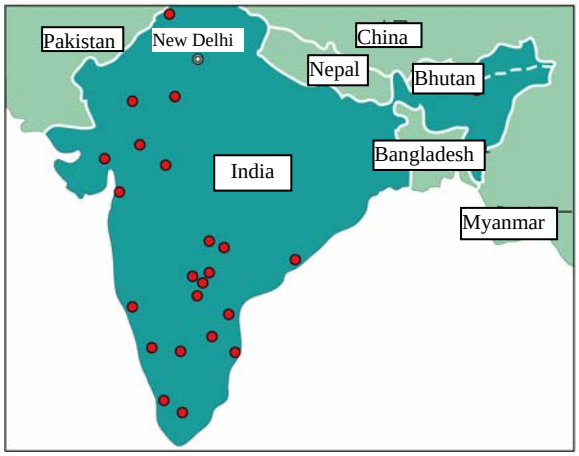
India

Urban Water Supply and Sanitation Improvement Program

External Evaluator: Hajime Sonoda

Field Survey: September 2005

1. Project Profile and Japan's ODA Loan



Map of project area

Water purification plant in the city of Tirupati

1.1 Background

Water and sewerage services and solid waste disposal facilities are basic public services. However, in the latter half of the 1990s, many regions in India continued to lack a proper water supply even in urban areas where populations were concentrated. Taking into consideration the progressing urbanization, it was felt that large amounts of funding would be needed to promote the spread of such facilities.

In order to respond to such finance needs, it is important to levy charges on beneficiaries in urban areas where the water supply system provides direct connections to individual houses. From the standpoint of encouraging self-sufficiency on the part of local governments and public utilities that operate water and sewage system services, the Indian government determined that borrowing from financial institutions is more effective than receiving government grants or loans.

This project was conducted from January 1996 to March 2003 in order to provide support for the above-described Indian government policy. Specifically, the project was carried out with the objective of providing capital to the Housing and Urban Development Corporation, Ltd. (HUDCO), which is the policy finance institution in the fields of sanitation and urban water and sewerage services.

1.2 Objective

This project's objective was to improve the water supply and public health services in India's small- to medium-sized cities by extending long-term, low-interest loans via financial institutions to public services providers, thereby helping to improve living standards of people and develop infrastructure for industry.

1.3 Borrower/Executing Agency

Housing and Urban Development Corporation, Ltd. (HUDCO)

1.4 Outline of Loan Agreement

Loan Amount/ Disbursed Amount	8,670 million yen/8,670 million yen
Exchange of Notes Loan Agreement	January 1996 January 1996
Terms and Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	 2.1%/year 30 years 10 years
Final Disbursement Date	March 2001

2. Evaluation Result

2.1 Relevance

2.1.1 Relevance at the time of appraisal

The nation's Eighth Five-Year Plan (1992-1997) emphasized the importance of strengthening operation and maintenance and recovering operation and maintenance cost through revisions of water rates. Also receiving emphasis were the need to increase water supply levels and area coverage, extend coverage of sewerage waterworks, provide greater sewerage system coverage, and improve the handling of solid waste. However, the government's budget allocation towards the water works and public health sectors for the period corresponding to the Five-Year Plan remained just under 40% of the required funds needed to accomplish these ends. In order to encourage self-sustaining measures on the part of public utilities and local governments, as well as to promote outfitting of facilities through charges to service beneficiaries rather than government grants or loans, the emphasis was on the procurement of funds from financial institutions. From India's urban areas, this project singled out medium and smaller cities where the service of public sanitation services and water works was much

delayed. Given that the project was engaged in building, expanding, and repairing infrastructure through HUDCO, which at the time was practically the only financial institution that financed urban infrastructure projects, its importance was without question.

2.1.2 Relevance at the time of ex-post evaluation

The nation's 10th Five-Year Plan (2002-2007) emphasized the importance of the waterworks and public health sectors. The plan also aimed to promote these targets; (1) 100% water supply coverage of cities and farming villages, (2) 100% recovery of operation and maintenance cost, (3) provision of sewerage treatment plant in medium and smaller cities that had made use of appropriate technologies and low-cost sanitation facilities, and the promotion of solid waste disposal in accordance with the technology standards newly established by the government. At the time of ex-post evaluation, though there still is a great demand for funding for the provision of infrastructure facilities[1], in order to make better use of capital expenditure, the Indian government is placing an even greater emphasis on sector reforms such as reforming state-level government financial structures and improving the collection rate for water service fees.

