

The logo of the Asian Development Bank (ADB), consisting of the letters 'ADB' in white serif font on a dark blue square background.

BEST PRACTICES IN WATER SUPPLY AND SANITATION:

LEARNING FROM SUCCESSFUL PROJECTS

A Case Study from the 2006 Annual Evaluation
Review

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Abbreviations

ADB	Asian Development Bank
km	kilometer
MDGs	millennium development goals
NGOs	nongovernment organizations
OEM	operations rvaluation mission
O&M	operation and maintenance
PPTA	project preparatory technical assistance
PRC	People's Republic of China
SES	special evaluation study
WSS	water supply and sanitation
WUCs	water user committees

Note

In this report, "\$" refers to US dollars.

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I. Characteristics of Successful Water Supply and Sanitation Projects

1. This review of the factors contributing to the success of Asian Development Bank (ADB) water supply and sanitation (WSS) projects is based on an analysis of 18 projects approved between 1990 and 1997 that were rated successful or highly successful. These covered urban projects, rural projects, and combined urban/rural projects, and focused about equally on water supply and water supply/sanitation projects. There was no discernible difference in the success between the urban and rural projects, with 35–40% of each group being considered highly successful and the rest successful. In terms of lending modality, the large majority were project loans, and a few were sector loans.

2. Successful WSS projects positively affected their intended beneficiaries by providing them with a better quality of life. Benefits were generally long-term and pro-poor, and tended to impact women, children, and other disadvantaged groups proportionately more than men and other socially empowered groups. Successful WSS projects contributed directly to the attainment of the Millennium Development Goals (MDGs). The projects directly addressed MDG Target 10 (halving by 2015 the proportion of people without sustainable access to safe drinking water and improved sanitation).

3. Ongoing and efficient operation and maintenance (O&M) was an important issue in ensuring the long-run sustainability of the benefits of WSS facilities. Successful projects typically were those that (i) were run by financially self-sustaining water supply institutions, (ii) put in place water user committees (WUCs), and (iii) adopted the “user pays” principle. A lesson learned from one project was that the early establishment of WUCs fostered greater beneficiary participation, resulting in a stronger sense of ownership and willingness to accept O&M responsibility among project beneficiaries.

II. Quality at Entry

4. A striking feature of successful WSS projects was their ability to learn from past lessons and incorporate these lessons in project design. For example, a key lesson learned from early rural WSS projects was the effectiveness of the community-based approach to rural water supply. Under such an approach, projects are designed incorporating the learned experience from the community, and communities directly participate in rendering the WSS systems sustainable. Other past lessons successfully adopted in later projects involved designing projects in a cost-effective manner, and strengthening institutional capacities.

5. Technical innovation characterized many of the successful WSS projects. For example, an innovative



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approach to conserve freshwater resources through induced recharging of water resources using an infiltration basin was first pioneered in the Philippines under an ADB project. In another Philippines project, the construction of a 13 kilometer (km) water supply tunnel (at that time, the longest of its kind in the country) was an innovative solution to convey water for urban use. The alternative solution would have been the construction of 25 km of access roads that would have opened adjacent forest areas to illegal loggers. In Sri Lanka, an innovative caretaker approach, whereby a single person/entity was made responsible for all water supply matters in a designated area, was successfully implemented under an ADB project and then replicated in the Greater Colombo area. The use of public information campaigns was an effective and innovative approach in several project designs in Philippines and Sri Lanka.

6. A participatory approach was adopted in many of the successful WSS projects and appears to have contributed to their success. Successful projects were typically formulated through extensive consultations with local government staff, local nongovernment organizations (NGOs), representatives of indigenous people, and other beneficiaries to discuss concerns about the impacts of WSS projects. This approach helped to foster a sense of ownership and



ultimately contributed to improving the sustainability of the projects. As an example, in Indonesia, community participation was emphasized in design, construction, and O&M of subprojects, which led to the achievement of clear socioeconomic benefits such as employment for local people and additional income generated by complementary use of project facilities (in this case, multipurpose ponds).

III. Quality during Implementation

7. The review of successful WSS projects indicates that strong commitment by governments, both national and local, is one of the key determinants of project success. A high level of commitment by municipal/provincial governments in making the project facilities operational as quickly as possible, together with sound management support in the agencies concerned, was a notable feature in the implementation of several of the WSS projects. Strong commitment was particularly evident in projects in the People's Republic of China (PRC) and Thailand.

