Chapter-5
Major findings and Strategic Approaches for Drinking Water Quantity and Quality
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MAJOR FINDINDS AND STRATEGIC APPROACHES FOR DRINKING WATER
QUANTITY AND QUALITY FOR THE TOWN

5.1 Introduction

Next to air, water is necessary of life. We can not live without it for more than a few days. Just as without air we cannot live for more than a few minutes. The United Nation has recognized access to water as basic human rights. Provision of safe water is one of the most effective tools to improve the wealth status of communities. It has been estimated that the burden of sickness in the world would be reduced nearly 80 per cent if it is possible to safe water to the people every where. As of 2005, 12 per cent of Indian population or 127 millions people (92 millions in village and 35 millions in towns) where without clean drinking water supply. Intensive national and international efforts are being made to have potable water for all by year 2010.

Safe drinking water is basic need of human development, health and well being; which is also internationally accepted as human right (WHO, 2001). More over, it has been viewed that as infinite and bountiful resource water today defines human, social and economic development in India. Water supply and sanitation were added to the national agenda during the first five year planning period (1951-56) and increasing investment base. The health burden of poor water quality is enormous. It is estimated that around 37.7 million Indians are affected by water borne diseases. It has been estimated that die 1.5 m children due to diarrhea alone and 73 millions working days are lost due to water borne diseases each year. The resulting economic burden’s estimated at $600 millions a year. The problem of chemical contents in water there are also present in India with 1, 95,818 habitants are effected. The major chemical parameters of concern are fluoride and arsenic and iron is also emerging as a major problem with many habitations showing excess iron in the water samples.

The provision of clean drinking water has been given priority in the constitution of India with “Article 47” conferring the duty of providing clean drinking water and improving public health standard to the state. The government has undertaken various programmes since independence to provide safe drinking water to the people. Till the 10th plan an estimated total of Rs. 1,105 millions spent on providing safe drinking water. One would argue that the expenditure is huge but it is also true that despite such expenditure lack of safe and secure drinking water continue to be major hurdle and become a national economic burden. On the one hand the pressure
of development, changing nature of distribution of water in country access to adequate water has been cited as the primary factor responsible for limiting development. The average availability of water is reducing steadily with the growing population and it is estimated that by 2020 India will become a water stressed nation. Ground water is one of the major sources of drinking water in our country on which, 85 per cent of populations depend.

The 2001 census reported that 68.2 per cent of the households in India have access to safe drinking water. According to latest estimates, 94 per cent of the rural population and 01 percent of people living in urban have access to safe drinking water. However coverage actual supply over a sustained period or the quality of water being supplied which is most essential part. Water quality problems are caused by population and over exploitation. According to UNICEF/WHO/Planning Commission figures 5.1 shows that India is almost on course to meet the 300 Millions Development Goals (MDGs) Target for water and sanitation in urban areas by 2015 despite these rapid changes, between 1990-2000, India reached 8 mm extra people who require water per year as shown in figure 5.1 below.

![Urban Water Coverage in India](image)

Figure 5.1

The urban official did not give greater weightage to physical and financial progress rather than to the quality, reliability and sustainability of services. For instance, the coverage of drinking water in urban area was reported to be 91 per cent in the 55th round of National Sample Survey in 1998-99. However 59 per cent of the urban population received drinking water only from a public source to which they did not have role access. In water Aid India's experience, public sources often provide insufficient amounts of water and for intermittently in congested urban areas. In fact the survey noted that 15 per cent of the urban households did not get sufficient water from their principal water source during the month of April, May and June, it is therefore hard to believe that
90 per cent of urban population of India had access to safe and adequate drinking water in 2001. Poor quality, regular shortages in supply, weak infrastructure and high leakages are also major problems confronting the provision of urban drinking water.

Global consumption of water is doubling every 20 years. According to United Nations study, more than one billion people on the earth already lack access to fresh drinking water, 40 per cent people live in countries, where water is scarce by 2025; this is expected to rise to 66 per cent. The greatest environmental disaster afflicting the planet is the source of dirty drinking water. Dirty water kills 2.2 millions a year in developing countries. Most of the victims are children. In India water availability per capita which was earlier 5,000 cubic meters, has now dropped to 2,200 cubic meters. In fact the country is fast approaching a phase of extremely stressed water availability conditions. This is also affecting the quality of water very seriously with concomitant adverse effect very seriously effect on the health of the people. As per 2001 census reports, only 74 millions households in the country had a source of drinking water within their houses; 25 millions had the source near the house while a whopping 32 millions still had to travel long distance to fetch water. Only 36 per cent households (or about 70 millions) have access to tap water and equal per cartage drink untreated water from hand pump.

