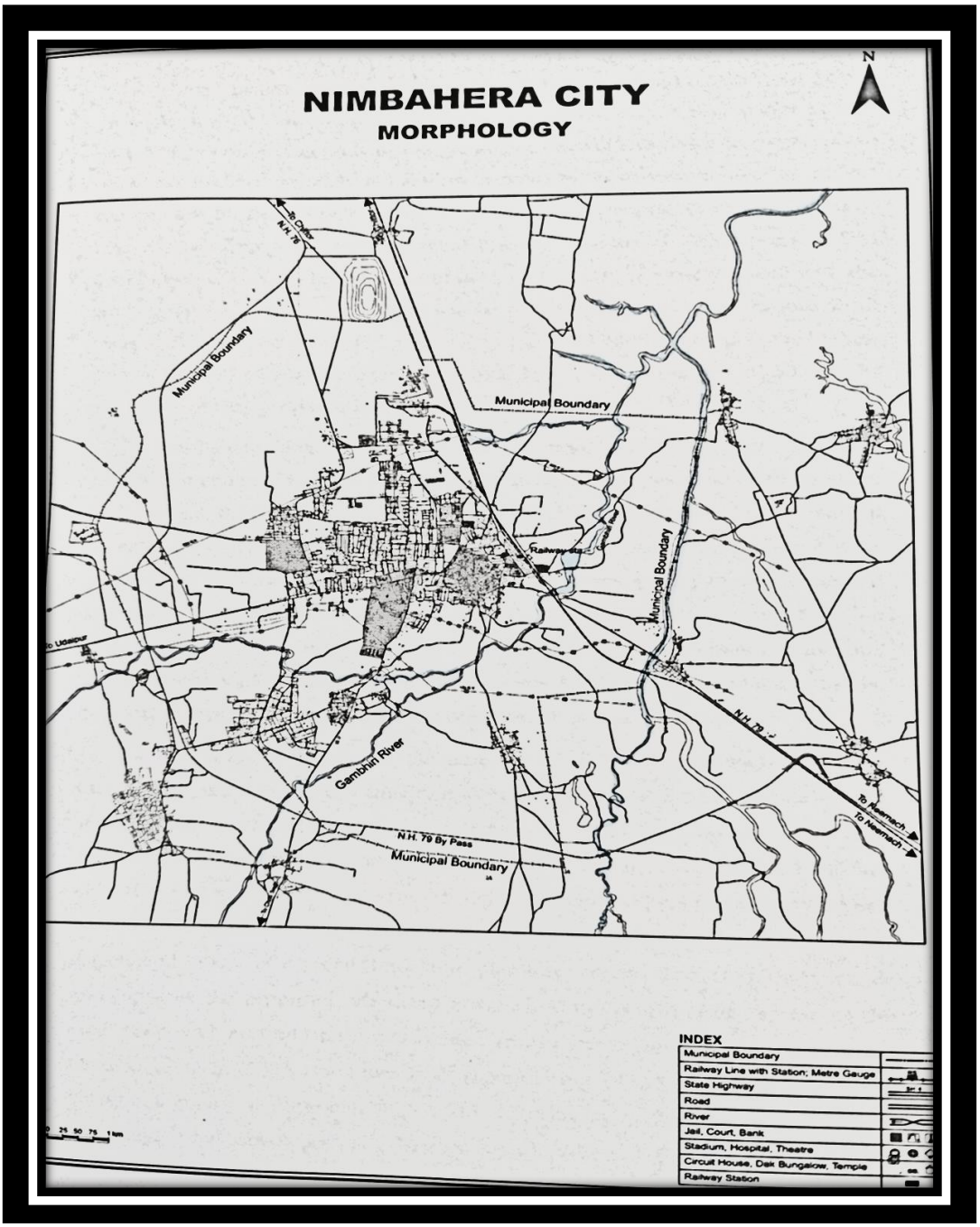
- To study the Hydrology and the Hydrograph and the status of potable water in the Nimbahera
- To study quality of the water and its distribution pattern in various cities of Nimbahera.
- To say the conservation and management of potable water in the cities of Nimbahera.

HYPOTHESIS

With the increase in population the demand of potable water increases but water being a natural resource is limited. Hence future seems to be bleak.