2.1.3 Summary of ex-post evaluation result on relevance

Recapping the evaluation result on relevance, this project's objectives—namely, to promote establishment of water supply and sewerage system and sanitation infrastructure—are both important and necessary, and thus highly relevant. If the project had covered efforts for sector reforms, whose importance has come to be recognized in recent years, the degree of relevance would have been greater.

2.2 Efficiency

2.2.1 Outputs

(1) Loan results and terms

This project planned to provide sub-loan of a total of 8,670 million yen through HUDCO to approximately 50 water supply and sewerage projects and solid waste disposal projects in medium and smaller cities. In reality, 90%[2] of that plan (2.91 billion

[1] In India's 10th Five-Year Plan, when responding to the enormous need for funding in the water supply, sewerage system, and public health sectors, the present model which is that state government provide loan guarantees whenever regional cities are obtaining loans from financial institutions is not necessarily sustainable since generally speaking state governments' financial capacity was low. Moreover, as the water supply sector has increasingly come to be financed through private financial institutions, HUDCO's role has shrunk in relative terms.

rupees) was used to finance a total of 26 projects, 19 of which were for water services, and another 7 for sewerage systems in 23 cities. The sub-loan terms and conditions were as shown in the table below. Though the number of loans made was below the plan, financing through this project went almost as planned.

Table 1. Planned and Financing Terms and Conditions and Actual Performance

Item	Plan	Actual
(1) Targeted projects	Approx. 50 projects for water supply utilities, sewage and drainage, and solid waste disposal.	26 projects, of which 7 pertained to sewerage systems, 19 to water supply utilities, and 0 to solid waste disposal projects.
(2) End user	Organizations responsible for providing water supply, sewerage, and solid waste disposal services as stipulated in HUDCO guidelines, including state and municipal financing corporations, development agencies, water and sewerage bureau, and local governments.	Almost as planned
(3) Financing terms Interest	JBIC interest rate + government warranty + swap rate + HUDCO profit margin of 1.5% OR the normal HUDCO lending rate, whichever is lower	Normal HUDCO lending rate (the lower of the two)
Repayment period	Maximum of 15 years	8-15 years (avg. 13 years)
Amounts disbursed	Maximum of 500 million rupees per loan envisioning 40-50 million rupees per individual loan.	12-461 million rupees/loan (average 148 million rupees/loan)
Financing Ratio	Up to 100% of the HUDCO loan ceiling amount	Average: approx. 75%

[2] The Japanese yen loan amount HUDCO received was 3,231 million rupees. The agreed sub-loan amount as of September 2005 was 4,339 million rupees, and the disbursed amount was 3,866 million rupees (89% implementation rate), of which 2,910 million rupees were funded by JBIC, setting the JBIC funding rate at 75%).

Security/guarantee	State government guarantees, bank guarantees, real estate, etc.	All loans guaranteed by the state government

The reason that the number of loans was lower than initial plan is that the average loan disbursed amount per project (112 million rupees) was more than double the amount estimated at the time of the appraisal. In the initial plan, average loan amounts were calculated based on HUDCO's results from 1990 to 1994. On the other hand, the sub project loans were agreed between 1996 and 1998. During that time, prices rose 50%-60% and it can be said that this is one of the reasons for the higher loan amount average. As for solid waste disposal, there was no candidate sub-project and no loan was made in this category.

In this project, HUDCO's normal lending interest rate was applied because the swap rate was higher than expected (see the evaluation result of 2.5 Sustainability).

Table 2. Outline and Degree of Completion of Subloan Projects[3]

Evaluation Results for Effectiveness

	City	Population (2005) (million people)	State	Project Type	HUDCO Loan Amt.(1) (million rupees)	Deg. of completion(2)	Effectiveness(3)
1	Bangalore	5.16	Karnataka	Sewerage system (new)	280	○	△
2	Chennai	4.37	Tamilnadu	Sewerage system (expansion)	255	◎	○
3	Surat	2.93	Gujarat	Sewerage system	201	◎	◎

[3] Calculated by estimating the degree of material completion of planned facilities based on the budget for each facility. (For example, assessing facility A at 2 billion, facility B at 3 billion, and facility C at 5 billion, if facilities A and B were completed, the completion rate would be 50% irrespective of the amount it actually cost).

