YEREVAN WATER SUPPLY

Going Private Gradually

Armenia makes gains taking transitional route through private water

Asian Development Bank
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In 1998, the Government of Armenia began to seriously weigh a private sector solution to the worsening situation with the water supply system in the country’s capital, Yerevan. The Government’s eventual decision to engage the private sector through a 4-year management contract—backed up by donor-funded projects—helped address some of the system’s biggest issues, such as high nonrevenue water and low revenue collection rates. With the system in a more promising condition following the management contract, the Government proceeded with a greater commitment to work with the private sector and offered a 10-year lease contract over the system.

For Yerevan, the Government employed the two-step approach to engaging the private sector: first with a short-term management contract (4 years, extended to 5 years) then a longer-term lease contract (10 years) with a private operator. The Yerevan experience proves the approach’s viability for attracting the private sector to an ailing utility. The Government has already put its second largest water utility—Armenia Water and Sewerage Company, a closed joint stock company—on the same path as Yerevan.

This model may provide confidence where governments are hesitant about involving the private sector but facing few alternative sources for the capital infusion and technical expertise that their failing systems call for.

This case study focuses largely on how the Government first embarked on private sector participation in its water supply and sewerage sector, which was through the 4-year management contract in Yerevan. Where it was possible, the case study also examines Yerevan’s transition to the 10-year lease contract, which is just concluding its second year of private operations.

**Armenia and Its Capital City at a Glance**

Armenia, a landlocked country between Georgia, Azerbaijan, Iran, and Turkey, has a population of about 3.2 million, with nearly 1.3 million residing in the capital city, Yerevan. Five independent water supply operators manage water services throughout the country:

- Yerevan Water and Sewerage Company CJSC covers the capital city and is privately managed through a 10-year lease and was previously privately managed through a 4-year management contract;
- Armenia Water and Sewerage Company CJSC covers 37 towns and 300 villages surrounding Yerevan and is privately managed through a 4-year management contract; and
- Three small municipal companies in Shirak, Lori, and Nor Akunq.

Outside these five independent water utilities, 530 rural communities are not serviced by any utility.

**Water Resources.** The country in general is not short on raw water supply, but the management of resources has created sustainability and quality problems. Armenia has over 80 medium-to-large water reservoirs, yet 96% of drinking water comes from springs or bore holes. More than 80% of river flows are formed in the country, with the key rivers being the Kura and Araks. These resources, however, are scarce in the more densely populated areas of Yerevan, in the south, and the northeast. The biggest water basin in Armenia, Lake Sevan, has suffered drastic depletion from hydropower generation and irrigation.

In Yerevan, 48% of the 11.7 cubic meters per second of water produced is pumped from groundwater sources—which explains the utility’s high operating expenses and high energy consumption. Elevation differences throughout the city require the distribution system to be divided into many pressure zones. Of the city’s 23 regulating reservoirs, only 65% of the total 307,000 m³ of reservoir capacity is in operation.

In the difficult years since the breakup of the former Soviet system, the population has continued to rely heavily on natural resources, including water, for both agriculture and electricity generation. Especially problematic for the water sector is the Government’s heavy dependence on energy imports, which became prohibitively expensive with the decision taken in the mid-1990s to align their prices with world prices without simultaneously adjusting consumer prices to general inflation and to cover internal costs.
Water Supply. Armenia’s, and specifically Yerevan’s, supply problems are not all that different than other systems in the developing world—high system losses, low tariff rates, and low collection efficiency. Across Armenia, in 2002, service coverage for water supply was 92% on average but the availability of supply ranged from 2 to 8 hours per day, with little of that enjoyed continuously. Unaccounted-for-water ranged between 40% and 90%. Nationally, the revenue collection rate has been estimated at only 15%. Under the former Soviet system, Armenia consumers generally did not pay for water services.

The picture for Yerevan water services is not much better than the national averages. Before the private sector took over operations in Yerevan in 1999 through the management contract, only 20% of the 1.3 million residents had 24-hour water supply. The availability of water for 2–8 hours per day was intermittent, with little to no pressure at the higher levels of multi-storey buildings, which are prevalent in most former Soviet urban landscapes.