AVAILABILITY OF WATER :

Nimbahera had remained a town since 1901 and registered a slow but steady growth of population reaching 27,566 in 1941 but for a by 21.45% in 1911. There was a spurt in its population growth by 53.45% between 1941-51, followed by a dip of plus 10111% in 1961 and therefore with a continuous space of progress and reaching a tie off 67.83% in 1981, which is the fourth highest growth rate amongst all the 27 urban places of the region. It may further be noted that about 80% of its population is engaged in non agricultural activities. It is well commected with the neighboring areas by the network of railways and roadways. Limestone in this area its available in abundance. Besides cement, agriculture based industries like ground oil has been an important manufactured product. Quarrying, dressing, crushing and polishing of stone have also provided the town with various economic activities as shown in figure given below:



HYDROLOGY:

Hydrologic cycle is a simplified model of the continuous flow of all forms of water on, in and above the earth's surface. It has been defined as total plan of movement, exchange, and storage of earth's water in gaseous state, liquid state and solid state. In other words, hydrologic system is the complex cycle through which water moves from the ocean to the atmosphere, to the land and back to the ocean again. It involves water in rivers, lakes, glaciers, and oceans, in the atmosphere, and in the pore spaces in the rocks beneath the surface.

Of all the resources of the earth, none is more fundamental to life than water. The properties of water in its three physical states (liquid, solid & vapour) make it by far the most useful of compounds. We can breathe it (water vapour). drink it, bathe in it, travel on it, or see beauty in its different forms. It is a raw material, source of power, waste disposal agent, solvent, medium for heat transfer, or coolant as the needs of modern technology may require. The high specific heat of water, its ability to exist in gaseous, liquid or solid forms under natural conditions, and its capacity for storing or releasing latent heat with changes of state give it immense influence on atmospheric processes. At the same time, making it available at different times and places is a function of weather and climate. The restless atmosphere is the most active agent in the constant redistribution of water on earth's surface- a fact that becomes even more striking when we realize that only a minute fraction of one percent (0.0001%) of earth's water is contained in the atmosphere, and if, at any time, all the atmospheric moisture were precipitated, it would create a layer averaging about 2 mm deep over the entire globe.

The sources of water have a great variation throughout the world due to topography, climate and rock structure of a particular India receives an average annual rainfall equivalent of about 4,000 billion cubic metres (bcm). This source of water is unevenly distributed both spatially as well as temporally. Most of the rainfall is confined to the monsoon season from June to September and levels of precipitation vary from 1000 mm a year in Western Rajasthan to over 9.000 mm a year in North Eastern Meghalaya. With 3000 bcm of rainfall confined over the four monsoon months and the other 1,000 bcm spread over the remaining eight months. India rivers carry 90% of water during June- November and only 10% of the river flow is available during the next six months. Spatially, the utilizable resource availability in the country varies from 18417 cubic metres in the Brahamputra valley to as low as 180 cubic metres in the Sabarmati basin. Rajasthan for instance, with eight percent of the country's population has one percent of the country's water resources. The Central Ground Water Authority says that in 286 districts across 18 states.Water levels have fallen more than four metres in the last 20 years from 1982 (Behl Swati, et. al. 2003).

Fresh water is the most precious basic resource, yet great differences occur in the quantities available to man from place to place on the surface of the earth. Water in the Mewar region is available as rain water, surface water & underground water varying in its qualitative and quantitative distribution

Changing Pattern of Rainfall (1950-2007)

Mewar region experiences the period of monsoon every year from the month of July to September. Both the quantity and quality of rainfall are of prime importance because it is the only replenishable source of the surface and ground water. The nature and amount of rainfall directly affect the water level in the water of the region. Moreover, the pattern of rainfall in the catchments area is also a factor of considerable importance, which supplements water in these reservoirs through various local "nalas" and "streams. Even a short delay in monsoon commencement results not only in scarcity of water for irrigation or industrial uses but for drinking and domestic purposes as well.

Most of the rainfall in the region is received from the Arabian Sea branch of the South West monsoon, though at times, the Bay of Bengal branch also causes precipitation. The South West monsoon season, June to September, is the principal rainy season when over 95% of the annual rainfall is received through 32 rainy days in a year. July is the wettest month of the year sharing 80% of the total annual rainfall. The annual variability of rainfall in the region is over 30 per