5.3 Major findings of the study
• There is a huge demand supply gap in drinking water in the study area. There is also huge gap in demand and supply per capita consumption of water at different level of income group. Main reasons are:-
   - Declining the level of underground water level
   - Growth of urbanization
   - Unequal distribution of water supply in different wards
   - Irregular Supply of canal water
• It has been estimated that safe drinking water supply to the habitants is not satisfactory in the town.
• Out of 23 wards, a very few of them i.e. 8.75 per cent households are consumes water above 80 LPCD, but there is an increasing trend in requirement of drinking water over the year.
• The water supply is not equally distributed in wards due to old pipe line and poorly maintained.
• There is not a satisfactory report of 50 per cent households in regard to supply of drinking water by the Public Health Department and the remaining households received water from alternative sources.

• It was noticed during field study that not more than 50 per cent households received drinking water supply through tap by the Public Health Department while they claim that they provide tap water to 85 per cent households.

• There are few households who pay dues according to the water meter reading while remaining have no any such type of facility through which they can pay dues.

• The quality of drinking water in the town was not good due to solvent of turbidity, fluoride TDS, Nitrate and Copper. They produced diarrhea, bone pain, and dysentery.

• There are only two sources which provide drinking water for the town, i.e. (i) tube well and (ii) canal water after filtration. Canal water is effective for a period of 15 days. So remaining 15 days people face many type of problem to fetch water for their domestic purpose.

• It is also evident that over the year (2001-2010) the requirement for domestic purpose has been increased. According to the demand the water was not supplied throughout the years by the Public Health Department. During the period 2001 to 2005 the per capita consumption has been increased to 40 liter i.e. 100 to 150 liter and it further remained constant during 2005-2010. But the existing per capita consumption has been decreased 105 LPCD, 80 LPCD and 75 LPCD during 2001, 2005 and 2010 respectively.

• As claimed by the Public Health Department that they provide supply water through tap to the 85 per cent households, while it has been recorded through field survey data that there are only 49.82 per cent households have direct tap water supply. But remaining house holds received water from alternate sources i.e. 1.82 per cent households have outside tap, 8.73 per cent households have community sources, 14.18 per cent households use municipal tanker water supply, 23.89 per cent households depend on private water supply like tankers and 1.64 per cent households have their own source i.e. hand pump or bore wells.

• The per capita consumption is also less than prescribed per capita consumption level. There is huge demand of supply water. The required amount of water depends on private arrangements like private tanker.

• It has also been noticed that on average per capita drinking water consumption seem to be worst in the wards 9 to 15 in the study area. Based on income group, it is accounted that per capita
consumption of drinking water is not the same. It varies from high to low income group. It has been noticed that as the income is increasing, the amount of consumption of water has also been increased. For example the lowest income group (less than Rs. 5000 per month) households they consume 50 LPCD, while it is increased by 87 LPCD in high income groups (Rs 15000 and more). This reflects that higher income group consumes more water for their domestic purposes than that the lower income group.

- Based on primary data it has been noticed that almost 40.36 per cent respondents used 50-60 LPCD everyday followed by 31.64 per cent respondents use less than 50 LPCD, 19.27 per cent respondents 60-70 LPCD and only 8.73 per cent respondents use above 7 LPCD water, while public health department has reported that they provide 80 LPCD per day. Over all in terms of per capita consumption of water is high in wards 1 and 2. Except 1 and 2, almost other remaining wards received less than 80 LPCD.

- It has also been observed that the availability of tap water is not the same in the whole town. According to the field survey only 7.82 per cent households have supply water for few hours twice in a day, 23.09 per cent households got once time in a day, 26.91 per cent households after one day gap, 26.73 per cent got once in a gap of two days and 15.45 per cent households did not reply. It reveals that the tap water is unevenly distributed.

- It has also been recorded that water consumption is far lower than the norms laid down by the urban water supply authority of the town.

- The quality of water is also very poor which spread several type of water borne diseases like cholera, typhoid, jaundice, and gastro enteritis. Which effect directly or indirectly on human health. Cholera and dysentery are two major diseases which effect much more people and spread throughout the town.

