

Water Balance Management in Urban Sector

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Abstract

In India, there is a rapid population growth which is accompanied by migration of people from rural to urban areas. By 2025, one half of India's population is expected to get shifted to urban centers. In future the population will increase and hence the demand of water will increase. Present water demand of the urban sector is being fulfilled through water intake from nearest River and supplemented by exploration of ground water. The 275 rivers (out of 445) have been declared as Polluted River (Central Pollution Control Board). The ground water table is decreasing day by day due to high and unscientific exploitation of ground water storages. From city survey it is clear that in pre-monsoon season maximum wells become dry or almost dry. Further due to development of capital city the water table is expected to get lower and lower with the pace of rapid expansion and growth of the cities. The available Ponds (natural resource of ground water recharging) have been destroyed till the date by the urbanization. Urban development adds impervious surfaces, and therefore increases surface runoff and decrease infiltration. 80% of Drinking water flows in drain as sewer. Rainwater falling on the land surface contributes to the formation of runoff. The storm water generated by human activity alerts the natural water balance and cause flooding, loss of property, water pollution and water shortage during dry periods. Demand of water is increased 20 times within last 20 years. Water can be utilized only to the extent of its recharge hence balanced exploitation of water resources is essential. Present paper focus on the need of balanced water resources management of water in urban sector.

Keywords: pollution, urban, water

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INTRODUCTION

Water forms the life line of every society. Base of life on earth is water. Since ages, the civilizations have flourished near the water resources such as river banks, lakes and sea shores.

With the unbounded use of water to meet the needs of over growing population, the water resources no more remained resilient.^[1] Leonardo da Vinci termed water as the “driver of nature.” The 21 century has been declared as the century of Fresh water Management.

In overall development of urban centers and for smooth functioning of the city, water resources play a vital role.

Apart from the challenges of water availability, major attention needs to be paid to their management in urban context i.e., achieving maximum gains within the constrains through efficient use of all resources.^[2]

Urban development adds impervious surface, which increase surface runoff appreciably and decreases infiltrations and evaporation to maintain the urban water

balance. The global water Use has grown almost three times faster than the population growth rate. The 80% potable water flow as sewer (goes into the drain). The demand of water is increased 20 times within last 20 years.

Water issues are local issue. Once cannot deplete an aquifer in Town A, than recharge ground water in Town B located 500 miles away, and say the everything is balanced. Town A's aquifer will remain depleted until the particular aquifer is recharged locally, at the watershed level.^[3]

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This calls for wider range of reforms in urban sector and a shift in focus:^[4-7]

- From water resource development towards water resource management.
- Supply oriented approach towards demand driven approach.
- Disjoint water management towards Conjunctive water management.
- Use maximization and extraction towards Use efficiency and conservation.
- Treating water as social good towards treating water as economic and social good.
- Centralized operations towards Decentralized operations.
- Top down approach towards participatory approach.
- Public sector management towards public private partnership.

Source: World Bank (1999).

STATUS OF RIVER IN INDIA

As per report of Central Pollution Control Board, there are 445 rivers in India.

During the 2009 the number of polluted rivers was 125 and now 275 (out of 445) rivers are polluted.^[2]

State wise polluted rivers in India are following:

State	River(s)
Bihar	Ganga, Harbora, Manusamar, Ramrekha, Seersia
Chhattisgarh	Kharun, Mahanadi, Sheunath, Hasdev, Keli
Delhi	Yamuna
Haryana	Yamuna, Ghaggar
Jharhkand	Bokaro, Damodar, Jumar, Karo, Koel, North-Koel, Sankh, Swarnarekha
Punjab	Ghaggar, Satlaj
Uttarakhand	Ganga, Suswa, Dhela, Bhella, Kosi
Uttar Pradesh	Gomati, Hindan, Kali, Ramganga, Rapti, Rihind, Sai, Saryu, Ganga, Yamuna, Kosi

Source CPCB.

In 2009, from 650 metropolis town city 2009-38254 million liter sewage flow in river without treatment and now 62,000 million liter sewage flows in river.