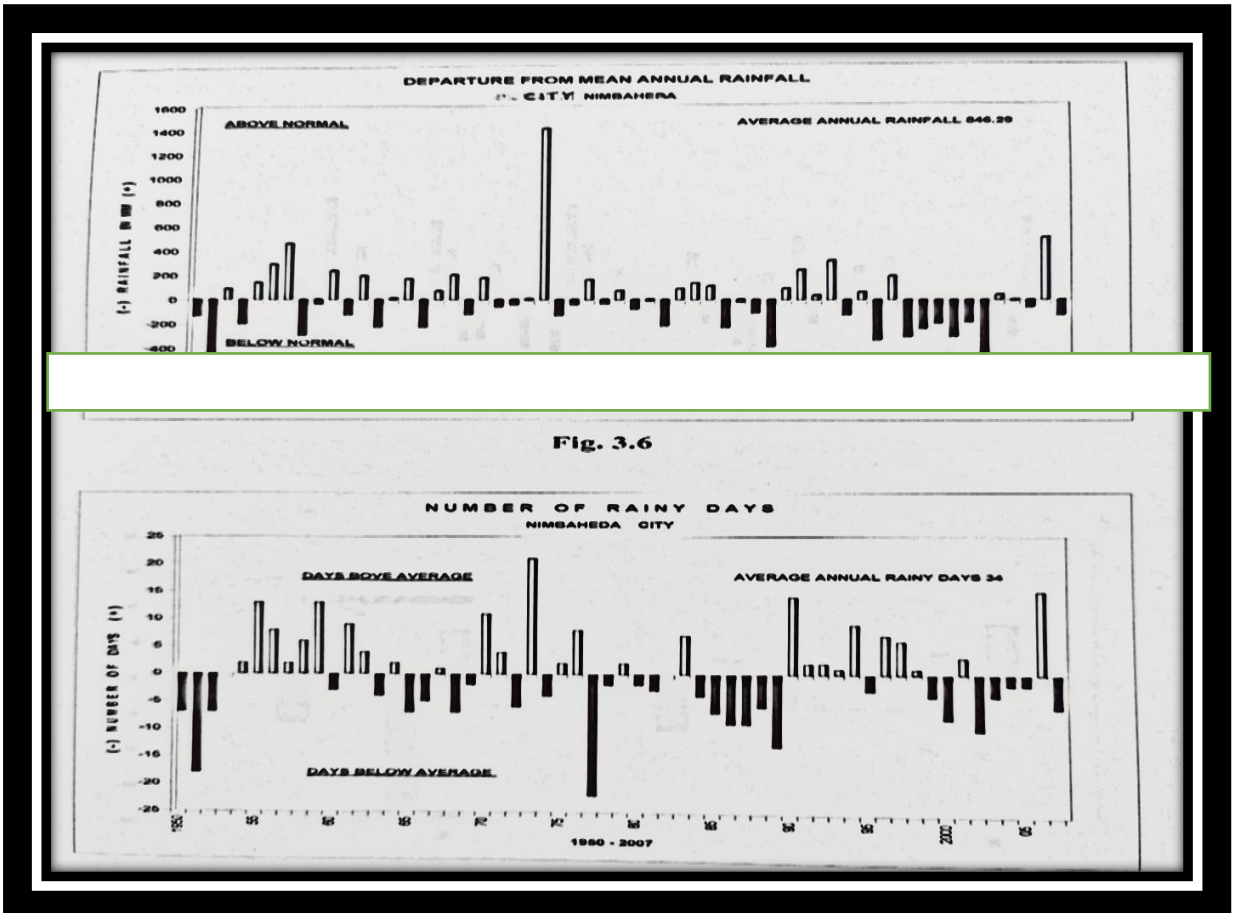


Fig. 3.6

Nimbahera city has average annual rainfall of 846.29 mm. The maximum rainfall in the city has been 2263.0 mm in the year 1973 and the minimum annual rainfall was 388.6 mm in 1951. 31 years experienced rainfall below average and 26 years received more rainfall. Average number of rainy days was 34 and in 1977 the rainy days were minimum whereas in 1973 it was maximum. The figure given above shows that the last decade had experienced less rainfall and a smaller number of rainy days than the average in the city.Nimbahera having 719 mm of rainfall in the same year which is relatively less in comparison to the data of other years.

WATER RESOURCES:

Water remained reserved in nature in various forms called water reservoirs. Rivers, lakes, tanks, anicuts, open wells, tube wells, baovries etc. are various types of water reservoirs of the Mewar region. They can be broadly classified into surface sources and underground sources.