In 1997, collection efficiency on sales and accounts receivable was only 45%. Unaccounted-for-water was 72%, and the average residential consumption was estimated at 250 liters per connection per day. Although these served as the official baseline figures for the management contract performance targets, both the consumption and unaccounted-for-water figures were later determined to have been seriously underestimated. For example, average residential consumption was found to be closer to 800 liters per connection per day.

Underpinning these service failures was a technically insolvent and bankrupt utility, the Yerevan Water and Sewerage Company, a closed joint stock company. Supply tariffs were the same for residential and nonresidential users—about $0.10/m3. At those rates, the tariffs did not cover operating costs or even the electricity costs of the pumping system, which was 75% of operating costs—a problematic figure in itself. In 1998, bad debts were projected to be 50% of receivables. In 2000, operating revenue for the Yerevan utility was $10 million, with 75% consumed by electricity costs and 8% by staff costs. In 2000, accounts receivables equaled four times the revenue.

Not surprisingly, a priority investment area leading into the management contract years was metering and billing to increase revenues and put the utility on the path to financial recovery while at the same time rehabilitating the water infrastructure. Because collection rates were so low (45%), increasing the tariff rate was not considered a financial remedy until the collections system could be improved. Tariff rates were not increased during the management contract.

Given the dire situation, the Government turned to international finance institutions for technical advice and financing, and to the private sector for the expertise to efficiently run a public utility. But in turning to these sources, the Government took measured, incremental steps.

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1 ADB, UNDP, UNESCAP, WHO. 2005. Asia Water Watch 2015: Are Countries in Asia on Track to Meet Target 10 of the Millennium Development Goals?
Rationalizing Private Sector Participation (PSP)

Ailing public utilities rarely get a chance to turn their failing operations into successful and profitable ventures. But, uncommon as it is, it can be done with the right mix of political commitment, human capacity, and financial support.

For water supply services in Yerevan, three factors compelled the Government to turn to a private operator—the need for capital infusion, a lack of existing utility capacity for efficient service delivery, and an urgency to improve water services.

The Government believed a private water operator—one with extensive experience—could work urgently and effectively at one of its greatest problems: the conservatively estimated 72% unaccounted-for-water. Part of the problem would be solved by capital investments, specifically widespread metering and pipe replacements, the rest by an effective billing and collections system. Overall, the private sector offered greater flexibility in terms of creating better incentive structures, hiring practices, and quicker procurement, among other advantages that are all conducive to increasing performance and efficiency.

Choosing the PSP Mode

Rather than jumping headlong into a full concession as had been done in many parts of the world, the Government pursued a short-term management contract (4 years) before heading into a longer, more involved lease (10 years). Pursued this way, the management contract offered a transitional period during which the private sector had the opportunity to make initial gains before deeper involvement. Ultimately, it was a confidence-boosting step for both the private sector and the Government—that the two could work in good faith and good practice.

Of the various PSP models, the Government also found that a performance-based management contract was the best option under the circumstances. The Government wanted to retain ownership of the assets, and the private sector was not willing to heavily invest in the utility, especially since the regulatory system was not mature.3

To attract reputable private operators, the Government approved a hybrid contract with both management and lease features:

- operator control over an operation investment fund to help fund priority operation and maintenance needs that corresponded with contractual performance indicators ($25 million fund, a part of the World Bank-funded infrastructure project, that the Yerevan public utility must repay);
- full operator control over the infrastructure during the contract period; and
- a $1.5 million performance bonus that allows the operator to retain a percentage of the incremental cash flow resulting from improved performance and efficiency; and full operator control of operations, maintenance, billing, and collection.

Description of the Two-Step Contract Process

Management Contract. The preparation of the 4-year management contract for Yerevan’s water and wastewater services took 6 months at a cost of $500,000, which was financed by a much larger World Bank-funded infrastructure loan for which the Yerevan public utility is responsible for repaying.

