

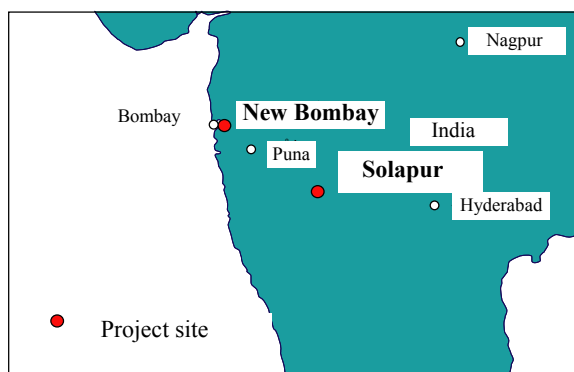
India

Urban City Water Supply Project

Report Date: February 2003

Field Survey: October 2002

1. Project Profile and Japan's ODA Loan



Project site



Purification plant at Solapur

1.1 Background

The Government of India (GoI) targeted a water connection rate for the entire population by the end of its Seventh Five-Year Plan (April 1985-March 1990). Whilst the bid resulted in an increase in the urban connection rate from 73% to 84%, per capita consumption in FY90/91 remained low at 148 liters per day. The Eighth Five-Year Plan again set its sights on achieving a 100% water connection rate and policies aimed at stabilizing living standards and improving health and sanitation were given pole position.

New Bombay is a new town located near Old Bombay, and in 1991 its population was around 700 thousand. In the region, water was supplied by the City and Industrial Development Corporation of Maharashtra Ltd (CIDCO), which received bulk supplies totaling 100,000 cubic meters per day from Maharashtra Industrial Development Corporation (MIDC) and Maharashtra Water Supply and Sewerage Board (MWSSB). It was predicted that the population and demand for water in the region would grow in line with progress in construction.

Solapur is a core regional city situated in southeastern Maharashtra where production centers on the garment industry. As of March 1991, its water service area embraced a population of some 620 thousand people, and a total of 100,000 cubic meters of water was supplied daily from the Ekrukh Water Tank and the Bhima River. The project undertaken in Solapur covered the city itself and nine villages in its environs. The population in the area was forecast to swell from 620 thousand (in 1991) to 1.3 million (in 2011), whilst peak demand for water was expected to surge from 101,000 cubic meters per day in FY90/91 to 186,000 cubic meters per day in FY10/11.

1.2 Objectives

The objectives of the project were to develop water supply facilities capable of supplying 150,000 cubic meters per day and 80,000 cubic meters per day, respectively, in the two cities of New Bombay and Solapur in the state of Maharashtra, to meet demand created by population increases

and to ensure the efficient operation of water supply services via the provision of consulting services.

1.3 Project Scope

The details of the main components of this project are as follows.

New Bombay Project

- Water intake facilities (not covered by the yen loan, water source: Hetwane Dam)
- Transmission facilities (not covered by the yen loan, Hetwane Dam-purification plant): reinforced concrete pipes: approx. 18km
- Purification facilities (treatment capacity: 150,000m³/day): raw watercourse, mixing basin, high-speed coagulation basin, rapid filtration basin, clean water reservoir, etc.
- Water supply/distribution facilities (purification plant - Nerul connection point): water pumps × 6, water pipes (steel: approx. 21km), junction well, distribution reservoir (capacity: 13,000m³), distribution pipes (steel: approx. 11km)

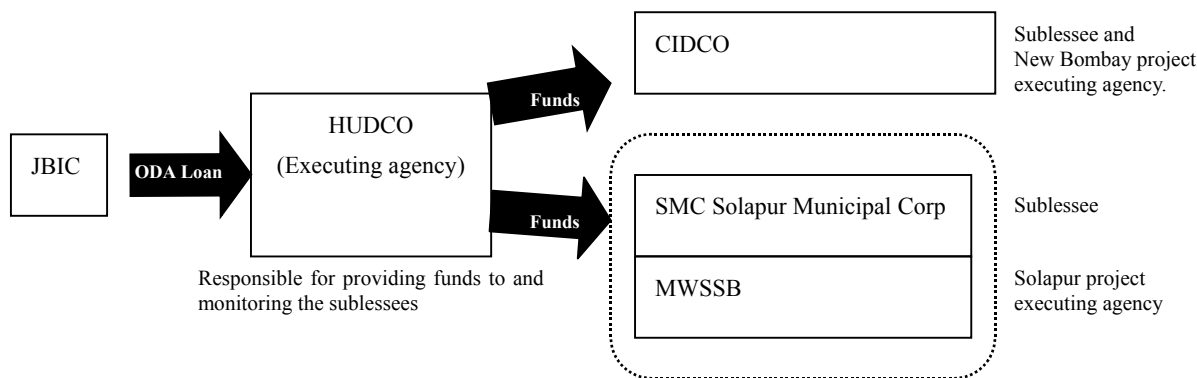
Solapur Project

- Water intake facilities (water source: Ujani dam): intake tower, intake pumps × 6
- Transmission facilities (Ujani dam – purification plant): steel pipes: approx. 47km, reinforced concrete pipes: approx. 40km, junction well
- Purification facilities (treatment capacity: 80,000m³/day): aeration tank, mixing basin, high-speed coagulation basin, rapid filtration basin, clean water reservoir, etc.
- Water supply/distribution facilities (purification plant – distribution reservoir): water pumps × 6, water pipes (steel: approx. 16km), distribution reservoir (capacity: 2,500m³ × 2)
- Other: electric equipment, communications road, access road, etc.