				(expansion)			
4	Jaipur	2.78	Rajasthan	Sewerage system (expansion)	150	◎	△
5	Amritsar	1.10	Punjab	Sewerage system (expansion)	53	△	△
6	Jodhpur	0.93	Rajasthan	Sewerage system (expantion)	12	△	△
7	Tirupati	0.25	Andhra Pradesh	Sewerage system (new)	197	◎	○
8	Ahmedabad	3.80	Gujarat	water supply increase and waterworks (expansion)	117	○	◎
9	Hyderabad	3.62	Andhra Pradesh	Stabilization of water supply and water distribution	396	◎	◎
10	Hyderabad	3.62	Andhra Pradesh	Stabilization of water supply	236	◎	◎
11	Indore	1.85	Madhya Pradesh	Stabilization of water supply	178	◎	◎
12	Amritsar	1.10	Punjab	Water supply increase and waterworks (expansion)	28	△	△
13	Tirupati	0.25	Andhra Pradesh	Water supply increase and waterworks	461	◎	○
14	Ramagundam	0.24	Andhra Pradesh	Waterworks (new)	68	◎	△
15	Vizianagaram	0.18	Andhra Pradesh	Water supply increase and waterworks (expansion)	164	◎	△
16	Mahbubnagar	0.14	Andhra Pradesh	Water supply increase and waterworks (expansion)	308	◎	△
17	Chikmagalur	0.12	Karnataka	Water supply increase and waterworks	134	◎	◎

				(expansion)			
18	Coimbatore	0.10	Tamilnadu	Waterworks (expansion)	100	◎	◎
19	Siddipet	0.06	Andhra Pradesh	Water supply increase and waterworks (expansion)	171	◎	△
20	Wanparty	0.05	Andhra Pradesh	Water supply increase and waterworks (expansion)	75	◎	△
21	Golaghat	0.05	Assam	Water supply increase and waterworks (expansion)	56	△	△
22	Chalakudy	0.05	Kerala	Water supply increase and waterworks (expansion)	43	◎	○
23	Pratapgarh	0.05	Rajasthan	Water supply increase and waterworks	42	◎	◎
24	Kandukur	0.05	Andhra Pradesh	Waterworks (new)	42	◎	△
25	Sadasivapet	0.04	Andhra Pradesh	Water supply increase and waterworks (expansion)	22	◎	○
26	Bagevadi	0.03	Karnataka	Water supply increase and waterworks (expansion)	59	◎	△

Source: Table data created by evaluators based on HUDCO data, except for population data, which derived from http://www.mongabay.com/igapo/2005_world_city_populations/India.html.

Notes:
(1) Loan disbursed amount by HUDCO as of September 2005.
(2) Determined degree of completion by comparison between actual and plan (based on budget figures for each facility and completion reports for each project).
◎ > 80%
○ 50%-80%
△ < 50%

(3) Overall project effectiveness was assessed by comparison between latest reported project effectiveness and project plan. The latest reported project effectiveness was based on available data,for example, water supply volume, amount of sewage disposed, number of houses connected to waterworks, and the rate of coverage expansion in completion reports and impact study reports for some projects. .

◎ > 80%
○ 50%-80%
△ < 50%

(2) Characteristics of each sub project (see Table 2)

Water distribution tank (Tirupati)

Out of a total of 7 sewerage system projects, 2 projects involved the construction of entirely new sewerage systems in cities that sewerage system was not provided and 5 were for the expansion of existing sewerage systems. 5 projects were carried out in large cities that, as of 2005, had populations exceeding one million people. The 2 projects where new sewerage systems were laid out in exceedingly unsanitary town areas were seen as being of great urgency.