8. Generally, the original objectives and overall design of successful WSS projects remained unchanged during implementation. Where there were changes in design details, the modifications in general did not result in increased project costs. The ability of the local governments to provide counterpart funds in a timely manner was an important factor for smooth implementation and on-target completion of the WSS projects.

IV. Performance of Executing Agency

9. EAs of successful WSS projects were normally committed and highly involved in project implementation. For example, the EAs for a PRC project, the Dalian Water Delivery Company and the Dalian Water Supply Group, both showed very strong commitment, which contributed to smooth implementation, including expeditious procurement, cost savings, project completion ahead of schedule, and significant tariff increases (see Box 1). The evaluation of the project noted that the involvement of the Dalian municipal government's executive vice mayor and

heads of the municipal government departments and bureaus was the key to the highly successful implementation of the project.

10. Institutional strengthening and training activities figured prominently in successful WSS projects. Training activities were not limited to human resource development but also focused on technical and engineering aspects of the projects, community-based water supply systems survey and design, social facilitation, participatory rural appraisal and rapid rural appraisal techniques, and construction supervision and management. The good performance of consultants was also an important determinant of WSS project success, particularly in the cases where the international consultants hired under the project preparatory technical assistance (PPTA) were retained for project implementation, as was the case in some projects. ADB's *Guidelines on the Use of Consultants* was recently revised and no longer allows PPTA consultants to participate in project implementation. This may be problematic if good quality consultants decide not to take part in the PPTA work because they would not be allowed to participate in the resulting loan project.

Box 1: Dalian Water Supply Project in the PRC¹

Dalian is a main port city located at the southern end of the Liaodong Peninsula in Liaoning Province in the northeastern PRC. In 1984, Dalian was declared an "open" coastal city and given a large degree of autonomy in its economic planning. The Dalian Economic and Technology Development Zone, established in 1988, has been one of the most successful economic zones in the PRC.

By the early 1990s, water shortages in Dalian were a serious constraint to economic growth and development. The water shortage was so severe that many areas had water service for only a few hours a day, and the pressure in the system sometimes was insufficient to provide water to higher elevations in the city for several days. In addition, frequent service disruptions had major implications for public health. Excessive extraction of groundwater was in some cases endangering the environment. The Dalian Water Supply Project, the first PRC project ADB funded in the water supply sector, provided new infrastructure to address the shortage as well as to meet the growing demand for water. During implementation, two small subprojects were added using loan savings. These comprised the expansion and rehabilitation of the Pulandian and Jinshitan water supply systems.

The project achieved its objectives and more. At completion, all facilities constructed were being operated satisfactorily. The 73,000 residential connections in Dalian exceeded the number projected at appraisal. In Pulandian and Jinshitan, the connections totaled 42,000 and 600, respectively, also slightly higher than at reappraisal. All customers had 24-hour supply, and the quality of water met national standards. The project also increased the supply to commerce and industry, removing potential constraints to economic expansion in Dalian Municipality and improving the investment environment. Use of groundwater by industrial and residential consumers has been reduced. The evaluation of the project confirmed two important findings: First, commitment by the local government is the most important factor contributing to the success of WSS projects. Second, consumers will accept and understand the need for higher tariffs once they are certain that water supply services are improved and became adequate and reliable. Tariffs increased substantially, at an average rate of 12.8% per year, from 1995 to 2001.

¹ ADB. 2003. *Dalian Water Supply Project in the People's Republic of China*. Manila.

V. ADB's Contribution to Project Success

11. ADB fielded 10–12 review missions per project, which is deemed adequate from a project supervision standpoint. Of the 16 projects reviewed, 3 had been delegated to the respective resident mission for implementation. A few of the projects evaluated cited examples of ADB missions proactively solving project implementation problems. For example, in the case of a Philippines project, ADB proactively introduced monthly coordination meetings among the EAs and implementing agencies, which was well received and proved to be an effective mechanism for promoting procurement activities and resolving issues. Good project administration can contribute to good project outcomes.

VI. Exogenous Factors

12. Two main exogenous factors influenced WSS projects. The first is urbanization, which has proceeded rapidly in the Asia and Pacific Region in the last decade.¹ In line with this increased urbanization, the demand for WSS services has grown rapidly in the growing towns, secondary cities, and the region's megacities. This growth in demand has created a need for investment for the sustainable delivery of WSS services.