The presence of fresh water in any area depends upon the amount of transpiration, evaporation, run off in the streams, and porosity of the soil. Precipitation that occurs in these urban areas of Mewar region flows of in the form of rivers. Most of the water is either lost in evaporation or by seepage in the soil. Due to wide fluctuation in precipitation, the pronounced low water periods tend to promote water storage and irrigation through reservoir construction. The streams, lakes, ponds, or Tals form the main sources of surface water in the region in range of 25 to 50%. Broadly they may be categorized into- (1) Rivers or streams and (2) Lakes or tanks. The major sources of surface water in urban area of Nimbahera having population above 50,000 arediscussed below.

Rivers of the Chittaurgarhdistrict in which Nimbahera city lies are Banas, Berach, Bamini, Bagali, Bagan, Orrai. Gambhiri, Seebana, and Jakham& Mahi .

Taking study area Berach and the Gambhiri rivers are the main sources of surface water for Chittorgarh district. Berach River passes through West to Northern part of Chittorgarh city and Gambhiri River flowing from South eastern part of Nimbahera.

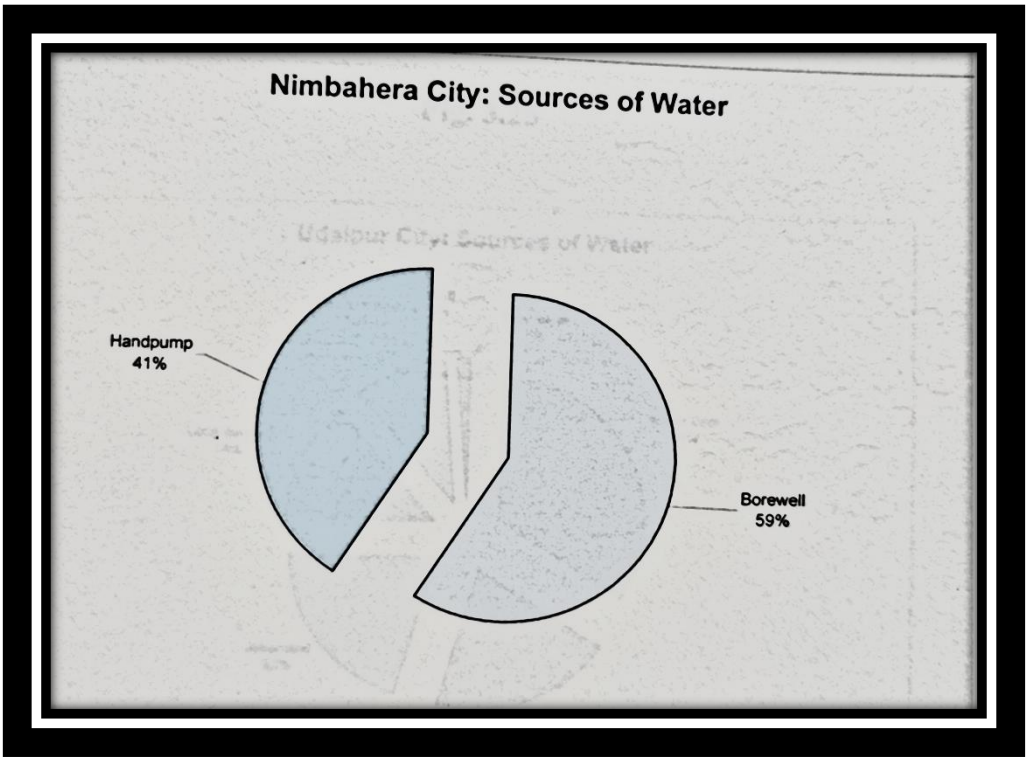
Rainfall from 1991 to 2007 had been mostly in the months of July, August and September. The maximum number of rainy days in a month had been 17 days in 2006 in Nimbahera in the month of August.

Bhopalsagar is in Chittorgarh. It has full tank gauge 18.00 ft, live storage capacity 650.00 mcft, dead storage capacity 5.00 meft, 13 mcft water was reserved for the PHED during 1998-99. Its capacity forms 60 to 650 mcft depending upon the yearly rainfall.

Bherdamines Are of Birla cement works in Chittorgarh is an example which has benefitted towards the regular water supply of factory as well as partly to the people of Chittorgarh town in critical time since last decade.

The use of ground water depends mainly upon the accessibility, dependability and quality. In Nimbahera, the availability of ground water varies greatly from region to region following the various water bearing formations.