A breakdown of the 19 waterworks projects is as follows: 2 projects were for the construction of new waterworks systems, 13 projects sought to expand the water supply coverage area and increase the supply of water in existing systems through increasing water resources, and 4 projects aimed to stabilize water distribution through rebuilding water supply networks, or to expand the water supply coverage without the addition of water resources. Nearly half of the projects (9 to be exact) were carried out in small cities whose populations were less than 100,000 as of 2005, and 5 projects were in cities with populations above one million. 7 projects (of which 6 were in small cities having populations in the order of 50,000) were viewed as being of high urgency on account of the fact that the per capita water supply prior to the project was less than 40 liters per day; in other words, supply was as low as 30%-60%[4] of government standards.

(3) Project completion level and problems occurring during project implementation

HUDCO approved a total of 4.34 billion rupees of sub loan for 29 projects.

[4] According to government standards established in 1999, the per capita water supply is 135 liters per day for cities with a sewerage system, and 40 liters per day for cities without a sewerage system.

However, by September 2005, 89% of loan agreement amount (3.87 billion rupees) had actually been disbursed. Looking at the degree of completion of the planned infrastructure facilities, 20 out of 29 projects were judged highly satisfactory (above 80%). 2 projects, satisfactory at 50%-80%, and 4 projects were not very satisfactory below 50%[5] (See Table 2). Taking a weighted average of individual project completion levels relative to project scale, overall, only 70%-80% of planned infrastructure facilities were constructed. The main reason that facilities were not completed was that the scope of projects shrank, either because local or state governments' fund shortage, or because delays in land acquisitions or construction work caused project costs to rise steeply.

The major problems during project implementation were as follows. In four projects, the state or local government had a fund shortage. Another four projects were hampered by inadequate work schedules, contract management, and monitoring. Three projects had difficulty in administrative coordination and obtaining required permission or approval. Three projects had plans that were technically deficient; two projects suffered delays in land acquisition.

2.2.2 Project period

At the time of the appraisal, this project was scheduled to run for 70 months, from January 1996 to December 2001. In fact, the project was implemented for less than the planned period, running 63 months from January 1996 to March 2001. As for individual sub loan projects, 7 projects delayed more than two years compared to the plan at the time of loan approval.

2.2.3 Project cost

The disbursed amount of Japan's ODA loan for this project was 8,670 million yen. The amount is identical as the plan. 89% of the loan amounts that HUDCO approved for 26 individual projects were actually disbursed. There were no cost overruns for individual projects, but this was because the scope of the project was shrunk. It does

---

[5] The actual status of projects judged to have medium to low completion rates at the time of the evaluation (the end of 2005) is given below. In the case of the Jaipur sewerage system project, the completion rate was considered to be high even though a sewage treatment plant had yet to be built. A treatment plant was constructed later on through an ADB project.

Jodhpur (completion rate: low): An unfinished sewage treatment plant was completed through an ADB project.
Amiritsar (completion rate: low): Unfinished water supply and sewer projects are scheduled for work together with a treatment plant that was not included in the present project.
Bangalore (completion rate: medium): An unfinished sewerage main network was completed using other funds.
Golagphat (completion rate: low): An unfinished water supply project (aqueducts and conduits) is being built using other funds.
Ahmedabad (completion rate: medium): The unfinished portion was canceled for technical reasons, and is not scheduled for construction.

not indicate high efficiency in project spending.

Sewage treatment plant in Tirupati city

2.2.4 Summary of evaluation result on efficiency

While the project period and project costs were both almost as planned (90% compare to the plan), output remained approximately 70% to 80% of the plan. Accordingly, the efficiency of the project is evaluated to be satisfactory.

2.3 Effectiveness

2.3.1 Effectiveness of individual projects

(1) Effectiveness and achievement of objectives of waterworks projects

The result of 19 waterworks projects in 18 cities funded through this project is reported as follows.

- In 14 cities, 400,000 people obtained water taps to their homes. Thanks to the many public taps provided, the number of people who can access the water facility increased.
- In 15 cities, the daily water supply capacity increased to 187,000 tons/day thanks to the fact that new sources of water and water purification plants were provided. For the total of 3.6 million people living in these 15 cities, the daily water supply capacity per person more than doubled from a pre-project average of 41 liters per day to a post-project level of 93 liters per day.
- In Hyderabad and Ahmedabad, the daily water supply capacity increased to a maximum of 710,000 tons by linking to other water supply projects. (Assuming that each person consumes 140 liters per day, this is equivalent to consumption by roughly 5.07 million people).