13. Decentralization is the second factor that influenced WSS projects. In countries such as Indonesia, Philippines, and Thailand, decentralization reforms took place during the late 1990s and early 2000s, which led to devolution of responsibility for policy, planning, financing, and decision making for WSS development to the local government level. Local governments in these countries are now increasingly undertaking cost-recovery measures, tariff reviews, and tariff increases, sometimes in consultation with local residents. These reforms and other measures allow a greater role for local planners. If local institutional capacity is developed, this has the potential to have a positive effect on project implementation. However, there are sometimes disruptions during the early years of decentralization.² In the future, ADB will face the challenge of finding innovative ways to offer its products and services to regional and local government units and other subsovereign entities.

VII. Cross-cutting Themes



14. Cross-cutting themes common to all of the successful projects included issues of environmental protection and capacity building. The projects with successful wastewater components, in particular, had a strong positive environmental impact due to the reduction of untreated wastewater allowed to flow back into the ecosystem. The better water quality due to the treatment contributed to improvements in freshwater, coastal, and marine

¹ For a discussion of urbanization in the Asia Pacific Region, see ADB. 2006. *Urban Sector Strategy and Operations*. Manila.

² ADB. 2005. *Country Assistance Program Evaluation for Indonesia*. Manila.

ecosystems. The more rational use of water resources in water supply components also had a positive effect on water aquifers and water tables in the project areas. Capacity-building initiatives, as noted above, also contributed to the success of projects.

15. Other cross-cutting themes common to a number of projects included poverty reduction and support for gender/children issues. The improvements in WSS facilities in most cases were strongly pro-poor. Poor and disadvantaged persons in the project areas benefited both directly from improved health, thereby reducing medical expenses, as well as indirectly from increased availability of scarce medical services due to other nonpoor persons being healthier. Some of the most successful WSS projects were those that relieved women and children of the hardship of long-distance water collection—a task that they traditionally bear more than men. As a result of improved water supply, greater productivity and improved health were achieved, as more time was available for family care, education, and income-generating activities that would have otherwise been used for water fetching. This impact was particularly evident in successful projects in Nepal, Sri Lanka, and Viet Nam.

VIII. Counterfactual in the Water Supply/ Wastewater Treatment Sector

16. To better understand the factors that contribute to the success, or lack thereof, of water supply/wastewater treatment projects, some key indicators were compared among highly successful, generally successful, and partly successful/unsuccessful projects (see Table A). On average, highly successful projects were larger than successful projects, which, in turn, were larger than unsuccessful projects. In this sector, smaller projects, which presumably should be easier to design and implement, do not have a higher probability of success. Highly successful projects are less likely to be delayed (the average delay in implementation was less than a year). Surprisingly, the average delay in implementation for successful WSS projects (2.3 years) was slightly longer than that for less than successful projects (1.5 years). Cost variation is not a good predictor of whether WSS project outcomes will be, or will not be, successful. All seven projects that experienced cost overruns, averaging 19.1%, were rated as successful. Cost underruns averaged about 20% for all groups of WSS projects. The amount of ADB supervision did not vary significantly across projects, averaging about two missions and 23 person-days per year of implementation.



Table A: Characteristics of Successful Water Supply and Sanitation Projects

Item	Highly Successful		Generally Successful or Successful		Partly Successful ^a		Total	
	No. of Projects	Average	No. of Projects	Average	No. of Projects	Average	No. of Projects	Average
Project Characteristics								
Size of Project (\$ million)	6	230.3	18	77.0	8	31.9	32	94.5
Economic Internal Rate of Return at Appraisal (%)	3	17.6	8	17.9	3	15.7	14	17.4
Economic Internal Rate of Return at Postevaluation (%)	^a	^a	^a	^a	^a	^a	3	15.9
Planned Implementation Period (years)	6	4.0	18	4.2	8	4.1	32	4.1
Actual Implementation Period (years)	6	4.8	18	6.5	8	5.7	32	6.0
Implementation Delay (years)	6	0.7	18	2.3	8	1.5	32	1.8
Cost Deviation (%)	6	(16.3)	18	(4.6)	8	(21.4)	32	(11.0)
Cost Overrun (%)			7	19.1			7	19.1
Cost Underrun (%)	6	(16.3)	11	(19.7)	8	(21.4)	25	(19.4)
ADB Inputs								
Project Processing Missions	6	1.7	15	1.9	8	2.0	29	1.9
Project Processing Person-Days	6	135.8	15	109.1	8	89.1	29	109.1
Project Administration Missions during Implementation	6	7.5	18	11.1	8	10.5	32	10.3
Project Administration Missions per Year of Implementation	6	1.9	18	1.9	8	2.2	32	2.0
Project Administration Person-Days during Implementation	6	86.7	18	139.4	8	116.4	32	123.8
Project Administration Person-Days per Year of Implementation	6	20.5	18	24.8	8	22.5	32	23.4

