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STATUS OF SEWERAGE AND SEWAGE TREATMENT PLANTS IN DELHI

CENTRAL POLLUTION CONTROL BOARD

'Parivesh Bhawan, East Arjun Nagar

Delhi-110032.

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FOREWORD

In India, domestic sewage and sullage is the main source of water pollution, especially in and around large urban centers. During the last few decades, although water supply has been significantly augmented, sewage disposal has not kept pace. This has resulted in generation of huge amount of wastewater without adequate arrangements for collection, treatment and disposal. For rational planning of a comprehensive strategy to cope up with this problem, assessment of total sewage generation, its collection, treatment and disposal is essential. Accordingly, the Central Pollution Control Board carried out a performance study of all the thirty sewage treatment plants in Delhi. The findings of the study are presented in this report. An attempt has also been made to compile data on sewage being discharged into the river Yamuna /Agra Canal in order to get a comprehensive picture of sewage management in Delhi. Information on sewerage & its functioning as observed and collected from Delhi Jal Board in different parts of the city is also presented in this report. In the present report, an attempt has also been made to identify the gap between wastewater generation and existing treatment in Delhi.

A team of scientific and technical officials of the Central Pollution Control Board under the guidance of Dr. R. C. Trivedi and Dr. Sanjeev Agrawal, Scientist `C' conducted the study. We hope, the information contained in the report would be useful to the concerned authorities, organizations, academic institutions, researchers and others involved in planning wastewater management in Delhi

(DR. V. Rajagopalan)
Chairman

CONTRIBUTIONS

Guidance, Planning and Principal Coordinators	Dr. B. Sengupta, Member Secretary Dr. S. D. Makhijani, Additional Director Shri P. M. Ansari, Additional Director Dr. R. C. Trivedi, Additional Director
Report preparation	Dr. R. C. Trivedi, Additional Director Dr. Sanjeev Agrawal, Scientist `C'
Field Coordinator for STP's Monitoring	Dr. Sanjeev Agrawal, Scientist `C'
Field Coordinator for Drain Monitoring	Dr. C. S. Sharma, Senior Scientist
Analysis & Monitoring of STP's & Drains	Dr. Sanjeev Agrawal, Scientist `C' Shri A. Manoharan, Scientist `C' Shri. N. C. Durgapal, Sc. C Shri. B. K. Jakhmola, Sc `C' Shri. G. K. Ahuja, Sc `B' Shri. G. Thirumurthy, AEE Shri Vinay Gangal, Sc `B' Shri. P. K. Behera, Sc `B' Shri. M. Pandey, Sc `B' Shri R. K. Rastogi, Sc `B' Shri Somendra Singh, Sc `B' Mr. Lokesh Bhardwaj, SSA Mrs Gargi Gurtu, JSA Mrs Meenu Mishra, JSA Shri B. L. Meena, SLA Shri Satveer Singh, Sr. Technician Ms. Chetna Anand, SRF Mrs Kavita Shrivastava, SRF Shri Vasu Tiwari, JRF Mrs B. Shashi Devi, JRF Shri Rameshwar Bandewar Shri Ram kishan Shri S. K. Sahu Shri Ravi Charan Shri R. C. Mishra Shri C. P. Singh
Computer Graphics	Shri Ganga Singh Shahi, LDC Shri Vasu Tiwari, JRF Dr. Sanjeev Agrawal, Scientist `C'
Report Typing	Shri Satish Changra, UDC, Mrs Chanchal Arora, PS Shri Ganga Singh Shahi, LDC

Executive Summary:

