

(Themes: Water & Sanitation, Lakes)

ABSTRACT

Case Title:

Diversion of domestic sewage for improving urban lake water quality, India

Sub Title: Describes the initiatives of the State Government in improving the ecological status of two important lakes in Bhopal through the diversion of sewage inflow from the urban catchment.

Description

Approximately 40% of the water supply to the city of Bhopal in Madhya Pradesh comes from Upper Lake. Until 1947, the water quality of Upper Lake was so good that it required no treatment before supply to the public. However, due to the tremendous population growth of the city (for example, from about 70,000 in 1951 to about 1.4 million in 2001) and rapid urban development, the lake has been subject to various environmental problems. Foremost of these has been the deterioration of water quality as a result of the inflow of untreated sewage.

The State Government of Madhya Pradesh implemented an integrated lake conservation programme from 1995 to 2004 through a Project Directorate directly controlled by the State Housing & Environment Department. The programme included a sewerage scheme based on the diversion, treatment and disposal of sewage outside the lake catchment area. Due to undulating topography, work involved the laying of 68.73 km trunk sewer line and 24.78 km force mains; construction of as many as ten large and five small sewage pump houses; as well as four waste stabilisation ponds for the diversion and treatment of the sewage. Emphasis was placed upon low cost, labour intensive and less energy requiring treatment technology in order to minimise operation and maintenance costs.

The State Public Health Engineering Department (PHED) was primarily responsible for the planning and designing of the scheme. The Bhopal Municipal Corporation (BMC), the urban local body with the mandate to provide sewerage services, was to be responsible for the operation and maintenance of the scheme. Subsequently a division of PHED under the control of the Project Directorate implemented the scheme, with the understanding that the scheme would be handed over to the BMC on completion. And in 2000, the BMC passed the by-laws making it mandatory for house owners to make individual sewerage connections to the new system.

However, at the end of the project period in 2004 when the sewerage system was to be handed over to BMC (as per the decision of the State government for post project operation and maintenance of the system), the BMC refused to take over the responsibility of operation and maintenance of the system. The State Government consequently decided to allocate a budget directly to PHED, on the understanding that it would take over the responsibility of operation and maintenance of the system through one of its divisions. However, progress in ensuring individual household connections to the main sewer lines has been poor, due to lack of willingness on the part of BMC to cooperate with the PHED. Recently the Minister, Urban Administration & Development reviewed the progress and directed the BMC to cooperate with PHED to expedite the work of household connections.

Lessons

- Urban local bodies have the mandate for providing urban basic services including the sanitation and generate resources for operation and maintenance of the system. In this case the BMC had enacted the by-laws for individual connections well in advance. The manner in which the Municipal Corporation did a volte-face of its earlier decision reflects on its lack of ownership towards the project. There should have been a separate platform for consultation among the Project Directorate, BMC & public representatives of the wards where the sewerage system was being implemented. This would have enabled the negotiation of an amicable solution for implementing household connection as per the by laws of BMC.
- Local bodies lack expertise and technical manpower for development works related to sanitation. Therefore, the relevant government departments execute the schemes and then hand over the works for

operation and maintenance by the local body. In the process it is easy for the urban local bodies to become disconnected from the planning and execution process leading to problems during the handing over stage.

Importance of case for IWRM

In developing countries like India underground sewerage system are virtually nonexistent. Therefore, examples of successful operation and maintenance of the system are few. This case would provide an insight to the concerned to take precautionary action when planning such systems. The case demonstrates that all the stakeholders, especially, Urban Local Bodies and the public representatives should be involved in the decision making from the very beginning of such projects, and a public information campaign seems a must to persuade them to cooperate with the government and the urban local bodies to improve the local environment.

Main tools used:

- C7.2 Pollution & environmental charges
- A3.2 Financing options 1: Grants and internal sources
- C4.2 Communication with stakeholders
- C4.3 Information and transparency for awareness raising

Key words: Pollution of lakes, sewerage system, Local body, operation & maintenance

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MAIN TEXT

1. Background and Problems

Until 1991, Upper Lake was the sole potable water source for the city of Bhopal. Today it accounts for some 40% of the city's supply. The lake has a catchment of 361 sq. km. (40 % of which includes urban settlements), while secondary lake has a catchment of 9.6 sq. km (with the entire area densely populated, which includes the largest slum area of the city). Unfortunately, prior to 2004 these areas had no organized sewerage system. As a result, untreated sewage flowed into these lakes, causing a serious deterioration of their water quality. A major initiative to address this alarming situation, the State Government of Madhya Pradesh implemented an integrated project (Bhoj Wetland Project) for the conservation & management of Upper & Lower lakes of Bhopal. This was done with loan assistance from the Japan Bank for International Cooperation (JBIC). The project ran from April 1995 until June 2004, and consisted of 21 sub-projects, under which various preventive and curative measures were taken. These measures included a sewerage network for the diversion of sewage from the lakes.