The slope conditions also affect the level of water in the ground sources. There is great fluctuation in the levels of ground water. The level of water rises in periods of heavy rainfall and falls in the years of drought. Similarly, in the pre monsoon period the water level goes down and in the post monsoon period it rises.



Exploitation of groundwater in last 20 years there has seen continuous downfall in the underground water level, near about 0.30 m every year. This has been due to excessive growth in population, increase in industrialization and increase in irrigated area with three crops a year and more water consuming crops.

Wells are the principal source of irrigation. They irrigate 1916.90 sq km of the total irrigated area of Chittorgarh district including Nimbahera and Chittorgarh Chittorgarh city is a zone of limestone formation. The pre monsoon conditions of underground water in the year 2001, 2005 and 2007 were dry, 14.50 mbgl and 6.10 mbgl respectively whereas post monsoon depth to water was 5.42 mhgl. 6.25 mbgl and 6.15 mbgl in the year 2001, 2005 and 2007 respectively as shown in figure 3.18. This throws light on the fact that underground water consumption is increasing and the recharging of underground water is not sufficient.

Nimbahera city is also a zone of limestone.. In 2001, 2005 and 2008 the pre monsoon depth to water was 19.52 mbgl, 16.74 mbgl, 16.50 mbgl, respectively and post monsoon depth to water was 12.20 mbgl, 8.20 mbgl, and 13.20 mbgl, in the year 2001, 2005 and 2007 respectively. Nimbahera pre monsoon depth to water from 2001 to 2007 has been more than 16 m below ground level which throws light on the over exploitation of the underground water in the region. The post monsoon conditions in 2006 and 2007 had been at a depth of 6 m which indicates good, precipitation in the region.

As underground water plays an important role in meeting the demand of potable water in the city of Nimbahera. It has maximum number of handpumps i.e. 507 it has 20 borewells, 78 tubewells.

The seasonality of rainfall has increased the dependence on ground water resources. In the absence of wide network of surface storage system, ground water is the only source of supply of water especially during summer. Though long term use of water is not favourable but due to exigency the dependency on ground water

has increased since independence and has seriously increased since last decade. Sources of water supply to Nimbahera city are 20 bore well and 14 hand pumps .There are 5 ponds in Nimbahera .

The Chittorgarh district including the city of Chittorgarh and Nimbahera has a prominent mining industry .The ground water is over exploited in the district at 2095 mcft. People are actually mining ground water resource which is disastrous to the health and efficiency of the aquifers and ground water structures and sustainability. The ground water levels in the district of open wells vary from 5 m to 20 m in May 1989 and 10 m to 25 m or dry in May 2003. The conjunctive use of surface and ground water is called for safe yields and utilization of water resources. In the year 2004 due to rainfall infiltration and recharge through streams, river anicuts and tanks in monsoon there has been exceptional rise in ground water levels in wells and boreholes, at places in the vicinity of anicuts.

It is the degree of urbanization which is an indication of level of economic and social development of a region. A lower level of economic development is indicated by a lower degree of urban development from the very beginning and at least chronologically According to 2001 census, and 54 urban settlements with a total population of 1,323,160 persons. The process of urbanization remained very slow till 1981 when as many as six places were declared as urban which were two in 1911, nil in 1921, one in 1931, 1941, two in 1951, again nil in 1961 and 1971 as per the then census. History of at least 1500 years, is now receiving a new lease through the process of modernization, activated by the establishment of large number of industries for which favourable infrastructural facilities exist in course of time this North South industrial nucleus may form an important part of the more extensive North South 85 km long Bhilwara-Nimbahera manufacturing belt .

Nimbahera had remained a town since 1901 and registered a slow but steady growth of population reaching 27,566 in 1941 but for a decline by 21.45% in 1911. There was a spurt in its population growth by 53.45% between 1941-51. followed by a dip of plus 10.11% in 1961 and therefore with a continuous space of progress and reaching a rise of 67.83% in 1981, which is the fourth highest growth rate amongst all the 27 urban places of the region. It may further be noted that about 86% of its population is engaged in non agricultural activities. It is well connected with the neighboring areas by the network of railways and roadways. Limestone in this area is available in abundance. Besides cement, agriculture based industries like ground oil has been an important manufactured product. Quarrying, dressing, crushing and polishing of stone have also provided the town with various economic activities .

Nimbahera does not contain sewage treatment plant. The waste water is disposed of into the local streams, rivers, ponds.