The Government offered a 4-year management contract through international bidding using a two-envelope system for submitting technical and financial bids. The technical bids were first assessed on a pass/fail basis, and then the financial bids of

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shortlisted eight bidders, three of which passed the technical bid stage. Financial bids were then opened and the results were as follows: the French consortium of Lysa and Suez Lyonnaise des Eaux ($5 million); Germany’s biggest water supplier, Berliner Wasser Betriebe ($3.9 million); and the Italian consortium led by Acea with partners C. Lotti & Associati (also of Italy) and Britain’s WRc Companies ($2.9 million).

The contract was awarded to the Italian consortium which later on incorporated the management operator, “A. Utility.” According to the bid terms, a performance guarantee amounting to 20% of the proposed price was also posted by the winning bidder to cover for the obligations of the operator for the duration of the management contract until 18 months after the end date of the contract. The contract was signed on February 2000.

The Government and the industry have generally viewed the 4-year management contract in Yerevan (which was extended 1 year to actually become a 5-year contract) successful. The bid preparation, including the passage of necessary reforms to attract the private sector into Armenia’s water and sewerage sector, took several years beginning as early as 1995 and was supported by technical assistance amounting to $5 million.

A. Utility indeed exceeded many of the contractually agreed targets by wide, respectable margins, which would not have been possible without the practical policy measures the Government took to jumpstart new connections and reverse the deepening debt trends. For example, the Government passed a debt forgiveness law that was linked to water metering for water consumers. As a result of this law and a public communications program to orient users to the practice of paying for actual usage, metering increased from the targeted 1,000 in 1999 to 277,000 by 2005.

Ultimately, A. Utility earned $1.58 million in incentive payments over the 5-year management contract, which is 84% of the $1.875 million possible payment. In summary, the operator exceeded contractual targets, as seen in Table 2.

The indicator target for unaccounted-for-water could not be measured meaningfully given the high level of unmetered connections. Moreover, water pressure and hours of supply increased significantly but with the distribution network remaining in poor condition, water losses as a percentage of production increased.

The tariff was increased in 2000 to AMD 56 ($0.18)/m$^3$ including value-added tax. No further tariff increases were made during the 4-year management contract. However, in April 2004, in preparation for the lease contract and during the 1-year extension, tariffs were increased in AMD 90.2 ($0.29)/m$^3$ and again on May 2005, to AMD 125.1 ($0.40)/m$^3$. The tariff increases were necessary to support the capital improvements needed by the utility. The Government undertook a massive information campaign on the reasons for the

### Table 1. Performance Targets for the Yerevan 4-year Management Contract

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Performance Target</th>
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<tbody>
<tr>
<td>Unaccounted for water</td>
<td>Reduce by 25%</td>
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<tr>
<td>Energy consumption</td>
<td>Reduce by 20%</td>
</tr>
<tr>
<td>Metered connections</td>
<td>Install or replace 20,000 subscriber meters</td>
</tr>
<tr>
<td>Collection percentage from sales</td>
<td>Improve by 20%</td>
</tr>
<tr>
<td>Leak detection and repair program</td>
<td>100% of system</td>
</tr>
</tbody>
</table>

### Table 2. Achievements on the Performance Targets for the Yerevan 4-year Management Contract

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Contractual Target</th>
<th>A. Utility Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption</td>
<td>Reduce by 20%</td>
<td>Reduced by 48%</td>
</tr>
<tr>
<td>Meter installation</td>
<td>20,000</td>
<td>277,000</td>
</tr>
<tr>
<td>Collection efficiency</td>
<td>Increase by 20%</td>
<td>Increased to 79%</td>
</tr>
<tr>
<td>Hours of supply</td>
<td>16 hours</td>
<td>16 hours</td>
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</tbody>
</table>
The water tariffs were computed using the volumetric pricing formula, meaning that they increase as usage increases. It is worth noting that despite the increases in water tariffs as a result of the private operations, they account for a very small fraction of household expenses—just 2.4%. This could explain why, despite subsidies not being offered to the poor to ease the burden of tariff increases, collection efficiency rate among them is relatively high at 80%. If not for the commitment of the Government to see the contract through, outsiders say the contract could have easily collapsed elsewhere where the typical environment that private operators are accustomed to is complicated by hesitancy and skepticism.