1.4 Borrower/Executing Agency

The President of India/Housing and Urban Development Corporation Ltd (HUDCO)

HUDCO was the project’s executing agency, however, the projects that were undertaken in the two cities (sub-projects) were actually managed by CIDCO in New Bombay, and Solapur Municipal Corporation (SMC) and Maharashtra Water Supply and Sewerage Board (MWSSB)*¹ in Solapur, which organizations received funds from HUDCO.



¹ MWSSB has been renamed and is currently operating as Maharashtra Jeevan Pradhikaran (MJP). In this report “MWSSB” and “MJP” are used conjunctively.

1.5 Outline of Loan Agreement

Loan Amount	6,788 million yen
Loan Disbursed Amount	4,207 million yen
Exchange of Notes Loan Agreement	December 1991 January 1992
Terms and Conditions	
-Interest Rate	2.6%
-Repayment Period (Grace Period)	30 years (10 years)
-Procurement	General untied
Final Disbursement Date	March 2000

2. Results and Evaluation

2.1 Relevance

The aim of this project was to develop water services in the two cities of New Bombay and Solapur, which were forecast to witness a surge in demand for water on the back of population growth. This was both consistent with the then current national development plan (Seventh Five-Year Plan) and a response to the strained water demand position in the two cities. The separate and specific circumstances of the two projects are given below.

New Bombay is contiguous to the major city of Bombay (Mumbai), and it was anticipated that the new town would help to ease population congestion in that city, thus in this sense too, infrastructure development in New Bombay was a necessity. As construction in the new town progressed, growth in the population and demand for water became conspicuous, and it was predicted that the population in the area to be covered by the project (12 of New Bombay's 20 districts) would surge from around 700 thousand at appraisal (1991) to upwards of 2 million by 2001, with demand for water increasing 6.3 fold to 630,000 cubic meters per day during the same period.

Solapur is located between the two major cities of Bombay (Mumbai) and Hyderabad and is a strategic junction for national roads and railways. This led to the city's urban population becoming increasingly dense as it grew in size and the need for development and infrastructure provision in the nine villages in its environs had been pointed out. The population in the project area was forecast to grow from 620 thousand at appraisal to around 1 million in 2001, with water demand increasing 1.4 fold to 140,000 cubic meters per day. Moreover, water levels in the two sources not covered by this project dropped during periods of low precipitation and there were calls to secure new sources.

The GoI continues to emphasize the importance of water supply facilities, which were again a priority policy within its Ninth Five-Year Plan (1997-2002). Specifically, the GoI has stated that potable water "is indispensable to achieving our primary objective of 'Health for All'".

In terms of the above, this project was based on then current government's development policy and the circumstances in the regions, and its significance has remained unchanged to the present day; its relevance is thus highly evaluated.

In connection with the Solapur project, it was revealed during the survey that the development of the distribution network (not covered by the yen loan) had fallen behind the schedule conceived at appraisal ². Accordingly, whilst this does not affect the overall relevance of the project per se, there

² SMC has plans to invest approximately Rs1.25bn in the installation a total of 70,000 distribution points (there are currently 55,000) in two phases by 2026. It has already spent Rs200 million and the project is partially underway. It has applied to the state government for funding, but it is not clear how the remaining funds are to be raised.

is room to explore the feasibility of undertaking future measures in a flexible manner such as yen loan funding and the like, for the materialization development of the distribution network, which is inextricably linked with this project.

2.2 Efficiency

2.2.1 Project Scope

[New Bombay Project]

Although minor adjustments were made to the length of transmission pipes, the number of pumps at the supply facilities, and so on, in line with change in the location of the purification plant (it was not possible to acquire the private land initially scheduled for construction, and a plot of national land at a higher altitude was selected), a water system with a daily supply capacity of 150,000 cubic meters was constructed as per the plans.

However, training for CIDCO employees, one of the consulting services planned at the appraisal stage, was not implemented since no request for the service was placed by CIDCO.

[Solapur Project]

As per the plans, a water supply system with a daily supply capacity of 80,000 cubic meters was constructed. However, scope revisions were necessary for the following items.

(1) Water supply/distribution facilities

As a contingency against the instability of supplies from the existing source in the north of the city, the route for the supply pipes was changed to a northerly one, thereby increasing its length.

(2) Other materials and equipment, etc.

It became clear that the initially planned power supply was insufficient for the operation of the facilities, rendering work (expansion of substation, etc.) necessary to secure the additional power.

(3) Consulting services

Consulting services were planned to facilitate the trouble-free operation of the facilities after project completion, however, they were not implemented as no request for the services was received from the executing agency (MWSSB, currently MJP).

The hardware modifications cited above are believed to have been necessary and relevant to the realization of the initially conceived facility functions. Nevertheless, these changes in scope were also connected with a surge in costs, as detailed later.

2.2.2 Implementation Schedule

[New Bombay Project]

After testing, etc., the facilities finally went into commercial operation in October 2002, eight years and two months behind the initially planned schedule. Facilities construction alone was subject to delays of six years and two months. CIDCO has indicated that the main reason for these delays was hold ups in the acquisition of land needed for the project (in fact, they were the result of the accumulation of numerous separate hold ups). The specifics are given below:

(1) Securing forestland: There was an approximately 4-year delay in the transfer of land from the

Forest Department*³.

- (2) Land acquisition: The acquisition of private land needed for laying transmission / distribution pipes and for the various facilities was delayed by approximately 6 years; likewise, the transfer of land from the Public Works Department fell 7 years behind schedule.