The development of a sewerage system was very important since its main aim was to prevent untreated domestic sewage from the urban catchment and from flowing to the lakes. The scheme involved the diversion and treatment of sewage and its disposal outside the catchment area of the lakes. Due to undulating topography, it involved the laying of 68.73 km of trunk sewer lines and 24.78 km of force mains; the construction of diversion structures on 19 drains; and as many as ten large and five small sewage pump houses, along with four waste stabilisation ponds. The total cost was Rs. 629 million. Emphasis was placed upon low cost, labour intensive and less energy requiring treatment technology in order to minimise operation and maintenance costs.

As per the 74th constitutional amendment, the entire responsibility of water supply and provision of sewerage system for cities rests with the Municipal Corporation of the city (in this case the BMC). However, in this instance the BMC lacked the necessary technical resources to take on the required skills for planning and implementation. Therefore, a division of the Public Health Engineering Department (PHED) of the State Government was entrusted with this responsibility. In 1998 State government created the Project Directorate under the administrative control of Housing & Environment Department, Government of Madhya Pradesh for executing most of the sub projects and thus facilitate the timely completion of the project. A full division of PHED was attached to the Project Directorate as well for this purpose. BMC continued not to be involved in the planning and execution of the scheme.

All the major administrative and financial decisions were taken up by the Empowered Committee chaired by the Chief Secretary of the State and having Principal Secretaries of all relevant departments of the State government, such as, Finance, Urban Administration & Development, PHE, Housing & Environment, Fisheries etc. as the members. Despite representation of Urban Administration and Development Department, the controlling State government department, in the Empowered Committee, the opinion of the BMC was sought by the Empowered Committee of the Project, while taking administrative decisions regarding the implementation of the sewerage scheme, where in the Commissioner of the BMC was a special invitee. In this process the State Government decided that, after the completion of the project, the responsibility of the operation and maintenance of the sewerage system should be transferred to the BMC as per the constitutional provision. This provision entitles the local body (BMC) to charge necessary fees from the households to raise funds for the maintenance of the system.

Accordingly, directions were issued to the BMC which published the by-laws, duly passed by the General body of the BMC, by a notification in the official gazette on May 12th 2000 elaborating the system of obtaining mandatory sewerage connection by the public. This very exhaustive set of rules prescribed the following charges for underground connection according to sewerage discharge from sanitary fixture units:

Type of Connection	Connection Charges	Service Charge Per year	Penalty
Residential houses	Rs. 300/- to 600/-	Rs. 200/- per seat	Rs. 500/-
Non- residential houses (Hotel, School, Hospital, Office, Assembly, Cinema, Restaurant, Industries, Station etc.)	Rs. 1000/- to 5000/-	Rs. 500/- per seat	Rs. 500/-
Connection of underground drainage of colonies into the sewage line	Rs. 5000/- to 30000/-		

Thus it was evident that the BMC had decided to undertake the responsibility of ensuring individual household connection to the main trunk lines in 2000.

Later in May 2002, the State Government had included the Mayor and the Commissioner, BMC as the members of the Empowered Committee of the Project to facilitate development of a mechanism for transfer of assets being created under the project. The Empowered Committee in its meeting held in August 2002 had reiterated that on completion of the project, responsibility of operation and maintenance of the sewerage system would be transferred to the BMC. The BMC was also directed to take necessary action in this regard. As per the estimations, about 33000 houses are to be connected with the sewerage system laid under the project. Out of these, 95% are residential and the rest are non residential. On this basis the revenue generation from sewerage connection was calculated as below :

Type of Connection	Number of Connection	Average Rate	Total Income
Residential	31350 (95%)	Rs. 450/- Rs. 300/- to Rs. 600/-	Rs. 14107500/-
Non residential	1650 (5%)	Rs. 3000/- Rs. 1000/- to Rs. 5000/-	Rs. 4950000/-
		Total	Rs. 19057500/-

In this way, revenue to the tune of about Rs. 19.0 million was expected through underground sewerage connection.

Besides this, after completion of sewerage connection of 33000 houses, it was expected that revenue of Rs. 16.6 million will be generated through collection of annual service charge (Residential houses – Rs. 12.5 million [31300 x Rs. 200 x 2 seat = Rs. 12500000 on the standard of 2 seat per house] and non-residential Rs. 4.1 million [1650 x Rs. 500 x 5 seat = Rs. 4125000 on the standard of 5 seat per house]).