- In Hyderabad, Ahmadabad, and Indore, thanks to improvement in water pressure and standardization of water supply volume through the regions, the water supply was stabilized.

The achievement level of objectives waterworks projects was analyzed by comparison between the plan and the actual result in the latest performance reports (2004). 7 of the 19 projects reached more than 80% of their target, 3 projects achieved 50%-80% of their target, and 9 projects achieved less than half of their target (See Table 2). The major reasons that the achievement level was not satisfactory compared to initial plans were as follows. (1) Although the water supply capacity and water mains were completed, because residents were unwilling or unable to pay, in 8 projects households were either not connected or connections were delayed[6]. (2) In 4 projects, water was not available on account of a water shortage (In cases where the water source was from water runoff and rain water, the actual water supply volume depended on the amount of rainfall). (3) In 1 project, work was not completed on account of fund shortage of state government level.

(2) Project effectiveness and achievement of objectives for sewerage system projects

7 sewerage system projects in 7 cities received funding through this project. In 5 of those cities, approximately 650,000 people were connected to sewerage systems for the first time, and in 2 cities, the capacity increased by 85,000 tons per day. In 1 city, tertiary treatment capacity increased by 60,000 tons per day[7]. No problems have been reported regarding the water quality of disposed water in projects that have a treatment plant, but in Amritsar, which has yet to construct a treatment plant, sewerage water is being discharged untreated[8].

The achievement level of objectives sewerage system projects was analyzed by comparison between plan and actual result in the latest performance reports (2004). One of the seven projects reached more than 80% of its goals, two projects achieved 50%-80% of their goals, and four projects achieved less than half of their goals. The major reasons that initial targets were not achieved were as follows. (1) In four projects,

---

[6] The fact that many cities have public water taps that can be used free of charge, and that the water supplied is of low quality are thought to account for residents' low willingness to pay for services. There are some cases that the plan was thought to be too ambitious because the scale of facilities was planned based purely on future population projections and supply volume standards per person when using water supply connection at home (estimating that the volume would be greater than the volume used at public taps).

[7] Tertiary treatment is being carried out with the aim of creating a supply of intermediate water for a thermal electric power plant.

[8] The establishment of a treatment plant at Amritsar's sewerage works was not included. Its future construction is planned (see Footnote 2)

sewerage water mains facilities and treatment plants were not completed on account of insufficient funds[9]. (2) In one project, the number of connections did not increase. (3) In one project, a thermal power plant that was supposed to use treated water was not completed.

(3) Overall achievement levels of objectives

Looking at achievement levels of objectives of both water supply and sewerage system projects, out of 26 projects, 8 (corresponding to 36% of the share of funding disbursed) had attained more than 80% of their objectives, 5 projects (25% of the share) were between 50% and 80%, and 13 projects (39% of the share) achieved less than half of their goals. Taking a weighted average of individual project goal achievement levels of objectives relative to project scale, overall some 60%-70% of the present project's goals were achieved. In short, the results were moderate.

2.3.2 HUDCO's role and contribution

The state government (mainly the Public Health Engineering Department) basically owes the responsibility for creation and plan of the projects. HUDCO's role was to review project plans from technical and financial perspectives at the time of the appraisal.

State government plans were not based on sufficient demand research, including the research for residents' willingness to pay for services. In some cases, the planned figures were just followed by government guidelines and the actual demand for increase of sewerage and water supply connections to individual households was overestimated. However, because of lacking field data, HUDCO was also not capable of revising those cases. For many projects, HUDCO did conduct financial analyses to indicate what would be appropriate fee levels, and even suggested raising service fees. But because fee revisions fall under the domain of the state governments, there was no binding force to HUDCO's recommendations, and it was rare for the authorities to follow them. Generally, HUDCO was not able to make significant contributions to the effectiveness, sustainability, or overall quality of individual projects. One of the reasons that not much attention was given to this problem is probably that there was little risk of default on the loans thanks to state government guarantees[10].