[Solapur Project]

Commercial operation finally commenced in July 1998, three years and one month behind schedule. Three reasons cited for these delays as follows:

- (1) L/A approval: A delay of 15 months occurred whilst HUDCO was waiting to obtain a central government guarantee.
- (2) Laying of transmission / distribution pipes: Revisions to the structural design and changes to the service pipe route necessitated by an earthquake in a neighboring area resulted in delays of a year and eight months.
- (3) Purification plant construction: Similarly, design revisions necessitated by the earthquake pushed construction back by a year and eight months.

CIDCO made continuous efforts to expedite the acquisition of land for the New Bombay project, holding frequent meetings with representatives from the central and state government and the local community, however, without question, the hold ups on both projects impacted on the ability to achieve the proposed results of the projects.

2.2.3 Project Cost

[New Bombay Project]

There was a significant overrun in total project costs, which at Rs1,267 million were approximately double the initial budget (approx. Rs687 million). Across-the-board delays in construction and inflation are cited in this connection, but the cost increases for the following items were particularly conspicuous.

- (1) Purification plant (128% increase over initial budget)
Bedrock at the alternative construction site was hard and required more expenditure and manpower than was anticipated, for drilling work, etc. A new pump was also necessary for drawing the raw water.
- (2) Transmission pipes (153% increase over initial budget)
Aside from the escalation in materials costs caused by the protracted implementation schedule, more concrete and steel were necessary due to the ground and the established route, etc. (increased number of trans-road sections, etc.).

HUDCO came up with the additional funds necessary to cover the shortfall, however, the rise in costs means that CIDCO have had to set comparatively high water tariffs under the pressure of necessity, which has also affected the realization of project effects. The yen loan portion of project costs was kept to within approximately 80% of the initial plan.

[Solapur Project]

³ When land is transferred between government bodies, the body requesting the transfer must first submit a proposal to the "collector" (the head of the administrative organ in each district), and then discuss it with the relevant department. The negotiations necessary for the transfer of land from the Forest Department encompassed five organizations/departments from the district level right the way up to the central government level and were thus time consuming.

Total costs of approximately Rs910 million equate to an approximately 10% overrun on the initial budget (approx. Rs827 million). The increase for the following items (excluding price fluctuations due to the protracted implementation schedule) was particularly conspicuous.

(1) Transmission pipes (56% increase over initial budget)

Increases were generated by the changes to the route.

(2) Other equipments (222% increases over initial budget)

Generated by the need to expand a 33kV substation and related facilities near the water intake duct and at the purification plant after it became clear that the initially conceived energy supply volume would be insufficient for facilities' operation.

(3) ETP Charge*⁴ (80% increase over initial budget)

This is a procedural fee paid to MWSSB, the executing agency, by SMC, the project's commissioner at a fixed ratio to project costs. It increased in line with the increases in project costs.

The Government of Maharashtra State covered the shortfall in project funding. Moreover, the impact of nearly doubled depreciation of Rupees served to keep the yen loan portion to within approximately 50% of the initial plan.

2.2.4 Performance of Consultants and Contractors

Construction work fell behind the initial schedule, but the accumulation of multiple factors to slow up the process made the interruptions inevitable, and the consultants and contractors employed by the executing agencies in both New Bombay and Solapur have been highly evaluated. No specific problems occurred in connection with the execution of the work.

As is evidenced above, investments in the implementation schedule and project costs were well in excess of initial plans and the "efficiency" of both projects became lower than initially expected. This verdict is particularly pertinent to the New Bombay project, given that it was delayed by upwards of eight years and project costs were virtually double the initial estimate.

2.3 Effectiveness

2.3.1 Water Supplies to Project Beneficiary Areas

[New Bombay Project]

The objectives of this project were to "construct water supply facilities capable of supplying 150,000 cubic meters per day to respond to increasing water demand in the city, and to realize efficient operation via the provision of consulting services".

Construction was severely delayed and the purification facilities were only in their second month of operation when this field survey was conducted. Although services to five districts within the city and to some rural areas had been commenced, the gross supply (= supply capacity) was well below the target level and was hovering at around 20,000 cubic meters per day*⁵.

Further, one factor behind the stagnant supply volume lies in the fact that agreement on water tariffs has still not been reached between CIDCO and NMMC (Navi Mumbai Municipal

⁴ Abbreviation of "Establishment Tool Plant Charge"

⁵ NMMC purchases 10,000m³ of the 20,000m³ to supply the city. The corporation purchases a total of 210,000 m³/day from CIDCO and other organizations.

Corporation), which purchases water from CIDCO and distributes it to dwellings throughout the city. If the price issue can be resolved then NMMC hopes to procure another 60,000 cubic meters from CIDCO that it is currently purchasing from another supplier and it is hoped that progress can be made in the negotiations*⁶.

According to a recent report issued by NMMC, the current population of New Bombay and water demand in the city are approaching the levels predicted made by CIDCO at appraisal.

[Solapur Project]

Overview of water supply by the project is shown below in the form of a comparison between initial targets and results.

Table 1: Project Targets and Water Supplies in Solapur (Plan)

(thousand tons/day)

FY	Supply population (thousand people)			a. Max. demand	Existing supply sources		Supply gap (a. -b.)	Project		Final supply gap
	City	Suburbs	Total		Installed capacity	b. Volume available		Installed capacity	Volume available	
1990/91	620	-	620	101	112.5	100.0	1	-	-	1
1995/96	651	179	830	122	112.5	100.0	22	80.0	66.0	-44
2000/01	684	311	995	144	112.5	112.5	31.5	80.0	66.0	-34.5
2005/06	718	441	1159	167	112.5	112.5	54	80.0	80.0	-26
2010/11	754	546	1300	186	112.5	112.5	73.5	80.0	80.0	-6.5

Table 2: Project Targets and Water Supplies in Solapur (Actual)

(thousand tons/day)