- Central Pollution Control Board (CPCB) carried out inspection and monitoring of sewage treatment plants (STPs) in Delhi to verify the utilization of sewage treatment capacity and their performance during November-December 2003.
- Delhi, the capital of India, has a population of over 13.9 million. It has grown by more than 300% since 1971 and expected to increase 23 million by 2021 at a growth rate to 26.4%.
- The decadal water requirement and wastewater generation as projected in the Master plan of DDA would be in order of 6674, 5340 mld in 2011 and 8365, 6692 mld in 2021.
- Presently about 3364 mld water is distributed by Delhi Jal Board (DJB) in Delhi.
- It is estimated that about 3267 mld of wastewater is generated in Delhi including 218 mld from industrial sources.
- The annual average discharge through drains in to the river Yamuna /Agra canal during the three consecutive year 2001, 2002 & 2003 is 3982, 4187 and 3898 mld respectively including about 630 mld fresh water in Najafgarh drain. The average pollution load in terms of BOD during these years is 308, 261 and 243 tonnes/day respectively.
- The study revealed that Nazafgarh & Shahdara drains contributed nearly 67%, 60% 63% of wastewater by volume during the year 2001, 2002, 2003, and 42%, 42% & 47% of BOD load respectively.
- The sewage treatment facility in the year 1997 was 1291 mld which was gradually augmented to 1829 mld in 2000 and 2125 mld in 2001. The present installed capacity is 2330 mld.
- Out of 3267 mld of treated & untreated sewage, 2365 mld is discharged into the River Yamuna, 661 mld is discharged into Agra Canal & 241 mld is used for irrigation.
- The sewerage facility is provided in planned colonies unauthorized/regularized colonies, JJ Resettlement colonies and urban villages. No sewer facilities exist in rural area, un-authorized colonies, slums and JJ clusters.

- There are 30 sewage treatment plants (STPs) located at 17 locations in Delhi. Out of thirty STPs, three STPs (Ghitorni, Rohini and Keshopur-I) are not found in operation.
- The total treatment capacity of the 30 STPs was observed as 2330 mld. The actual treatment of sewage during November-December 2003 was found only 1478 mld (about 63% of the treatment capacity).
- Out of 30 STPs, 20 are running under capacity, 5 are running over capacity and 3 are non functional and 2 are running to their capacity. Most of the STPs (23 Nos) are based on activated sludge process except 7 STPs work on either extended aeration (2) or high rate bio-filters (3)/Trickling filters (1) and Oxidation ponds (1).
- Most of treatment plants working on activated sludge process do not perform satisfactorily due to operational problems.
- The performance of the STPs in terms of percent reduction in pollution load in each plant was carried out. Average reduction in BOD, COD and TSS load computed as 87%, 81% and 88% respectively.
- The existing capacity of the treatment plants is under utilized due to of deficiency in the collection system and chocking of existing sewerage failure of pump connections and trunk sewers, internal sewers and peripheral sewers. The trunk sewers are 136 kms and heavily silted. The large network of (6000 km) peripheral sewers is very old and some of them are under sized and also in damaged condition.
- Part of the wastewater generated is collected through underground sewers and transported to the treatment plants and balance flows into the river Yamuna through 22 drains.
- There are total 28 industrial estates in all around Delhi contributes 218 mld wastewater (either treated or untreated) in to the open drains.
- It is concluded that out of 3267 mld of sewage generated, treatment capacity exists for 2330 mld (71%), and actual treatment is given to only about 1478 mld (45% of total sewage generated). It is also estimated that out of 480 tonnes/day of BOD load generated in Delhi, 264 tonnes/day (or 55%) BOD load is reduced due to treatment.

CHAPTER I : INTRODUCTION

1.1 Background:

Delhi being fast growing city is facing severe problem of untreated sewage. Since the untreated sewage is discharged into the Yamuna river, the river is severely polluted. Several efforts are made to depollute the Yamuna. In the past, Hon'ble Supreme Court issued several orders in this regard. As a result sewage treatment capacity in Delhi has been augmented. However, there is always controversy on the utilization of sewage treatment capacity. In order to get correct picture, a detailed study was conducted during November-December 2003. The findings of the survey are presented in this report.