9 At Jodhpur, due to insufficient funds 80% of the end-stage sewerage works were not laid down. At Bangalore, because it is necessary to lay down once again a trunk line of sewerage channels alongside a highway, the work of connecting the works to homes has not yet been begun.

10 For example, HUDSO does not survey the effectiveness of sustainability of individual projects unless requested to by its donors.

2.4 Impact

2.4.1 Impacts on the improvements in living standards

According to HUDCO's report, improvements in living standards were identified in each of the cities where individual projects were conducted. Projects had various impacts, including such things as an increase in water consumption, a decrease in supply-related costs (including time costs for drawing water), improvements in hygiene habits (coinciding with increased water consumption and improvements to public health facilities), a healthier environment in residential areas, and lower incidence of water-borne diseases. HUDCO's report lacks concrete data, however; there is thus no information on which to base a quantitative analysis of the impact[11].

For the ex-post evaluation, interview surveys were conducted of 300 households in Tirupati city in the state of Andhra Pradesh, where 2 projects—1 for the water supply and 1 for the sewerage system—were conducted. (In both cases, the completion rate was judged as greater than 80%, and effectiveness was judged to be 50%-80%; see Table 2.) The survey results are shown below (see the column).

- Roughly two thirds of all households had obtained new water supply connections to their homes, and half of those households were satisfied with the fact that using water had become more convenient. However, the other half was not satisfied with the quality of the water.
- While the number of connection for water supply taps into households had increased thanks to the project, because of recent droughts, water was conversely being supplied for shorter periods and in lower quantities. It is believed that this was connected to the fact that water quality had declined.
- Roughly half of the households were connected to a sewerage system. Not only were downtown areas becoming far more hygienic, but other positive changes were reported, including decrease of mosquitoes, a reduction in foul odors, and a improvement of environment.
- Compared to pre-projects, improvements to hygiene habits were seen thanks to the greater frequency with which residents washed their hands, bathed, and laundered their clothes. Most residents believe that their own increased awareness of hygiene wrought these changes. However, it seems likely that these

[11] For all individual projects, an impact study was submitted and approved at the time of the loan agreement, but the reports were inadequate. Data on effectiveness was incomplete, and the reports contained almost no specific information on the impact.

improvements were spurred by the fact that water supply projects made it that much easier to obtain water.

Column: Impact of Water Supply and Sewerage Projects on Tirupati City

Two projects were carried out in Tirupati city in the State of Andhra Pradesh (population approx. 250,000). One involved the construction of a new sewerage system, and the other was a waterworks project that increased water supply capacity through the use of new water resources. Interview survey was conducted using questionnaires to housewives of 300 households in the city selected randomly (sample rate 0.6%).

Waterworks projects

Out of 300 households, 195 (65%) received new water supply connections. Out of these, 107 (55%) were satisfied with the project for the following reasons.

- It became possible to do laundry frequently (81 households, 27%).
- There was no longer a need to travel far to draw water (54 households, 18%). (The time spent drawing water was shortened by an average of one hour.)
- Children became able to bathe daily (21 households, 7%).

However, on account of a water shortage due to insufficient rainfall over the previous two to three years, even in households that had obtained a new water supply connection to their homes, water consumption did not increase significantly. Moreover, two out of three of these households (127 total) were unsatisfied with the water quality on account of contamination, foul odors, or foreign bodies.

Out of 300 households, 89 (30%) had had water supply connections to their homes from before the project began. Although these households received a new water source through this project, on account of a water shortage, there was no improvement in water quality or the volume or amount of time water was supplied. As such, the benefits of the project were barely recognized.

Of the 300 households, 16 (5%) had not received water supply connections to their homes even after the project was completed. Half of those were using a well that they had on their property, and the other half were using public water taps (either a water supply tap or public well). Nearly all of these households were satisfied with their current condition, and were not particularly hoping for a water supply connection to their home given the water supply service's low quality (in terms of both water quality and the amount of time water was supplied).

Sewerage projects

Thus far 139 households (47%) out of 300 were connected to sewerage systems. As reasons for the connection, 62% of connected households cited hygiene, and 34% cited convenience. For 92 (31%) of the 300 households, sewerage water in downtown areas had been allowed to discharge as it was into roadside gutters, but once they were

connected to the sewerage system, the environment in downtown area greatly improved. Some households that could have been connected to the sewerage system declined the service. As reasons for declining the connection, half stated that they were satisfied with their current situation, and the other half cited the connection fee.