^a EIRRs at appraisal were not recalculated at postevaluation.

ADB = Asian Development Bank.

Notes:

"Average" refers to simple mean (i.e., unweighted).

Project size refers to the actual cost of the project, which includes funding from ADB, the government, and other sources.

Implementation period refers to the length of time taken to implement a project (from original date of effectiveness to completion).

Implementation delay is the difference between planned and actual implementation period.

Processing missions comprise fact-finding and appraisal missions.

Administration missions are supervision missions carried out from inception to project completion, excluding PCR missions.

Sources: Project completion reports and project performance evaluation reports of approved water supply projects since 1990 containing a rating circulated as of 31 December 2005.

17. Over the period studied, 16 WSS projects were rated as partly successful or unsuccessful by project/program evaluation reports and project/program completion reports—7 in the Philippines; 2 in the Lao People's Democratic Republic; 2 in Pakistan; and 1 each in Cambodia, Indonesia, Marshall Islands, Federated States of Micronesia, and Viet Nam. Differences were examined between these projects and the successful and highly successful projects to better understand the factors that contribute to successful WSS projects.

18. Adverse exogenous factors were associated with the lack of success of some of the projects. Nearly half of the less successful projects were located in the Philippines, which has over the years experienced macroeconomic and fiscal problems. These problems often affected counterpart funds availability and limited the financing available for maintenance of WSS systems.

19. Less than successful WSS projects suffered from operational shortcomings due to lack of proper balancing among economic, financial, and social objectives in the project design and operation; institutional constraints; and funding deficiencies that placed benefits at risk over the long term. Weaknesses in WSS projects rated as less than satisfactory included (i) a mismatch of technology or design with the resource base of target communities, (ii) low tariff rates and problems of financial sustainability, (iii) insufficient consideration of alternatives for attaining the project's objectives, and (iv) high water losses.

20. An example of a poorly designed WSS project was the Majuro Water Supply and Sanitation Project in the Marshall Islands. Although the Project achieved its overall objective of enhancing water supply and sanitation for Majuro, this was achieved using an overdesigned and high-cost technical solution. Two factors exacerbated the situation. First, the system was designed for a much larger population and greater demand than was realistically possible at the time of appraisal, and it neglected to take account of the city's reservoir capacity. Second, the consultants engaged for the project preparatory work did not undertake adequate dialogue and consultation with the local community and with the staff of the utility.

IX. Summary

21. Box 2 summarizes the characteristics of successful WSS projects.

Box 2: Characteristics of Successful Water Supply/Wastewater Treatment Projects

1. Rapid urbanization created a strong demand for the output of water supply/wastewater treatment projects.
2. There were positive impacts on intended beneficiaries, particularly women.
3. There was an ability to learn from past lessons and incorporate the lessons in project design.
4. Technical innovation and a positive impact on the environment occurred.
5. Proper O&M helped ensure long-run sustainability.
6. The projects typically (i) were run by financially self-sustaining water supply institutions, (ii) put in place WUCs, and (iii) adopted the “user pays” principle.
7. A participatory approach contributed to success. Successful projects were typically formulated through extensive consultations with local government staff and the local community, including NGOs. Beneficiary participation resulted in a stronger sense of ownership and willingness to accept some O&M responsibility and to pay higher tariffs.
8. EAs were committed, highly involved in project implementation, supported by institutional strengthening and training activities, and provided with counterpart funds in a timely manner.
9. Consultants and contractors performed well.
10. Regular ADB review missions proactively helped to solve problems.

Source: OED.