However in June 2004 when the sewerage infrastructure was completed and the project authorities started the process of handing over the same to the BMC, the BMC opined that their financial condition was not sound enough to meet the expenditure on the maintenance of sewerage system; and that without the financial help and grant from the State Government it would not be possible for them to take on the responsibility. As against the estimate of annual expenditure of Rs. 46 million (including salary of staff) by the project authorities, the BMC estimated it at Rs. 80.2 million for maintenance of sewerage system. The Public Health Engineering Department of the Government of Madhya Pradesh (PHED) estimated budget requirement of Rs. 33.5 million (Salary Rs. 10.753 million, electricity expenditure Rs. 9.148 million, maintenance of Pipeline, Pump House & Treatment Plant Rs. 13.9 million).

The Finance Department of the State Government opined that the Urban & Administration Department should not make the payment from the budget for operation and maintenance of sewerage scheme, and that the local body should charge appropriate fee from the users for running such system and to make it self-sustainable.

In the mean time, the tenure of the Project came to an end on June 12th 2004, i.e., the reimbursement of expenses of the State Government on the project was closed. On account of refusal of the BMC to take over the assets and any decision regarding the transfer of assets created for sewerage system, the sewage pump houses and the treatment plants continued to be maintained for a period of 3 months by a skeleton staff of the Project directorate whose services had not been returned to their parent departments within the State Government providing the finances. The saving grace was the advance payment of electricity charges for the sewage pump houses (SPH) to the Madhya Pradesh State Electricity Board and a prepaid contract for the maintenance of SPHs by the Bhoj Wetland Project. This enabled the running of the system.

2. Decisions and Actions Taken

In September 2004, the State government decided that the operation and maintenance of the sewerage system would be done by a PHED division with the fund provided by the State Government. The maintenance and operation of the old sewerage system of Bhopal city was already being handled by the same PHED division. The State Government has also decided to have a separate budget provision for the operation and maintenance of the sewerage scheme under the departmental head of PHED. From the financial year 2005-06, State Government has made budget provision for the operation and maintenance of the sewerage system. However, no mechanism for ensuring the transfer of the fees collected from the individuals by the BMC to PHED was decided.

Since the responsibility of doing the connections is with the PHED while the responsibility of collecting user charges rests with the BMC, which is unwilling to do so, the resources are not being transferred from BMC to the PHED and connections are not being made. This has led to the continuing inflow of untreated sewage into the lakes, thereby defeating the purpose of creation of the sewerage system to a great extent.

A Lake Conservation Authority of Madhya Pradesh (MPLCA) was formed by the Government of Madhya Pradesh in May 2004, just prior to the closure of the Bhoj Wetland Project. The aim of MPLCA is to facilitate the conservation and management of water bodies in the entire State; as well as to look after the post-project maintenance of certain works of the Bhoj Wetland Project which have not been transferred to any department/agency. On continuous follow up by MPLCA, a couple of meetings were convened by the Housing & Environment Department in which the modalities for transfer of the fees from BMC to PHED as well as the manner of execution of individual household connection by PHED were decided. However on account of elections to the urban local body neither PHED nor BMC attempted to carryout the work in the proper spirit in 2004-5.

3. Outcomes

Individual household sewerage connections have still not taken place. Meanwhile, the Govt. along with the municipal corporations of Bhopal, Indore, Gwalior and Jabalpur has started executing the M.P. Urban Water Supply & Environment Improvement Project with funding from the Asian Development Bank. The works are executed by a Project Implementation Unit under the Municipal Corporation with the assistance of Design and Supervision Consultants. One of the project components for Bhopal relates with to a functional sewerage system for the city. The BMC would be utilizing the infrastructure created under the Bhoj Wetland Project and has decided that the individual household sewerage connections would be completed by the them under one of the packages of the project without any cost to the users. However, users have to pay the annual service charges as fixed by the BMC.

4. Lessons learned

- The urban local bodies has the mandate for providing urban basic services including the sanitation and generate resources for operation and maintenance of the system..In this case the BMC had enacted the by-laws for individual connections well in advance.. The manner in which the Municipal Corporation did a volte face of its earlier decision reflects on its lack of ownership towards the project There should have been a separate platform for consultation among the Project Directorate, BMC & public representatives of the wards where the sewerage system was being implemented. This would have enabled in thrashing out an amicable solution for implementing household connection as per the bye laws of the BMC.
- Local bodies lack expertise and technical manpower for development works related to sanitation. Therefore, the relevant government department -PHED execute the schemes and then hand over the

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5. *Contacts, references, organizations and people*

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