FY	Supply population (thousand people)			a. Max. demand	Existing supply sources		Supply gap (a. -b.)	Project**		Final supply gap
	City	Suburbs	Total		Installed capacity	b. Volume available		Supply target	Actual	
1990/91	620	-	620	101.0	112.5	100.0	1.0	-	-	1.0
1995/96	720	85	805	112.5	112.5	100.0	12.5	-	-	12.5
2000/01	875	-	875	122.5	112.5	80.0	42.5	50.0	45.0	-2.5
2005/06*	1075	-	1075	150.5	112.5	90.0	60.5	70.0	60.0	0.5
2010/11	1300	-	1300	182.5	112.5	112.5	70.0	70.0	70.0	0.0

* At the present time, figures for 2005/6 onwards are forecasts. ** "Supply targets" in Table 2 are supposed to correspond to the "Volume available" in Table 1, however, MJP has been using these figures from the outset (targets were not revised midway).

A comparison of the two tables reveals that the volume of water (average) being supplied by the project facilities is slightly lower than the initial targets (FY00). According to SMC, the 45,000-ton figure is the average, and actual production ranges between 30-60 thousand tons depending on seasonal fluctuations in demand.

Two major reasons have been cited for the lower average production volume as against the initial supply targets. (1) Demand for water has been less than expected in line with lower than anticipated population growth rates. (2) Development of the distribution network in Solapur city, which plays a key role in supplying water to the city, has been behind schedule.

Meanwhile, droughts in Solapur mean that water supplies from existing sources are lower than expected and the project's water sources are now a key to filling that gap. For example, in FY00, the share of supplies from the project facilities had reached 36% of gross supply to the city and its environs and was approaching the initial target (40%), and thus, in the sense of "securing a new stable supply of water" the project objectives have been being achieved. Especially during the

⁶ CIDCO has proposed a tariff of Rs9/kiloliter based on its outlay for the project, but NMMC is looking for a tariff of Rs5-6; negotiations were still in progress in April 2002, after this survey was completed. In passing, the bulk supply price (wholesale price) for the local government in neighboring Gujarat State is Rs3.5-5.

drought that extended from last year into this, the water supply system constructed via this project has been supplying volumes well in excess of the annual average at 60-70 thousand tons per day.

2.3.2 Levels of Satisfaction Among Local Residents

A social survey carried out as part of this study focused on (1) whether or not the beneficiaries were satisfied with the services (quality and volume) provided by this project, and (2) whether the project had linked to health improvements among residents.

[New Bombay Project]

Residents were divided into two categories, with each sample comprising 50 households*⁷.

Category 1	People receiving water services via the project facilities. Direct beneficiaries.
Category 2	People receiving water services from other sources (the existing supply network excluding this project)

The following assessments were made on the basis of survey results.

<Satisfaction with the service>

- 70% of Category 1 respondents and approximately 55% of Category 2 respondents judged water quality to be “good”. Category 1 respondents cited a marked improvement in quality after the project (there was a increase of around 10% in “good” responses for each question).
- No major changes have been noted in the health of the respondents since project completion. Generally speaking, residents in the areas covered by the survey are in good health, and incidences of diarrhea and other water-related diseases are low.

<Impact on health>

- In Category 1, the top three project impacts were (1) increased water pressure (selected by 46% of respondents), (2) improved water quality (color) (40%), and (3) increased supply volume (28%).

【Solapur Project】

Residents were divided into three categories, with each sample comprising 50 households.

Category 1	Areas fully covered by the distribution network where water is supplied from this project. (Long the urban zones forming the core of Solapur city)
Category 2	Areas partially covered by the distribution network where water is supplied from this project. (Areas that were originally rural villages that have recently been incorporated into Solapur)
Category 3	Areas with no distribution network and have no connection with the project.

The following assessments were made on the basis of survey results.

<Satisfaction with the service>

- There has been a remarkable shift in the water supply source among Category 2 respondents, from ground water to piped water, with the percentage of people having access to piped water having increased from 55% (pre-project) to 94%. This change was not conspicuous in the other

⁷ In both areas, respondents were randomly sampled using the systematic random sampling method. The survey was conducted as interview survey using a questionnaire constructed by an expert in the field of social research. The number of sample (50 households per category) was considered appropriate due to time constraints. To confirm “with/without” effect of the projects, the respondents were categorized into two (New Bombay) or three (Solapur). Category 1 (New Bombay) and Category 1/2 are labeled as “beneficial area” by the projects whilst the rest are not. Category 1/2 in Solapur reflects the influence of the development of distribution network in the city.

two categories.

- Average per household consumption has increased in Category 2. For example, respondents using 200-300 liters per day increased from 20% pre-project to 37%. This remarkable phenomenon was unique to Category 2 respondents.
- A comparison of pre- and post-project water quality reveals a mixture in items such as transparency, color, flavor, and smell, that have improved and those that have not for Category 1. Overall improvements in quality were noted for more items among Category 2 respondents.
- Respondents in Category 1 and 2 pointed to the improvements in water quality (color/flavor) as being the most significant impact of the project (selected by more than 20% of respondents).

<Impact on health>

- Regarding health perspectives, there were no major changes in health among any of the respondents, regardless of category. (Most households traditionally boil or filter their water and hand washing is strictly enforced in the area.)

2.3.3 Consulting Services

The project included plans to provide consulting services aimed at strengthening the organizational capabilities of the executing agencies and bolstering human resources, which were intended to realize efficient operation of the facilities after project completion. However, with the exception of part of the New Bombay project, the actual circumstances differed from the initially conceived plans. In both instances, this was due to the fact that requests for services from the respective executing agencies were fewer than anticipated at appraisal.