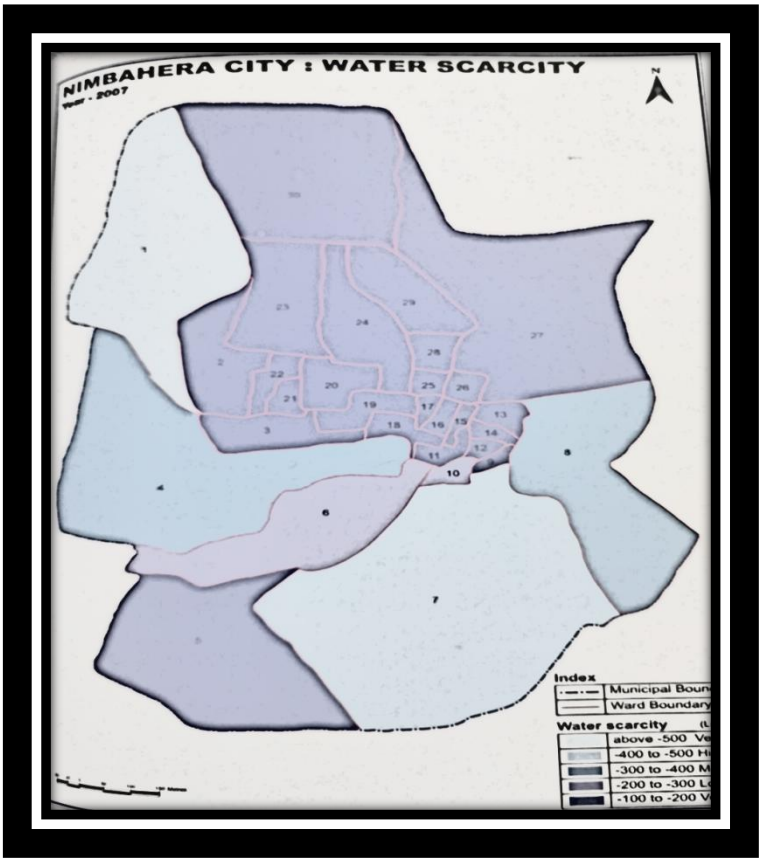
With the increase in population the areas of this city extended and their land use pattern changed in which more non agricultural activities increased including urbanization, industrialization. This directly and indirectly affected the availability of water in relation to its quality & quantity. In short due to change in environment the quality and quantity of water has been affected with the passage of time in the five cities under study.

In the past when the population was less, environment was less exploited and degraded, there was larger forest coverage and the spans of rain were sufficient enough to recharge the surface sources as well as underground water sources. At that time the surface water reservoirs like lakes, kunds, baovriesetc. were enough to meet the local demand of the city,Nimbahera. With the increase in population the areas of this city have extended and it'slanduse pattern has changed, in which more non-agricultural activities increased including urbanization. industrialization. This directly and indirectly affected the availability of water in relation to the quality and quantity.

The cityof Nimbahera having population above 50,000is facing numerous problems related to water, since last few years. The city has transformed into drought prone areas due to frequent drought occurrence in the past decade because of erratic nature of rainfall. During this period the city has experienced hot and dry spells. The water sector of it has faced multifaceted effects on their economy.

If we look at per person demand of the city we may conclude that there is wide fluctuation in itNimbahera 60 lpcd, The reason for this is population and the sewerage line. Sewerage line in the city is the deciding factor of demand. The Nimbahera area has the sewerage line very less there the demand is considered to be between 30 lpcd to 40 lpcd..

In perspective with the availability of water other than rainfall. The other sources of water are wells, tanks, borewells, tubewells, handpumps etc. But the fact is, that these sources are also dependent on rainfall. Though groundwater is available but not at the extent of the demand because of extracting problems from the depth.Sources of water supply to Nimbahera city are 20 bore well and 14 hand pumps.