- There is no any type of alternate facility which could help in the improvement of drinking water quality. Very few households have aqua guard facility.

- There is no any type of water testing laboratory in the town for testing the contamination water.

- The patients of water borne diseases have been increased during 2001 to 2010. According to civil hospital information the total number of patients of water borne diseases has been recorded 1373 in 2001 which has been increased by 2853 and 3223 during 2005 and 2010 respectively. It indicates that the diseases spread very fast rate due to unsafe quality of drinking water.
• It has also been recorded that the water borne diseases are much more affected to the people of poor income group. A very big percentage (33.75%) of people effected by the water borne diseases who have income less than Rs. 5000 per month

5.3 Some important strategic approaches for improvement drinking water supply in the town

Hence an the above findings there has been made an attempt to the lesson the drinking water supply and related diseases of the town. It has been seen that these are various problems against of the people. One of the major issue decaling underground water level at very fast and hence the town has no any other alternate source of water supply except the canal. This problem creates specially in summer season. Another problem is that supply of drinking water is not safe, which produced water borne diseases like cholera, typhoid, gastroenteritis, jaundice and dysentery. According to civil hospital in 2001 total number of cases of water borne diseases patients was 1373, in 2005 it was increased 2858 patients, then in 2010 the patients which affected by water borne diseases increased up to 3223. According to civil hospital data dysentery is more effective diseases which are spreading very fast. Supply of drinking water is irregular. The data related to drinking water supply indicated that only 11 per cent households of the town received water daily two times, while 35 per cent households received often one day or remaining 54 per cent households get water after two or more days. So due irregular supply of drinking water people face may type of problems to get it. So it may be concluded that a common definition of coverage and its assessment is required for all national level surveys. Functionality of improved source, usage and water quality have to be included in these norms otherwise there is no point to claiming 98 per cent coverage for urban drinking water at national level. The main problem arises before us that there is no outline from government to study the problems of drinking water supply for a small town.

There has been noticed that the urbanization trend is increasing high vulnerability of urban lively hoods and insecurity the higher financial allocations mobilization for same cities and not other. All these provide the moral imperative include urban water as a development goal for coming decades. According to field survey, it has been noted that big income group people have better water supply. For example sector I and ward 2 (officer colony) have more than Rs. 15000 per month get better water supply, while the poor people of ward 9, 10, 11 specially Scheduled Caste people did not get drinking water up to small satisfaction. Due to this problem people of this ward faces many difficulties to get drinking water. Through the field survey it has been found that,
those people who have monthly income group more than Rs. 15000 have 120 LPCD, while those people who have income less than Rs. 5000 per month or below get 60 LPCD. Since different options for delivery of water to the urban poor in the state potential for free minimum drinking water along with a slab based water tariff that cross subsidies poor consumption levels is also possible.

So Public Health Department municipal committee and state government should be given more attention to improve existing sources of water supply in poor income group for sustainable development of the town.

**Effective policy for the sustainability of safe drinking water**

Increasing un sustainability of drinking water schemes, there is a need to identify water point exclusively for drinking water needs of the community and corporate. This remains the legal and administrative frame work of urban governance so that these water points are considered a common property resource and any treat to its sustainability is countered by administrative action. If this is not done merely increasing funding will not solve the problem of increasing water distress. Urban drinking water needs a long term planning safe disposal. The current discourse on right to drink water and priority for drinking water in the national and at the state level water policies is not matched with the reality of budget allocation and the projects on the ground. A planning is being proposed to water boring level approach in most state and national budgets planning. Strengthening regulation for safe drinking water provision is also required.

**Monitoring of water quality, access and affordability**

Effective monitoring of access, quantity and quality of water is a key consideration of the town. Given a large investments and big programmers and schemes including the current thrust of sector reforms, absence of good quality of monitoring of parameters of health and hygiene, status of other complimentary services like electricity and delivery charges, social aspects of access for the marginalized and poor communities programmers and schemes, subsidies and campaigns interface between different agencies etc. is not being done properly.

At the national level, the size of the country and the complexity of the situation, regional and national level bodies that monitor the progress of water and sanitation coverage and financing requirements should be constituted with sufficient participation of the civil society. The NGOs for urban water supply community monitoring systems shall be provided. Water quality and water
usage through charges these should also required for supporting higher level planning and monitoring.