Nevertheless, the fact that the services were not provided does not automatically signify that the objective of “realizing efficient operation” was not achieved. As is explained hereunder, both executing agencies provide regular training for their employees of their own accord, and there are not considered to be any particular issues in this respect.

2.3.4 Recalculation of Financial Internal Rate of Return (FIRR)

[New Bombay Project]

Recalculated on the basis of results and forecasts received from the executing agency, the resultant FIRR was 3.3% and lower than the figure calculated at appraisal (7.5%). The following assumptions were used for the recalculation.

(a) Benefits

As at appraisal, project benefits were taken as revenue from water tariffs (= weighted average tariffs × revenue-yielding supply (85%)). However, the tariff was set at the FY00 level (Rs6.75/liter) to reflect the current market price and assumed to remain fixed thereafter. It was assumed that the supply volume would increase from 20,000 cubic meters (FY02) in proportion to the population growth forecasts for the supply catchments area, and remains fixed at 90,000 cubic meters (FY12) thereafter.

(b) Costs

Maintenance costs were calculated at the appraisal level of Rs64.15 million per year. Actual costs for FY01 (Rs67.5 million/year) were used for the recalculation, and an annual increase of 3.5% per year was assumed thereafter, including the cost of equipment replacement.

(c) Project life

Project life was extended from the 15 years postulated at appraisal to 30 years since equipment replacement costs had been included in maintenance costs.

[Solapur Project]

Recalculated on the basis of results and forecasts received from the executing agency, the resultant FIRR was 4.1% and lower than the figure calculated at appraisal (6.4%). The following assumptions were used for the recalculation.

(a) Benefits

As at appraisal, project benefits were taken as revenue from water tariffs (= weighted average tariffs × revenue-yielding supply (85%)), with actual results being used up to FY02. A 16% increase (the 20% increase in tariffs minus 4% for expected inflation rate) in revenues was assumed for FY03-FY06 to reflect the planned increases in water tariffs; thereafter, the increase was taken as 5% in consideration of increases in supply along with the development of the distribution network.

(b) Costs

At appraisal, the cost of materials and equipment replacement at the purification plant 15 years (FY10) after the start of operations was reckoned at Rs.62.3 million, however, at recalculation, replacement costs were assumed to be Rs100 million and Rs90 million in 2013 and 2014, respectively. For maintenance costs, actual figures were used up to FY02, with an increase of 1.0% per year assumed thereafter.

In addition, since it is assumed that “distribution network development” will increase revenues hereafter*⁸, the requisite funding costs were newly incorporated. Specifically, currently identified total investment costs were multiplied by the percentage of gross supply from the three water sources that will benefit from the development of the distribution network accounted for by the project to obtain total investment cost, divided proportionally by the assumed construction period.

(c) Project life

As at appraisal, assumed to be 30 years.

2.4 Impact

2.4.1 Socioeconomic Impacts

“Housing development and industry promotion, plus improvements to the health of residents in areas with expanding populations” were anticipated as being primary project objectives (refer to 2.3.2 for details of the impact of water services, including improvements to the health of residents).

[New Bombay Project]

Supplies from the project’s water facilities have only just commenced (October 2002), thus it is difficult to confirm what impacts have been achieved. However, from the hearing with NMMC, the entity charged with delivery to individual households, it was learned that the severe delays in project implementation has been a problem in that NMMC has only been able to supply 3 hours of service per day during the last 4-5 years, which has brought numerous complaints from local residents. This problem may have been mitigated if the project facilities completed much earlier.

⁸ The development of the distribution network will require a considerable outlay, however, it is not currently clear how the executing agency intends to raise the funds. Accordingly, the scenario of supply increases assumed for distribution network development is speculative.

[Solapur Project]

Hearings were undertaken at SMC and with the private city developer to obtain information on urban development and in the field of health and sanitation. The status of impact achievement in each of the fields is given below.

(1) Housing development

According to a major city developer, results from the last few years show that housing construction is progressing at a rate of 1,500 houses per year in both the city center and the suburbs (95% are being built for people already living in the city). SMC considers that the project has made a major contribution to this housing construction, and believes that the figures would have been as much as 70% lower in the absence of the project. It is considered that the future development of the distribution network in the city will allow for an even greater impact on housing development.

(2) Industrial development

Solapur's main industry is textiles. There are two large industrial zones to the east of the city (Akkapkol and Hotagi), however, there had been a downturn in production output. This is attributed to a nationwide recession, the dwindling purchasing power of farming households due to a slowdown in agricultural production and to water shortages (the textile industry uses large volumes of water) in recent years⁹. In the Chincholi district, the Maharashtra Industrial Development Corporation (MIDC) is pushing ahead with industrial development, primarily in the chemicals industry, but development has been sluggish and demand for water is falling¹⁰. Without doubt, project facilities are propping up water supplies during periods of drought, however, since demand for water per se is on the decline it is not clear to what extent the project are contributing to industrial development.

(3) Health and Sanitation

As mentioned in section 2.3.2, it was not possible to acquire any data (on diseases with a strong causal relationship to water) on the relationship between the project and the health and sanitation of local residents. Prior to project implementation the residents of rural villages used ground water for drinking, and since the quality of ground water in this area is not necessarily good, it is surmised that long-term impacts from the project will become more conspicuous in rural areas.

2.4.2 Impacts on Local Residents

[New Bombay Project]

The implementation of this project did not require any involuntary resettlement of residents. However, compensation was awarded to residents affected by transmission / distributions pipes (not covered by this project) passing through their land, etc. Under the provisions of domestic legislature, a total of Rs9.9 million was paid in compensation to the deed holders of a total of 28.6 hectares of land in 23 villages¹¹. No specific problems such as litigation, protest campaigns and the like, were reported on the New Bombay project.