1.2 Introduction:

Delhi, the capital of India, has a population of over 13.9 million (Approx. 14 m). It has grown by more than 300% since 1971. The population density in the city is also widely divergent, ranging from 1300 persons per sq. Km to 70,000 persons per sq. km. The population growth pattern of Delhi is the single most Important factor that affects the level quantity of water supply and sewerage services available to its habitants. Delhi Jal Board (DJB) is the authority responsible for planning, designing and execution of water supply and wastewater management facilities within its jurisdiction in the National Capital Territory of Delhi. About 40% of the population of Delhi (J.J. Clusters, MCD area, unauthorized colonies & rural villages) live in un-severed areas. Presently about 650 mgd (2955 mld) water is distributed by DJB in Delhi. Additional 90 mgd water supply is estimated from ground water. In future the demand is projected by DJB as 845 mgd (3841 mld) by the year 2006 & 950 mgd (4319 mld) in 2011. In absence of any additional source of water, no further significant increase expected up to 2021. The population that has been projected by Delhi Development Authority (DDA) by 2021 is 23 million. However, the projected decadal growth of population and expected sewage generation as per the Master Plan of Delhi up to 2021 is presented in Fig 1&2.

Fig.1 : Decadal Growth of Population in Delhi

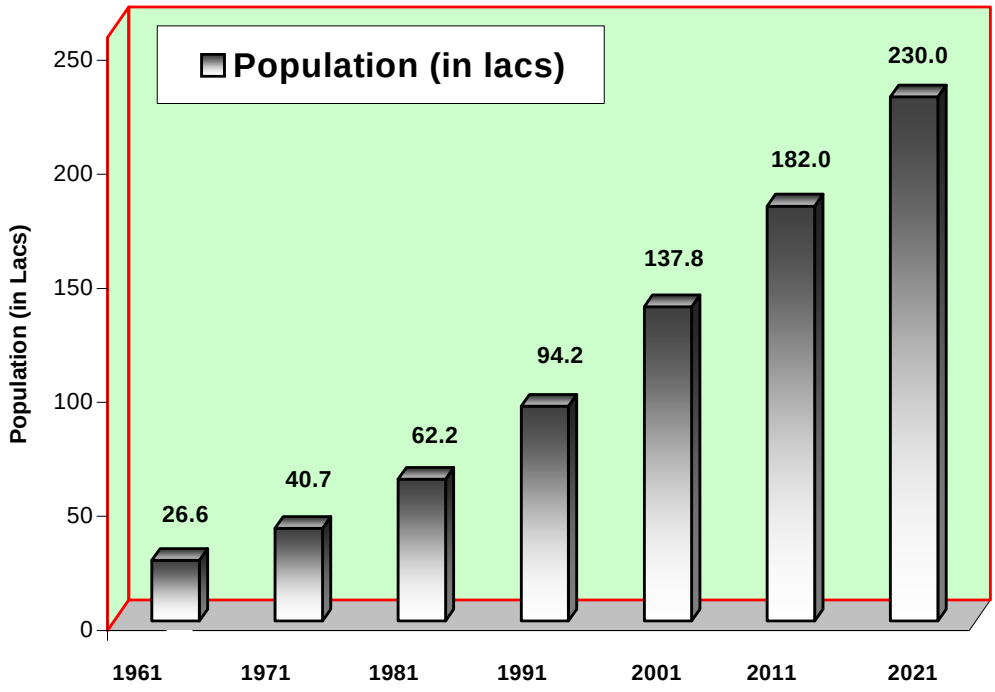
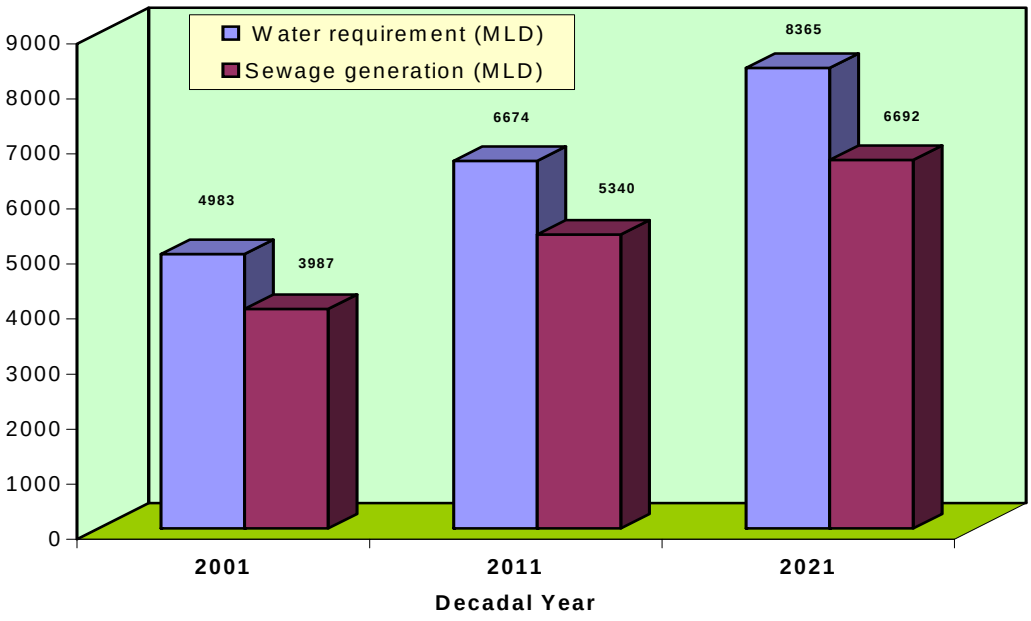