Among impacts of the sewerage systems, one-third of the households cited a reduction in foul odors, one-third cited beautification of the surrounding area, 30% mentioned a reduction in mosquitoes, and a quarter cited disease prevention.

Improvements in hygiene habits

Questions were asked to households about changes wrought over the past seven years regarding hygiene habits. Out of 300 households, 34% mentioned that they washed their hands more often after using the bathroom, 35% mentioned washing hands before eating, 31% cited bathing more frequently, and 24% said they did laundry more often. 70% of residents reporting such changes cited heightened awareness of hygiene as driving the changes, whereas only 20% mentioned this project. While the hygiene habits of households with a water supply connection to their home were greatly improved over those who had no such a connection, but there was no observable difference between households connected to the sewerage system and those without connection.

Residents in a slum which received water faucets through an individual project

2.4.2 Impacts on improvements of the industrial infrastructure

The water supply and sewerage development work carried out under this project was mainly intended to improve living standards, but in the 2 cities below, positive impacts that contributed to improvements of the industrial infrastructure were observed.

- In Hyderabad, the project-funded development of the water supply system was a significant factor in developing the city as a technopolis, a project being promoted by the city.
- In Bangalore, intermediate waterworks from tertiary treatment of wastewater has produced a major supply for the city's thermal electric power plant (incomplete).

Development of Hyderabad as a technopolis (a development hoped for in the establishment of the distribution reservoir under this project)

2.4.2 Impacts on environment

In 5 cities, the very poor hygiene environment in certain sections of the city lacking sewerage system has improved. On the other hand, in Amritsar where a sewerage treatment plant has yet to be constructed, wastewater has been discharged into the local river without treatment, causing the risk of odor problems and deterioration in water quality.

2.5 Sustainability

2.5.1 Sustainability of individual projects

(1) Organizational structure

Management, operation and maintenance of individual projects is handled either by a water and sewerage services department under the respective local authority or a water

and sewerage public corporations established in big cities. Generally speaking, many water and sewerage public corporations in large cities tend to be established and staffed with a relative wealth of capable employees, but the water and sewerage services departments of smaller cities tend to be organizationally undermanned.

(2) Financial status

In 5 (mainly large) cities out of 23 cities, operation costs were essentially recovered through service fees, but in 12 cities, less than half of operation costs were recovered. The shortfall was covered by city revenues (city taxes, including property tax and state subsidies). The majority of the cities targeted by this project are dependent on state subsidies for over 30% of their revenue. Site survey revealed some cases where facilities are not being maintained properly on account of funding shortages. Taking all the above into account, the financial sustainability of individual projects is considered inadequate[12].

Examples of facilities where proper maintenance is not being kept up
(Right) Water utilities in Amritsar: Control panel of deep well pump
(Left) Sewerage utilities in Tirupati: Pump motor at sewage treatment plant

(3) Technical capacity

There is an insufficiency in number of engineers to operate the water supply and sewerage systems in smaller cities, so the public health engineering departments of each state generally provide technical support. Even so, overall the know-how and technologies (measurement of loss from water meters, etc.) to enhance efficiency of

[12] In cases where beneficiaries' ability to pay the fee is limited, it is important that the shortfall be covered through municipal resources. In addition, it is hoped that project administrators will exhibit financial self-reliance through the levying of beneficiary charges in order to optimize operating efficiency.

operation are insufficient. Further strengthening of technical capacity is necessary in order to obtain sustainability.

2.5.2 Sustainability of the executing agency (HUDCO)

HUDCO's annual lending figures and pretax profits are both on the increase in recent years. At 6.3%, its FY2003 capital adequacy ratio was good for a domestic financial institution. HUDCO funding of city infrastructure projects is increasing, and while its share of the market continues to shrink[13], it continues to extend loans for the construction of water supply, sewerage, and sanitation infrastructure.