Lease Contract. Because of progress made under the management contract, the Government initially planned on a concession contract. Ultimately though, competent firms were not likely to be interested in financing the required investments so the Government decided on a 10-year lease contract. Advertised in January 2004, the lessee would be chosen on a least cost-of-fee bid. Under the contract, the lessee would establish a separate company for executing the contract and the related government agency, the State Committee of Water Systems, would be the asset holding company for Yerevan’s water supply and sewerage sector (see next section on institutional reform). The lessee would have full-use rights of all assets and would be fully responsible for management, operation, and maintenance of the water and sewerage system. The lessee would also be responsible for billing and revenue collection and payment of all expenses, including debt service but excluding capital investment, which would be provided via a $20 million capital investment fund for system repair and rehabilitation. The fund would be provided through a World Bank loan to the Yerevan Water and Sewerage Company CJSC, which is responsible for repaying the loan. The lessee, however, would be responsible for managing the fund and procuring for its works and goods.

The main performance criteria under the lease contract are to improve water supply duration, water quality and monitoring, and response to consumer complaints.

Seven international firms from four countries (Germany, France, United Kingdom, and Italy) prequalified and initially showed interest, but only two French firms ultimately submitted bids: Compagnie General des Eaux (Veolia) and Saur. Veolia was awarded the contract on a bid of AMD 93.3 ($0.30)/m³ for the “average rated tariff,” which includes all taxes, customs duties, fees, and charges. Saur had bid AMD 152.3 ($0.49)/m³. The contract was awarded in December 2005; and in
accordance with the bid terms, CGE/Veolia set up a closed joint stock company in Yerevan, “Yerevan Djur,” CJSC to act as the lessee. On May 2006, the Public Services Regulatory Commission approved an overall tariff for Yerevan of AMD 172.8 ($0.56)/m³, covering water and wastewater services.

The lease contract came into effect on 1 June 2006.

A snapshot of the winning bid of CGE/Veolia is summarized in Table 3.

Reforms for Introducing PSP
Reforms have largely been a by-product of loans from international finance institutions, and their development, approval, and implementation have run simultaneously to the rehabilitation and entry of PSP to water utilities.

In general, the country’s reform of the sector began in 1999, a year ahead of the management contract for Yerevan water services and continued progressively during the period of the management contract. In particular, the Integrated Water Resources Management Planning Study and its main output (a plan for an integrated water sector) initiated the country’s water reforms. It aimed to define a comprehensive policy framework, taking into account economic, financial, environmental, social, and institutional considerations.

Reforms were designed to attain financial sustainability and commercial operations for all water supply companies by 2008. This required major capital investments through loans and improved billing collections. Estimated investments needed for the first 5 years totaled $200 million, which is significantly conservative according to other estimates. To achieve this, the Government needed to modernize the existing legal and regulatory arrangements governing water resource management, and to implement tariff, institutional, and administrative reforms.

Legal. Three legal instruments provide the foundation for Armenia’s water supply and sewerage sector, all of which have been passed since 2002: the Water Code, 2002; the Water Policy, 2005; and the National Water Program, 2006.

The Water Code calls for the preparation of the subsequent Water Policy and National Water Program, but important to the business of the water supply sector, the Water Code deals with economic

<table>
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<th>Table 3. Main Targets for the Lease Contract as Proposed by Yerevan Djur, CJSC</th>
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<tbody>
<tr>
<td>Performance Indicator</td>
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<tr>
<td>Average water supply</td>
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<tr>
<td>Coverage</td>
</tr>
<tr>
<td>Energy consumption</td>
</tr>
<tr>
<td>Metered connections</td>
</tr>
<tr>
<td>Unaccounted-for-water</td>
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<tr>
<td>Collection efficiency</td>
</tr>
<tr>
<td>Reaction to major breakdowns</td>
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<tr>
<td>Response to written complaints and inquiries</td>
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Box 3. Prequalification Criteria for Bidders

General water experience. At least 5 years experience over the last 10 years in managing, operating, and maintaining the water systems, including billing and collection.