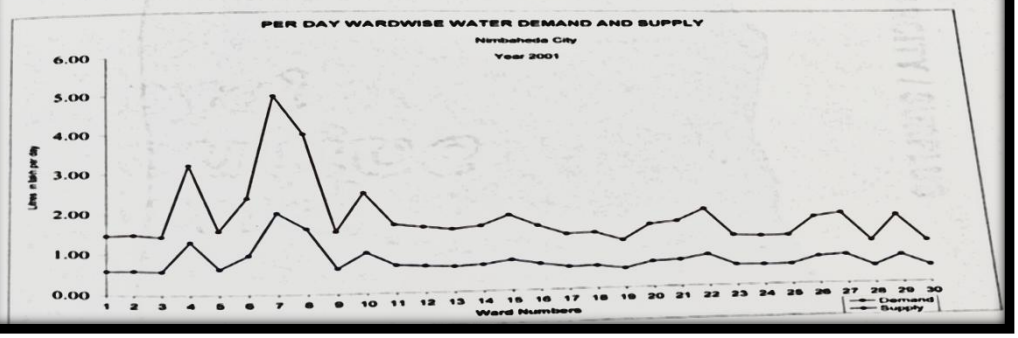
A similar trend is noticed in other units of the study area . Where the degree of scarcity is not so high and from 2001 to 2007 there has been a decreasing trend i.e. the margin of scarcity between demand and supply is minimizing. The scarcity index is reported to be positive that is the supply more than the demand in Nimbahera where there was no scarcity in 2007 because of introduction of new techniques, increasing the capacity of the reservoirs, and connecting the unit with the other sources of water.
The per capita average annual freshwater availability has reduced from 5177 cubic metres from 1951 to about 1869 cubic metres in 2001 and is estimated to further come down to 1341 cubic metres in 2025 because of rapid increase in population and resource being limited.

From the above study we may conclude that the potable water which is the prime need of the people has been a major problem. It has been observed that. as it is a general principal, that availability of water is not uniformly available and distributed in all the five cities. Though geographically the Mewar Region almost falling under the similar physical conditions and the population also increasing with the similar trend but the rapid expansion of Urbanised areas has in general aggravated the problem and hence the demand and supply of water is badly affected by this fact. This fact has resulted a different graph of man water ratio which also depends on the demand and supply of water in the entire region. Thus, the present trend of demand and supply and man water ratio showing the general water in all the units.

Nimbahera City: Per Person Demand and Supply

Years	Population (In Lakh)	Per Person Demand (lpcd)	Per Person Supply (lpcd)
2001	53321	61	41.2
2002	54300	61.5	36.8
2003	57800	59.4	51.9
2004	59300	59.5	59.0
2005	60800	59.5	59.2
2006	62300	59.4	59.4
2007	63800	59.7	59.6

Source: Computed



Role of department in management of potable water

Looking to the management conditions the role of departments like PHED, Ground Water Department, Rajasthan Urban Infrastructure Development Programme, Urban Improvement Trust, Municipal Counciletc. becomes more important because these are the departments supplying water to the areas according to the demands. More particularly it is the solely responsibility of PHED which supply water as per the demand in the areas. Therefore, if it is the proper management and channelization of water supply than there is less problem or otherwise. Therefore, at first glance they have to collect the information about the demand of the different parts of their command and then they have to regulate the supply of water on an equity basis.

Potable Water Demand & Supply inNimbahera city:

Water demand is the amount of water required for drinking purpose and the supply is the amount of water given to meet the requirment. The water demand is established on the basis of design criteria as per the guidelines given by PMC, which states that 85% domestic and 15% slum figure has been considered as per the field situation which out to be 135 lpcd for domestic and 70 Ipod for slums.

For communities with population upto 20,000, water supply through stand post should be 40 lpcd (min) and 70 lpcd for house connection. Communities with population 20,000 to 1,00,000 it should be 100-150 Iped. And for communities above 1,00,000, it should be 150-200 lped (as per manual) central Public Health and Environmental Engineering Organisation, New Delhi.InNimbahera town where the population was 53323 in 2001 the service level was 40 lpcd and water and the water supply period interval was 2 days. Water supply considerably decreases with the beginning of summer season in all the cities under study. It is at interval of 1 to 3 days. The drinking water sources include surface as well underground water sources. Nimbahera had 20 bore well and 14 hand pump working.