**Establish water testing laboratory and filtration plant**

It has been found through field survey that water supply and quantity the town is not good. Unsafe drinking water has been the cause for spread of several harmful diseases i.e. cholera, typhoid, gastroenteritis, dysentery, jaundice and some other water borne disease. This water also contaminated from large amount harmful chemical, which are dissolved in it which is injurious to health. In summer season more people are affected by dysentery and cholera. Hence there is a need of water testing laboratory for testing the contaminated harmful chemical which dissolves in the water. Narnaul town has only two filtration plants which are situated near Patikra village and Nasibpur village which filter canal water only. Remains in sources of water supply could not provide good quality of drinking water. For the safe drinking water a filtration plant may be installed near water boosting stations.

**High technological water treatment**

Once water contaminated it should be detected at the water source points. Due to unsafe or untreated water cause borne diseases like diarrhea, gastroenteritis, cholera, typhoid and jaundice etc.

**Table 5.1: Treatment of Contaminated water**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment Method</th>
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| Turbidity               | • Cloth filtration  
                         | • Slow sand filtration  
                         | • Candle filtration |
| Odour                   | • Aeration  
                         | • Boiling |
| Colour                  | • Slow sand filtration  
                         | • Carbon filtration using charcoal |
| Bacterial impurities    | • Boiling  
                         | • Chlorination  
                         | • Slow sand filtration |
so to control these types of diseases improve in water quality by using some appropriate high treatment tech method. It indicates that table 5.1 shows some suitable techniques which improve the water quality and make water drinkable. If above mentioned treatment methods are applied before the use of drinking water, may be saved from various diseases.

**Alternate source of water supply**

This is a major issue of scarcity of drink water due to growing population pressure and decaling level of underground water table and lack of rainfall. Narnaul town is basically depending on two main sources like tube well which provide 65 per cent from tube well and 35 per cent from canal water of total water supply. In which some tube wells are dry due to decaling underground water table because of irregularity of rainfall. According to public health department the supply of tube well was 8,25,000 gallons during 2001 but it has been increased the quantity and has been increased by was 11,83,000 gallons per day by during 2005 because of establishment of new tube wells near by villages, while the number of tube wells is the same but amount of supply of drinking water has been decreased even after 5 years. The supply of canal water was the same in 2001 to 2010 which is 5,80,000 gallons. Through the field study it has been noticed that canal water may be made effective after treatment a gap of 15 days. For the solution of this type of problem, there should be developed a technique for water harvesting and increase the storage capacity of canal water or filtration plant for providing water during the time when filtration is in the process.
Effective education

Today after food, clothes, home next safe water is an important part of our life. But today it is a great problem that only 0.07 per cent safe water is available on this planet. There is no doubt that water and sustainable development are inter link and viewed as water is an infinite and bountiful resource. Water today define human, socio, economic development depend on adequate supplies and management of fresh water resources but also to save it. One of the most important plans is to start effective educational programmed to minimize down stream health impact of safe drinking water. Human health is also depend on whole some and reliable supply water and safe sanitation. The various components which are present in major concentration in potable water are calcium, magnesium, sodium, potassium, chloride, sulphate, carbonate, bicarbonates, some proportion of aluminum, barium, boron, fluoride, iodine nitrate, iron, magnesium and trace should elements which is dissolved in water and make unsafe and untreated. But a layman does not know about drinking water quality. So start some effectable education programmes about drinking water quality and its impact on human’s health. It can be played an important role for management and to lessen an impact of untreated unsafe drinking on human health. The Government should also be chalk out some educational effective programme to disseminate to knowledge of about drinking water problem.

Misuse of drinking water meter facility

Fresh water is being a limited source of drinking purpose on the planet. We should use it as per requirement. It has been found out that there is no proper limit of use of water for domestic purpose. So public health department should also provide water meter facility for each and every household, so that people start using properly and wastage of water can be controlled.

Privatization of water supply

The poor performance of water supply by the public health department, there should be encouraging private sector participation. If private sector partnership is to be encouraged they at first will have to create credible regulatory mechanism. Without such facility to ensure quality, equity and sustainability, private sector participation will only prove disastrous for the people.