In addition, potable water is also being supplied to 68 villages (approx. 80 thousand people) outside the project's beneficiary area, which are located near the route of the transmission / distribution pipes. Further, various support measures have been undertaken for the people living near

⁹ The GCP growth rate for Maharashtra State, which includes Solapur, shrank from 10.2% in FY99 to 2.7% in FY00. In addition, agricultural production has also been sluggish during the last 2-3 years, mainly as the result of low rainfall.

¹⁰ SMC was planning to supply 20,000m³/day to MIDC, however, at the request of MIDC the volume has now been changed to 10,000m³/day.

¹¹ Compensation procedures were executed in conformity with the Land Acquisition Act of 1894 (revised in 1984).

the purification plant, including the supply of drinking water, the provision of jobs (32) at the facility (purification plant), road development, and the construction of school buildings and a community center, which have been highly evaluated by the community*¹².

[Solapur Project]

The Solapur project did not generate any necessity for involuntary resettlement either. However, it was necessary to award compensation for the passage of transmission pipes and to purchase privately owned land (unoccupied) for the purification plant. The compensation / purchasing was undertaken for a total of 34 people on the basis of the Land Acquisition Act, generating costs in the region of Rs2 million.

Otherwise, one lawsuit was filed by residents (a petition to halt the laying (passage) of transmission / distribution pipes), but it was dismissed having been examined by the courts. Aside from this case, there were no specific reports of litigation or protest movements from among the populace.

There were considerable differences between the two projects in terms of the expenditure on measures for local residents.

Table 3: Comparison of Expenditure on Local Resident Measures

Comparative Item		New Bombay	Solapur
Project scope	(1) Overall project costs (million Rs)	1267.0	910.2
	(2) Total length of transmission/supply pipes (km)	49.7	103 (original plan value)
Costs involved	(1) Compensation/purchasing costs (million Rs)	9.97	2.0
	(2) Regional support costs (million Rs)	Unknown*	0

* Various support measures were undertaken for the people living near the purification plant, including the supply of drinking water, the provision of jobs at the facility (purification plant), road development, and the construction of school buildings and a community center.

Although it is not feasible to make a straightforward comparison of the two projects, despite the fact that the total length of transmission and service pipes in Solapur was almost double that in New Bombay, in terms of absolute value and the ratio to total project costs, a much lower amount was spent on measures for local residents in this city. Moreover, in terms of the time required for land acquisition, whilst in Solapur the process took a few months from the signing of the loan agreement, in New Bombay it took six years. In other words, the time and cost of land acquisition was kept at considerably lower levels in Solapur.

The reason for the emergence of this gap was that in New Bombay it was necessary to lay a substantial stretch of the transmission / distribution pipes through privately owned land, which resulted in increases in time and expenditure for land acquisition, whilst in Solapur the route for the transmission / distribution pipes passed through relatively fewer plots of private land and was mainly laid underground in those it did traverse, which enabled land acquisition costs to be kept to a minimum as it was only necessary to award compensation (to the farming industry, etc.).

2.4.3 Environmental Impacts

To date, there have been no specific reports on the environmental impacts of either project. According to the executing agency, sludge generated at the purification plants is being treated within

¹² According to interviews with residents conducted during the inspection of the purification plant.

the industrial estates, and since volumes are low and the sludge does not contain any harmful substances there have been no reports of impacts on the environment. No specific environmental issues were raised during the hearings with neighboring residents either.

2.5 Sustainability

The project's executing agency was HUDCO, but in practical terms responsibility for the operation and maintenance of the two projects lies with CIDCO (New Bombay project) and SMC (Solapur project).

2.5.1 Current Status of Facilities

[New Bombay Project]

As per the plans, a water system with a daily supply capacity of 150,000 cubic meters has been completed. Facilities maintenance is generally being satisfactorily undertaken and there are few defects in facilities, equipment and so forth. Leakage (unaccounted water) during transmission and distribution stands at approximately 15%. Unaccounted water is an inevitable hazard in water supply business, but it is hoped that efforts will continue to be made to reduce this percentage. Project maintenance is being implemented in line with the CPHEEO*¹³ guidelines.

[Solapur Project]

As per the plans, a water supply system with a daily supply capacity of 80,000 cubic meters has been completed. Facilities maintenance is generally being satisfactorily undertaken, and the quality of piped water is being maintained in conformity with WHO standards. Although there are no special manuals for routine maintenance the work is predominantly implemented by workers with experience in the field. The facilities per se are being appropriately maintained, however, unaccounted water is approximately 15%, and it is hoped that efforts will also be made on the Solapur project to reduce this percentage.

2.5.2 Operation and Maintenance

[New Bombay Project]

(1) Organizational system

CIDCO is responsible for the maintenance of the project facilities. As its name suggests, CIDCO's operations are not limited to the water supply business but also cover housing development, railway construction, and the construction of industrial estates, among others. It has a payroll of 2,000, and there have been no major changes in personnel numbers or the structure of the company since appraisal.

With regard to the maintenance of the project facilities, two deputy control engineers (respectively responsible for the purification plant and transmission and distribution pipes) work under the control engineer with a further five technicians assigned to work under them. CIDCO reports that they plan to continue assigning sufficient numbers of experienced staff to project maintenance and that all workers have adequate technical skills. However, they do employ the services of external consultants where necessary.