Year	Availability of water in India per person yearly	Remark
1951	5177 Cu.M.	
2001	1820 Cu.M.	
2050	1140 Cu.M.	Expected

Source: Sankarnarayan K. (2005): *Urban Water Supply-Challenges Ahead, Presentation Made in XII World Water Congress of the International Water Resources Association Held on November 25–26, 2005.*

As per the International Standard Availability of Water per person yearly should not be less than 1000 m³. At present the availability of water per person per year is 2208 m³ including Brahmaputra and Barak river and 1583 m³. Excluding The Brahmaputra and Barak River; when the participation of industries is 8% only and expected 18% up to 2025. Brahmaputra and Barak river Basin have 16,589 m³ water availability. The Sabarmati river Basin has only 360 m³.

STATUS OF GROUND WATER

Water store deposited since millions of years are looming in crisis. Continuous declines in water level of around 15 m at a

rate of 1.7–4.4 m/year observed in urban area. The ground water table is decreasing day by day due to high and unscientific exploitation of ground water storages. From city survey it is clear that in pre monsoon season maximum wells become dry or almost dry.

URBANISATION

In India, there is a rapid population growth which is accompanied by migration of people from rural to urban areas. By 2025, one half of India's population is expected to get shifted to urban centers. Pattern of Urbanization in India is characterized by concentration of population and activities in large cities.

Urban development adds impervious surface, and therefore, increases surface runoff appreciably and decreases infiltration and evaporation to maintain the urban water balance. 60–80% of potable water goes into the drain. Demand of water is increased 20 times within last 20 years.

Rainwater falling on the land surface contributes to the formation of runoff.

The storm water generated by human activity alerts the natural water balance and cause flooding, loss of property, water pollution and water shortage during dry periods.

WATER SUPPLY SERVICES

Present water demand of the urban sector is being fulfilled through water intake from available nearest natural water resource. River or lake supplemented by exploration of ground water.

The service levels and quality are very poor, for example the average water supply is just 2–4 hours a day. Moreover, in terms of absolute figures, only 36.86 million of the 53.69 urban households have tap water supply, of which 26.67

have in their premises, 8.08 million have outside their premises and 2.09 million have within 100 m.

There are large gaps between demand and supply of water in urban services. In India the number of class I cities is 393 and only 77 cities have cent percentage water supply services.^[5]

PROPOSED PLANNING OPTIONS

- Suitable techniques for recharging can be selected after study & analysis of urban area.
- Traditional system of water conservation proposed with new technology, local knowledge and community participation.
- Conservation of existing wetland area (exclusively considered as a resource system)
- Utilization of existing drain (by Intermediate Technology Reed bed Channel System for Waste Water Reuse, etc.)

CONCLUSION

- In coming years city dwellers may have to face water scarcity due to lack of proper management of water sources, water bodies and water supplied to household.
- Careful consideration must be given to minimize storm runoff and maximize reuse of rainwater.
- Successfully implementation planning and management of water in cities increase the green cover as one of the indicator of ground water recharging. In nutshell, rainwater collection, storage, harvesting or conservation is suitable solution to cope with water scarcity in urban areas.
- The demand and supply has to be considered on priority basis so as to create proper balance i.e. recharge of ground water aquifers, recharge of surface water due to natural flow of

rain water as gravity flow and finally to plan structures with due consideration of chocking/blocking of rain water creating flood situation during rains. The storm generated at the area should be utilized for recharging by diverting it to suitably designed recharge pits or to the nallah by means of drain and finally to surface water collection reservoir, pond or lake.

- Rules and regulations, institutions, community involvement, cultures and tradition for water management are as much necessary as technical solutions and human sensitivity. Importance of fresh water must be considered a priority, while infrastructure development works. So, an assessment of quantity of water used and saved at household as well as city level is the requirement of present day. Ground water can be utilized only to the extent of its recharge hence balanced exploitation of water resources is essential.
- The concept of resiliency is important for Indian cities since it give a new way of framing and responding to the failure.^[1]

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