Awareness of drinking water quality

One of the major challenges is to make people aware on the need to consume safe water. It is well known fact that clean water is absolutely essential for healthy living. Adequate supply of fresh and clean drinking water is basic need for all human being on the earth so the government
should support civil society and organization involved in increasing awareness. An integrated campaign can also be helpful in wide spread information dissemination amongst the masses on the ways and means of preventing contamination of water source.

There is an urgent need to enhance the monitoring network by establishing monitoring stations across the region and seasonal assessments of all water sources. In case of contamination being detected, an action plan for dealing with should be provided. Today unsafe drinking water or water quality is a big issue for human development. Unsafe quality of water cause many type of water borne diseases, so well equipped laboratories with well trained staff should be provided.

**Dissemination of technology and research**

Water is necessity of life. After air, so it is very compulsory to use better quality of water. But today unsafe untreated water is created big problem for human health. To solve this type of problem provide appropriate technology and related research for improvement and pay the attention of adequate supply in the town. Many type of research which is related to drinking water is fruitful to solve the problem at different level. Special attention should be given on drinking water quantity, quality and impact of unsafe drinking water on human health.

**Improved in water quality and quantity**

Water is basic requirement for human being. No any thing lives without water. But today there is a major problem which creates every town is unsafe quality of drinking which produce many type of health problem. Narnaul town has also faced the same problem especially in dry months like June, July. Due to unsafe quality of water many type of water borne disease spread all over in the world. The health burden of poor water quality is enormous. While accessing of drinking water continues to be a big problem, assuming that is it a safe which is a challenge by itself and stop the socio-economic development of the town or a country. Another problem is quantity of drinking water. Due to decline level of underground water some tube wells are dried. Except canal no any other alternate source is available for drinking purpose. So State Government should also pay attention for the town to solve the water supply problem by providing following techniques.

**Recycling the waste water**

Recycling of water in different sector can be effected means of higher availability of water for the consumption of households. The recycle of water can be used for low toilet purpose,
gardening, agricultural for washing. It has been seen in the sample 550 households of Narnaul through primary survey that there is no one households which use it.

**Sustainability and equity of water**

Sustainability in urban water supply is addressed mainly through supply side augmentation. As said earlier that permanent source of water supply in the town is tube wells but the level of underground water table is going down and some tube wells are dried. So augmentation plans are generally gigantic and engineering oriented and has greater acceptability all levels. The demand management is the least preferred option. However when it is related for payment of water charges, the decision is invariably with the elected government and not with the executing agency, which has depend on the grants for operation and maintenance, for sustaining the quantity and quality. The unaccounted problem of water such as leakage in water supply pipe systems and illegal tapping reduces water availability. The average water loss in leaking water supply systems varies from place to place and it is generally between 10-20%. Dedicated efforts to plug the leakages are required in addition to demand management measures for achieving the sustainability and equity.

**Management of demand and supply of drinking water supply**

There is a huge gap between the demand and supply of water in the town, which is also growing day by day due to declining under ground water level. Table 3.9 highlights that the supply of water is decaling and demand of water will be increased because of growth of population; the per capita consumption of domestic water for different purpose has also been decreased. Demand management is necessary to achieve sustainability. So some important techniques such as recycling and reuse of water, reducing the water demand through rain water harvesting, proper use etc may be introduced. Proper metering of water and rational tariff would also be a tool reduce water demand and encourage conservation.

**Tenth five year plan strategy**

The tenth five year plan envisages the provision of potable drinking water to every settlement in the country on sustainable basis and the pursuit of all possible measures of the rapid expansion and improvement good quality of basic drinking water quality. But after even after this tenth five year plan, it has been noticed that no a single ward have good amount of water supply. Hence any type of plan is made effective by fixing the responsibility of the related official.

**Establishment some water purifier plant**
It has been noticed that about 75 per cent communicable water borne diseases spread over due to unsafe drinking water. There are 60 per cent improvement water filtrations plants established at common places for improving the drinking water quality and also control the water born diseases. These are some households who have high income group people may manage their own purified system like Reverse Osmosis system, while economically poor people could not do this type of facility. Therefore the filtration plant should be provided by the government and also does the maintenance of leakage pipe lines.

**Public and private partnership**

It is an after important provision of assuring safe drinking water for all which is an arduous task for the government. Therefore besides the state government, private sector, municipal committee. NRIs, NGOs etc. should be encourage to share is reducing the burden of provision, operation and maintenance of safe drinking water resources.

These are some suitable approaches which help to the improvement of drinking water quality and quantity of town.