Specific water supply experience. At least 10 years experience in:
- managing, operating, and maintaining either one water supply project for a 600,000 population or two or more water supply projects serving a combined total population of at least 800,000, with at least one of those projects serving a population of more than 300,000;
- managing, operating, and maintaining meter reading, billing, and collection systems with at least 150,000 customers; and
- repair and rehabilitation construction or construction supervision for at least three projects, each at a value of at least $5 million.

Financial capabilities. Demonstrate sound financial position with financial statements and audited balance sheets for the last 5 years—all related to the water operations of the applicant; in the case of a joint venture, each partner must submit separate financial information.

Required annual average turnover. $15 million average over the last 5 years for the water systems operations.

Personnel capabilities. General information and qualification of work experience for the following positions and their minimum experience required: commercial manager, 10 years; alternate commercial manager, 7 years; technical manager, 10 years; and an alternate technical manager, 7 years.

Litigation history/business practice: Information on any litigation or arbitration over the last 5 years.
incentives, fees, and tariffs for water supply and sewerage systems. The Water Code covers the conditions for the issuance of water use permits and the use and management of state-owned water systems.

The main principles of the Water Policy, passed in 2005, relevant to the water supply and sanitation sector are:

- Provision of safe drinking water of the required quantity and sanitation to meet the basic needs of the entire population;
- Efficient management of water resources and water systems by the application of water pricing criteria;
- Assuring the gradual introduction of a 24-hour water supply;
- Maintaining sanitary and hygienic standards;
- Assuring water resources management through a “user pays” and “polluter pays” principles and cost-recovery approaches; and
- Managing water resources and water systems in a transparent and participatory manner, assuring gender policy principles.

In turn, the Water Policy set out the principles of the National Water Program that was passed in 2006, proposing 5-, 10-, and 15-year agendas for water resources and systems development and management.

Institutional. The Water Code (2002) also enabled the creation of a new institutional framework that is implemented by three agencies: the Water Resources Management Agency for the protection and management of resources; the State Committee of Water Systems (SCWS) for the management and operation of water systems; and the Public Services Regulatory Commission as an independent body that implements tariff policy.

The SCWS is a key agency; it has been supervising the sector since February 2001. It administers its functions as 100% shareholder and asset holder of the five closed joint stock water companies mentioned earlier: Yerevan Water Supply and Sewerage Company CJSC, Armenia Water Supply and Sewerage Company CJSC, and the three small municipal companies in Lori, Shirak, and Akunq (of which the SCWS holds only 51% of shares, with the remainder held by various communities within their coverage areas).

The SCWS coordinates the contracts for private operators. It is deeply involved in all stages of development, bidding, and operation of the major public-private partnership arrangements in the sector. Its key roles and responsibilities are to:

- Develop and implement water systems investment policy;
- Manage investments;
- Assess technical designs;
- Oversee works in noncompetitive water supply systems, within terms of water systems use permits;
- Perform functions related to management of shares/assets in water businesses, includes the conclusion of effective contracts for management of state-owned companies, as well as supervision of water system use permits;
- Develop norms related to water and wastewater system losses; and
- Submit proposals on tariffs and water systems use permits to the Public Services Regulatory Commission.

Regulatory. The Public Services Regulatory Commission, or PSRC, is an independent regulatory body, functioning since 2003 over the water, energy, and telecommunications sectors.

The PSRC follows three steps in revising tariff structures. First, a water service company formally applies for a tariff revision with the support of the SCWS. Secondly, a public announcement is made about the proposed tariff adjustment, and public hearings are conducted. Lastly, the PSRC makes a decision, which is final.

Tariffs are set separately for each of the five service providers and on the recommendation of the SCWS. Tariff levels in Yerevan, Shirak, and Lori are currently set to recover operating and maintenance
costs. For Armenia Water and Sewerage Co., a state subsidy addresses the shortfall and the Government has agreed to begin increasing tariffs in 2009, starting with a 25% increase and reaching full operations and maintenance cost recovery in 2010.