Fig. 2 : Decadal water requirement and wastewater generation in Delhi



1.3 Sewerage System in Delhi:

The development of sewerage system in Delhi started soon after new Delhi was built in 1938. A Sewage Treatment Plant (STP) of 82 mld capacity was constructed at Okhla. By 1956, the capacity of this plant was augmented to 164 mld. Additional STPs were later constructed at coronation pillar (55 mld) and at Keshopur (55 mld) in 1957 and 1960 respectively. The treatment capacity increased from 273 mld in 1961 to 1273 mld in 1993. The present sewage treatment capacity in Delhi stands at around 2330 mld. Presently, the urban area of Delhi is served by a gravity collection sewerage system involving a large network of branch sewers, intercepting sewers, peripheral and trunk sewers, of about 6000 km length. As per DJB there are 28 main trunk sewers with size ranging from 700 mm to over 2400 mm diameter with a total length of around 140 km. While the balance length comprises peripheral sewers with smaller diameter that form the linkage between trunk sewers and the smaller internal sewers in colonies with the smallest internal sewers having diameter of 150 mm. There are 36 major pumping stations of capacities ranging from 6 mld to 455 mld. In the past the emphasis was for the provision of drinking water supply only to both urban & rural areas. As a result, growth in sewerage facilities has not been commensurate with the sewage generation. Even today, only about 60% of the population of Delhi is served by the sewerage system. For the purposes of sewerage and drainage, Delhi can be devided into six zones 1) Rithala, 2) Coronation Pillar 3) Keshopur; 4) Okhla; 5) Trans Yamuna; and 6) Outer Delhi. Besides this, there are newly developed area or urban extensions mostly contiguous with urban limits such as Narela, Pappan Kalan, Nazafgarh, Ghitroni, Vasant Kunj, Mehrauli & Sarita Vihar. At present STPs are located at 17 different places in Delhi with a cumulative treatment capacity of 2330 mld (512.5 mgd). The treatment capacity was plan to be increased to 3389 mld by the end of Xth plan by way of augmenting the capacity of some of the existing treatment plants and constructing new plants. As per DJB the status of sewerage system in various categories of habitants is as under:

i) Planned Colonies: About 40% of the population live in planned colonies are fully sewered; ii) Un-authorized –regularized colonies: iii) Resettlement colonies: iv) Urban villages: Rural villages, un-authorised colonies and J.J Cluster.

There are a total of 219 rural villages with an estimated population of about 0.6 million where drinking water supply has been provided & rate of water supply is only 50-100 LPCD. Whereas minimum of 135 lpcd water supply is required for smooth functioning of sewers. Wastewater from these areas finds its way into the river through storm water drains.

1.4 Objectives:

The study was carried out keeping following objectives in mind:

- To carry out detailed survey to collect data on status of existing drains joining the Yamuna river;
- To assess the existing sewage treatment capacity (plant-wise) in Delhi and its utilization;
- To evaluate the performance of sewage treatment plants in terms of reduction in BOD, COD, TSS and Coliform bacteria;
- To Study the status of sewerage system in Delhi;
- To study ongoing schemes / rehabilitation works in trapping sewage joining the Yamuna river.

Continued