¹³ Central Public Health and Environmental Engineering Organization. It belongs to the Ministry of Urban Affairs and Employment and formulates plans, compiles guidelines and advises state governments on national level water supply and sanitation issues. Although the CPHEECO guidelines are not binding, they form the basis for compulsory legislature established by state governments and governmental bodies.

(2) Financial status

According to their financial statements, CIDCO posted current account surpluses for three years running from FY97, and the figure for FY99 (approx. Rs180 million) in particular, was virtually treble that for the previous year. However, the company's equity ratio is low, as evidenced by the excessive amount of loans receivable/loans payable to revenue.

Table 4: CIDCO Statement of Earnings (Rs million)

	FY97	FY98	FY99
(a) Revenue (profit)	572	526	478
(b) Expenditure (costs)	261	207	219
(c) Inventory gap	201	250	78
Net profit (a-b-c)	110	69	182

Table 5: CIDCO Balance Sheet (Rs million)

	FY97	FY98	FY99
Current assets	26,731	28,085	27,686
Cash equivalent	1,098	730	844
Loan (receivables) account	23,657	24,305	23,682
Other current assets	1,976	3,050	3,160
Fixed assets	195	193	166
Tangible fixed assets	195	193	166
Investments, etc.	6	6	6
Assets total	26,932	28,284	27,858
Current liabilities	14,410	14,285	14,231
Fixed liabilities	12,066	13,473	12,920
Borrowing account	12,066	13,473	12,920
Capital	456	526	707
Capital account	40	40	40
Reserve/surplus account	417	486	668
Liabilities/capital total	26,932	28,284	27,858

The project has only just become operational and it is believed that it will take a little more time for it to get into gear. For the time being, CIDCO needs to guide the price negotiations with NMMC to an early conclusion and to endeavor to expand supplies so as to stabilize the revenue from its water supply business.

A large proportion of project revenue is intended to be generated by the supplies to NMMC and given its high tariff collection ratio – 99% from metered supplies, 70% from non-metered*¹⁴ - there are no particular concerns regarding the recovery of money from sales to the company.

In conclusion, whilst certain aspects of CIDCO's finances are unstable, the sustainability of this project is considered to be high. However, efforts will be needed to increase supplies and reduce the percentage of unaccounted water so as to place this sustainability on an even firmer footing.

[Solapur Project]

(1) Organizational system

¹⁴ Of the 155 thousand (approx.) households in the NMMC catchment area, water supplies to roughly 10 thousand are metered, and the company aims to have the remainder metered within the next 1-2 years.

SMC is responsible for the maintenance of the project facilities. SMC is equivalent to the city's municipal office and it employs some 5,000 people. The corporation undertook structural reforms in 1997, and is now comprised of four departments (general affairs, financial affairs, health and technology) and six regional offices.

The operation and maintenance of the project facilities is undertaken by a total of 57 technicians and administrative personnel, who are dispatched from other divisions involved in water supply business. The reason that personnel have not been exclusively assigned to the project lies in the fact that the company judged any net increases in project staffing to be unfeasible due to the straitened finances of its water supply business and to the low overall operating ratio of this business due to last year's drought.

Technicians receive regular training, and SMC are of the opinion that the technical skills of its workers are sufficient for the maintenance of this project. Moreover, in anticipation of projected increases in supply (improvements to the operating ratio) after a few years, SMC is planning to return the dispatched personnel and to hire some 60 new staff members exclusively for the project.

(2) Financial status

Outlay for maintenance costs averaged Rs32.9 million between 1999 and 2001. This is more than treble the amount envisaged at appraisal (Rs10 million per year), however, SMC have said that this amount is necessary for functional maintenance of project facilities*¹⁵, and it assumes that the maintenance will continue to require a similar level of outlay in the future.

Regarding the accounts for the project itself, the original plans anticipated securing sales in excess of Rs50 million from the second year of commercial operation and a final cash balance in excess of Rs40 million. However, although sales of Rs43.8 million and Rs81.7 million were recorded in FY00 and FY01, respectively, the final balance is lower than the target due to the high level of unexpected maintenance costs, as cited above. SMC plans to be achieving the initial targets from FY06 onwards.

As to the collection of water tariffs, SMC and MJP are expecting to maintain their stable collection rates. To date, the rate has been around 80% (Solapur water tariffs are paid on an annual basis and are paid not by individual households but by communities comprising several households). SMC handles overdue accounts by suspending water supplies.

Table 6: Cash Flow for SMC Water Supply Business (Rs million)

	FY98	FY99	FY00	FY01	FY02
Total revenue (a)	87.48	123.74	146.09	144.65	126.27
(Project revenue portion)	3.22	19.30	43.82	81.72	64.09
Total expenditure (b)	136.75	190.68	239.21	257.70	305.96
Difference (a-b)	-49.27	-66.94	-93.12	-113.05	-179.69

*Figures for FY02 are estimates.

SMC's water supply business posted losses during the four years from FY98. Moreover, its losses are expanding having grown from around Rs49 million in FY98 to around Rs180 million in FY02. The losses during the past two years (FY01-02) were mainly caused by a contraction in sales due to dwindling water supplies, however, in FY02 deficits overtook sales for the year, and SMC is currently having to adjust the balance of its payments for the entire city based on revenues from

¹⁵ It was not possible to obtain sufficient information on the factors underpinning the roughly 3-fold increase in maintenance costs during this survey.

other of its businesses*¹⁶.

To address these fiscal problems, SMC filed for an increase in water tariffs, and the bill has already been approved by the cabinet. Starting from the next fiscal year, SMC is intending to increase water tariffs by 20% a year for the next four years*¹⁷. However, it is not clear to what extent waters in the reservoir at the source will recover from the impact of the drought, and even assuming that the tariff increases are implemented as planned, the overall financial status of SMC's water supply business will remain in doubt.