2.5.3 Sustainability of two-step loans (TSLs)

As of September 2005, 69% of the total HUDCO lending funded by this project had been repaid. Only one project has been in arrears for more than six months. By September 2004, the loans on 9 of the 26 projects had been paid off ahead of schedule, and repayment performance is satisfactory.

However, because swap costs designed to avoid exchange risk had been mounting, as of September 2005 the balance on revolving funds was negative at ▲270 million rupees [14], and refinancing has yet to commence.

3. Feedback

3.1 Lessons Learned

(1) When using a TSL to extend funds to sectors in which reforms targeting improved operational efficiency and financial standing are a key factor, consideration needs to be given to the following points for the effectiveness of the project.

- Executing agency should take initiative on reforms, or, take a substantive role with local government and relevant agencies in the reform process in order to secure the steady implementation of the several key measures such as development of legal systems and framework, rate adjustment, and others.
- For individual projects, not only constructing infrastructure facilities, but it is also needed to proactively providing funds for training, consulting services and material

[13] See footnote 1.

[14] The interest rate swap was 12%-13%, and thus exceeded projections at the time of the appraisal (7% -8%). The rupee/yen swap market in India continues to be undeveloped, which is why it was not possible to obtain the initially envisaged low interest rate offer. HUDCO concluded swap agreements with the State Bank of India on three occasions, but because after this no financial institutions willing to cover the swap materialized, HUDCO was unable to swap 1.244 billion yen and was forced to repay the principal to JBIC in March 2002. Due to high interest rates and the inability to cancel contracts midterm (after 7-10 years), a negative spread emerged between the interest that HUDCO pays (JBIC interest rate + government guarantee rate + swap rate) and HUDCO's normal lending rate (currently 12%-14%). HUDCO has been suffering losses as a result.

and equipment provision that would boost the reforms.

(2) If the executing agency of the TSL is not conducting sufficient and systematic ex-post evaluations, technical assistance to ensure a proper ex-post evaluation of the TSL project itself is critical, and there is a need for appropriate input on the scope, timing, and methods used in the ex-post evaluations. If the executing agency is a policy finance organization, in order to encourage the achievement of policy objectives, technological support should be provided to introduce systematization and performance auditing in ex-post evaluations, whose role is to assess the performance (effectiveness and sustainability) of individual projects.

3.2 Recommendations to state governments

When implementing waterworks and sewerage projects, it is important to decide a reasonable project scale and to secure financial sustainability. For that reason, state governments should first estimate demand for the services to be provided and assess residents' willingness and ability to pay for them. Secondly, state governments should determine the maximum fee rate that beneficiaries can endure. Thirdly, they should come up with a realistic plan for public water taps and the provision of water supply connections to individual homes. Finally, they must decide on an appropriate project scale.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Outputs	Disbursement of a total 8,670 million yen in loans to 60 - 70 water supply, sewerage, and solid waste disposal projects in small- to medium-sized cities.	90% of the total loan target of 8,670 million yen was disbursed to 26 projects in 23 cities. Nineteen projects related to water supply facilities, and seven were for sewerage systems.
	(Overall scheme) (1) Target projects: water supply projects, sewerage and drainage projects, and solid waste disposal projects in urban areas (construction, expansion, or rehabilitation).	(Overall scheme) (1) As planned. However, no funds were disbursed for solid waste disposal projects.
	(2) End users: Organizations responsible for providing water supply, sewerage and solid waste disposal services as defined in HUDCO guidelines	(2) As planned.
	(3) Loan terms Interest: [JBIC interest rate + government warranty + swap rate + 1.5% HUDCO margin] or the normal HUDCO lending rate, whichever is lowest Repayment period: maximum of 15 years Loan amount: 500 million rupees, with individual loans of 40 - 50 million rupees Loan ratio: Up to 100% of HUDCO's loan ceiling Security/guarantees: state government guarantees, bank guarantees, property, etc.	(3) Essentially as planned. Interest: A drop in market interest rates pushed HUDCO's normal lending rate down, thus this was adopted as being the "lower" of the two Repayment period: 8 - 15 years (average: 13 years) Loan amount: 12 - 461 million rupees / loan (average rupees 148 million) Loan ratio: 50% - 100% (average: 75%) Security/guarantees: all loans guaranteed by the state government