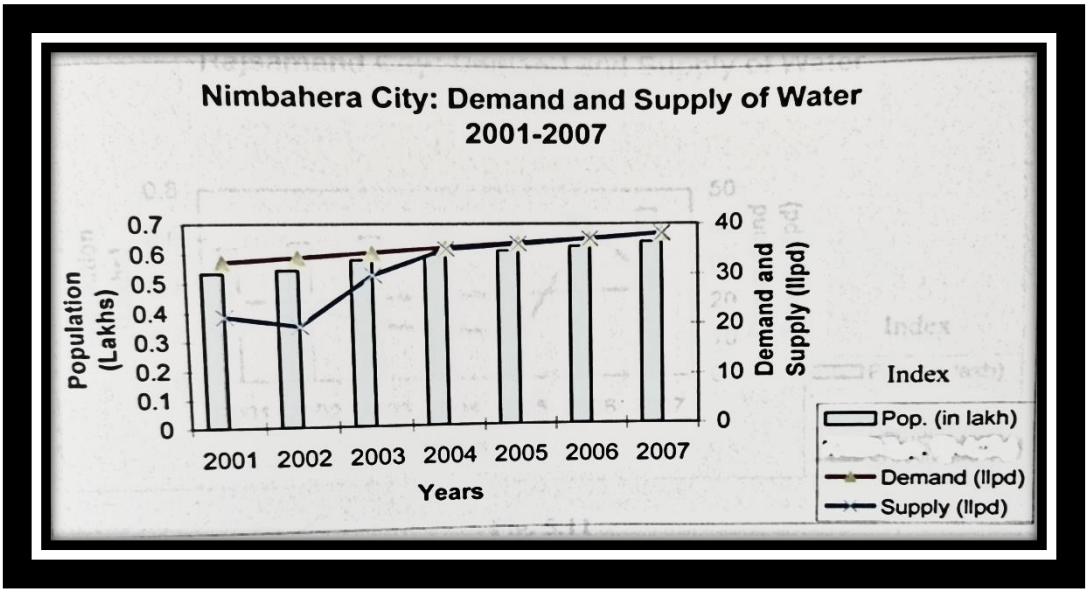


Figure above shows the situation of Nimbahera city in relation to demand, supply and population which shows an increase of growth in population and demand. The supply was very less in 2002 but in 2003 the situation improved. In 2004, 2005, 2006, 2007 the supply of water to the city was at par with the demand because of wells being dug.

The coeffiecent of correlation was computed shows that when we compute the correlation of demand and supply of water in unit of study, it reveals the following picture. It is interesting thatNimbahera comes under the very high category of demand and supply that means there is very narrow margin of scarcity, in other works water is abundantely available or supplier of the demand. This is clearly indicated by the 0.93 correlation value of demand and supply.

Duration of water supply in various wards of the city shows that ½ hour water supply is at ward no. 12 Laxminath Temple, Joona Bazar, ward no. 20 Hudko Colony, ward no. 28 Chandanapura area for 1:30 hours. followed by RamhaagrCluppa Mohalla of ward no. 30 gets water for 3 hours all the year along rest all other wards receive water for 2 hours during winter.

The city of Nimbahera also gets water supply after 24 hours and for 1 hour in all the seasons ward no. 2 has a hand pump upto 160 feet only ward no. I's Kasoda Darwaja gets water after 2 days, ward no. 13, 14, 15, 16, 32 gets water supply during morning. Rest all get during evening out of the 32 wards of the city.

II. CONCLUSION

The city of Nimbahera has been facing potable water scarcity due to the following reasons:

- Unplanned residential expansion in cities
- Uneven and erratic nature of rainfall .
- Surface and underground water sources are tangible
- Population explosion.
- Increasing water demand.
- More Demand ,less supply.
- Lack of coordination among departments (e.g., Cigation, PHED, Nape Palika, UIT, RUIDP, and so on.)
- Absence of a water supply management system
- Overexploitation of underground water.

III. SUGGESTIONS

Due to the erratic nature of the rainfall it is suggested that the wastage of water should be checked through rain water harvesting techniques which will check

- The lowering down of ground water levels.
- Rooftop harvesting, as well as rainwater harvesting, should be legally mandated for new construction.
- Day to day activities of people need a change like bathing.

- Such methods in daily chores should be practised which reduce the consumption of water.
- The water bodies should be conserved to make the supply of water adequate.
- There should be a standard procedure for boring wells.
- The use of lake water should be done with caution.
- Water from other surface sources should not be overexploited (talab, baovries etc.)
- Water bodies should be protected from pollutants such as garbage, solid waste, hotel sewage, and excessive boating, among other things.
- A treatment plant for polluted (dirty) water should be built.
- Old pipelines should be replaced, and leaks in pipes should be checked immediately to prevent water waste.

If the various measures suggested in this work are practised generously, the doomsday forecasters for mankind will be proven incorrect, and man will continue to enjoy the use of good quality potable water for a long time to come, and the doomsday fears will have to eat their words as they will be proven incorrect. The final remarks made are not the end in themselves, but rather guidelines for future development.

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