The same tariff is applied to all customers regardless of the use or type of customer—domestic, commercial, or bulk, for example—which has produced an inadequate tariff structure. Currently, because of the high dependence on pumped water, there is no price difference between pumped or gravity fed water, which creates a cross subsidy.

The PSRC is also responsible for regulating the performance of any current or future water service contracts through the application process for use licenses.

Financial. The Government has also adopted a comprehensive “Reform Program to Improve the Financial Sustainability of the Companies responsible for the Provision of Drinking Water Supply, Wastewater and Irrigation/Drainage Services” (2001–2008). The main objective is to introduce a commercial basis for the operations of all the water supply companies between 2001 and 2008. The eventual goal is to eliminate their dependence on budget subsidies. For this, significant capital investments were required from loans on favorable terms and increased receipts from billing collections. Estimated investments needed for the first 5 years total $200 million.

The financial reform program also envisaged a restructuring of the debts accumulated by the municipal water operators. This restructuring includes a number of components including rescheduling (mainly postponing some payments beyond 2006); partial write-offs; the clearing of the cross-indebtedness of water utilities to energy companies and those debts in turn to the state budget; and the priority solution to the problem of salary arrears.

To achieve financial reform, the Government articulated indicators that would be used in designing the performance-based management contracts with the private sector.

Early Progress Noted on the Lease Contract

The 10-year lease contract for Yerevan has less than 2 years of data available—not enough for any meaningful or fair assessment. However, within the first year of operations, Yerevan Djur, CJSC has achieved the following performance improvements: 17.5 hours of average water supply with 37% of subscribers receiving 24 hours water supply, 90.3% collection efficiency with 91.1% of subscribers now with metered connections. About 5,000 illegal connections have also been detected and eliminated.

Lessons from Introducing Private Operators into Yerevan Water Services

International finance partners have noted the favorable conditions that nurtured the successful introduction, continuation, and replication of public-private partnership in Armenia’s water supply and sewerage sector. From these conditions, these lessons can be gleaned:
LESSON 1: Strong and sustained government support is indispensable. The Government’s passage of necessary laws and policies paved the way for a private operator to manage Yerevan’s water services. A notable measure is the debt forgiveness law that offered amnesty to indebted customers on condition that they acquire metered connections, which ultimately led to a win-win situation for all stakeholders.

LESSON 2: Information campaigns are important to prepare the public. For most consumers, paying for water was unheard of since water services were once provided as a social service under the former Soviet system. People had to understand why tariffs are necessary and what benefits they would get from paying. Educating customers on the debt forgiveness law effectively enticed consumers to sign up for paid water services and allowed the utility and operator to achieve full retail metering.

LESSON 3: Reducing unaccounted-for-water requires substantial investments. Often, there is just no way around investing in infrastructure—where physical leakage is significant, extensive investments in repair and replacement of pipelines are necessary to achieve improvements in reducing unaccounted-for-water.

LESSON 4. Flexibility in target setting is critical. Baseline data used to set targets for contracts with the private sector may have inaccuracies that lead to the setting of unrealistic targets. These inaccuracies are often only discovered once the private operator

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has acquired practical knowledge of the network. In such cases, a fair recasting of the targets, through a renegotiation among stakeholders, should be undertaken to ensure that the level of service improvements targeted are realistically doable within the given time frame.

LESSON 5. Giving the private operator control over infrastructure investments is key to successful private sector participation. The utility itself undertook two infrastructure loans amounting to $45 million. Control over these loans—including planning, controlled purchases, and procurement—allowed the private operators to target the areas that will deliver maximum results in meeting their contractual obligations.

LESSON 6. Laying foundation through the short term facilitates the transition into a more productive, longer-term private sector involvement. The management contract gave all the stakeholders—the government, the private sector, and customers—a chance to test the waters. The private sector had the chance to gauge their risks and gains. The customers could adjust to the changes introduced in the process, from paying tariffs to getting better water services, the latter proving once more that people are willing to pay for improved services. Further, the short-term nature of the contract brought home the realization that a longer-term arrangement may ultimately provide more benefits.
About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to two thirds of the world’s poor. Nearly 1.7 billion people in the region live on $2 or less a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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