In conclusion, the facilities as a whole are demonstrating their anticipated function and appropriate maintenance is being undertaken, however, SMC's financial status, particularly that of its water supply business, is an issue, and in order to strengthen the sustainability of the project it will be necessary to rein in maintenance costs as far as possible, as they represent one of the factors causing the fiscal problems. On the other hand, the early development of the city's water distribution network, a concern that was raised at appraisal, will be a crucial first step towards expanding supply.

3. Feedback

3.1 Lessons Learned

The feasibility of project scope components not covered by ODA loan should also be carefully examined at appraisal.

The "development of the city's water distribution network" was an important condition for the success of the Solapur project, however, it had not ultimately been undertaken by the time of project implementation, which affected the realization of project effects. It is considered crucial that important components such as this be taken as part of the project and that measures be instituted at appraisal, such as the establishment of a monitoring system in cooperation with the project's executing agency.

For land acquisition procedures, etc., it is imperative that advance measures be taken to prevent holdups and that the procedures be expedited.

On the New Bombay project, the exceptionally lengthy period of time required to acquire the necessary land for project implementation led to an escalation of costs, which in turn impacted on the level of water tariffs, so that the project was ultimately only able to achieve limited effects. It is believed that anticipatory measures could have been taken to prevent this type of problem (the time needed for land transfer/purchase, etc.) such as an explanatory meeting should be offered for local parties involved in project planning at an earlier stage in the process*¹⁸, and coordination between government bodies commenced as early as possible. In addition, in view of the need for more vigilant monitoring of procedural progress, where necessary, meetings and the like should be convened with related organizations, and steps taken to facilitate smooth progress.

3.2 Recommendations

¹⁶ Since FY96 SMC has been rolling over approximately Rs0.2 million per year.

¹⁷ The above cash flow figures (forecasts) are premised upon the increases in the water tariffs.

¹⁸ The impression garnered during this study was that it is important to gain the understanding of parliament representatives who have influence over local residents.

[New Bombay Project]
(To CIDCO)

In order to promote the smooth growth of earnings from the project facilities, it is imperative that the negotiations with NMMC over water tariffs that are currently in progress be brought to an early conclusion. It is also required that aggressive measures will continue to be taken for future price negotiations.

[Solapur Project]
(To SMC)

In order to promote the smooth growth of earnings from and to bolster the sustainability of the project, the development of the city's water distribution network, a concern raised at appraisal, is imperative although it is not included in the scope of the project. It is thus important that SMC work to improve the financial status of its water supply business. In concrete terms, steps must be taken to pursue greater efficiency, and having effectuated fiscal improvements to then enhance fundraising capability so as to be able to advance the development of the water distribution network.

Third Party Evaluator's Opinion on
Urban City Water Supply Project

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Relevance

The JBIC financed projects in New Bombay and Sholapur serve to further the national development policy of the Government of India (GOI) for this sector which states that "Drinking water supply and sanitation facilities are very important and crucial for achieving goal of Health for All"²⁰. The population covered²¹ with drinking water in urban areas has steadily increased from 72.9% in 1985 to 90.2% in 1999²². GOI's aim is to cover the entire population with water supply in the coming years. The present two projects are, therefore, in tune with the national development policy of GOI.

The ex-post evaluation report of these projects prepared by JBIC indicates that the projects have responded to the needs of the beneficiaries, as there was a need for building water supply facilities for the growing population in these two cities. However, New Bombay's population did not grow at the projected level (from 0.7 million in 1991 to over 2 million in 2001). At present New Bombay has a population of a little over one million, therefore, full utilization of the capacity generated by the project may be delayed.

Certain changes in the project design/ scope were necessitated in both the projects after the appraisal stage. In the New Bombay project, external factors affected the progress of the project. While it was the land acquisition process that caused unusual delays, the cost of the project was also affected due to a change in the location of the purification plant and the physical conditions at the new location. In Sholapur, the dwindling water sources in the north and earthquake in a nearby region caused some changes in design. Also it was found during implementation that the power supply to the purification plant from the existing source was insufficient and it became necessary to secure additional power. These factors affected the design/ scope and the cost of the projects. While the delays caused in New Bombay could be addressed by initiating measures to start the process of land acquisition at an earlier date, the problems faced by Sholapur were unanticipated. Network development in Sholapur could, however, have been speeded up with the right measures.

There are no other similar projects in these two cities that are being funded by other donors.

Impact

While the goal of developing water supply facilities for supplying 150,000 cu. m. of water was achieved in the New Bombay project, the impact on the beneficiaries could not be judged as the operations started only recently. In Sholapur too, the project goal has been achieved but the slow progress made on the development of network has affected the full realization of project impact. In both the projects some external factors (as given above) have affected the project. However, the goals of the project have been achieved, though somewhat delayed. The projects have not caused any negative or positive impact on the environment.

The Sholapur project has had a positive spin off in housing activities due to the water supply project. The project will, by providing additional water supply to the city, also help improve the quality of life and promote economic activities in the future. In Sholapur, the project has also had a positive impact on an unforeseen aspect at the time of appraisal. The city has experienced drought conditions in the last few years and due to this the water level in the other sources started dwindling. During such periods of shortage it was this project that provided water to the city.

Overall, the two projects cater to the basic needs of these cities and will help in the socio-economic development of the two cities and their surroundings.

²⁰ Ninth Five Year Plan (1997-2002), Planning Commission, Government of India.

²¹ Though coverage has not been defined in the document, it refers to access to water supply through a public water supply facility.

²² Economic Survey 2000-2001, Ministry of Finance, Economic Division, Government of India.