Title: Rigorous Impact Evaluation of Punjab Rural/Community Water Supply and Sanitation Sector Projects in Pakistan

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I. Introduction

1. The International community is increasingly seeking development institutions to demonstrate development effectiveness, including doing more rigorous impact evaluation and adopting managing for development results. The Asian Development Bank (ADB) is no exception. The role of evaluation in this context is to assess results in a credible and independent fashion, contribute to learning and accountability, and provide the basis for effective policy decisions and program improvement (Network of Networks on Impact Evaluation draft statement on impact evaluation, February 2008). The community wants to ensure that development resources generated by tax payers are invested on programs and projects that work and, as a result, more effort is required in demonstrating impact on the ground. However, demonstrating development impact is a rigorous time-consuming and resource-demanding exercise. The Center for Global Development report highlights that there is an evaluation gap because measurement of impact is rare. The report states that in absence of verifiable impact measures, program designers benefit little from accrued experience about what works, and developing country governments and their donor partners have little basis upon which to defend the wisdom of their investment or make adjustment. As a result, policy makers are faced with dilemma in allocating resources; and, even more so, for the improvement of rural areas.

2. The recent emphasis on accountability and results-based management has stimulated interest in evaluating not just the process, outputs and outcomes of development programs; but also their impact (ultimate effect) on people’s lives. Impact evaluations go beyond documenting change to assess the effects of interventions on individual households, institutions, and the environment, relative to what would have happened without them, thereby establishing the counterfactual. World Bank views it as a policy tool that helps discern the causal impact of a project or a policy initiative. Impact evaluation techniques compare the impact on the beneficiaries of a certain policy intervention or project with a counterfactual group that has not been exposed to the same intervention or project. The results from impact evaluations can help inform policy makers on where to allocate scarce resources and can also provide evidence on whether current policies are working or not. This rigorous approach to evaluation is

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increasingly advocated as the only reliable way to develop an evidence base of what works, and what doesn’t, in development.⁴

3. At ADB, while the Operations Evaluation Department (OED) reports have continued to focus on relevance, effectiveness, efficiency, sustainability, and likely impacts at the project, sector, and country levels; establishing the relationship between causality and impact has not, until recently, been systematically addressed.⁵ The Report is based on rigorous impact evaluation methodology, and it addresses attribution issue. As such studies are time- and resource-demanding, OED is committed to conducting one rigorous impact evaluation annually. The *Punjab Rural/Community Water Supply and Sanitation Sector Projects* (PRWSSP and PCWSSP) in *Pakistan* will be the subject of OED’s second rigorous impact evaluation in its 2008 Work Program. The PRWSSP provided support for the: (i) construction of water supply and drainage schemes, (ii) hygiene education program, and (iii) institutional strengthening; and covered seven districts of Punjab on a pilot basis. The scope of PRWSSP was expanded in 30 of the 35 districts of Punjab in PCWSSP, with an additional fourth area of support for social uplift and poverty eradication program. The construction of water supply and drainage schemes in PCWSSP also included both gravity and pump-based schemes, as well as rainwater harvesting schemes. Reportedly, PCWSSP had more intensive community participation in the design, implementation and management of schemes compared to PRWSSP. Basic project data for PRWSSP and PCWSSP are provided in Appendixes 1 and 2.

4. ADB’s strategy for the water supply and sanitation (WSS) subsector is shaped by the International Conference on Water and Environment (1992); the World Bank/United Nations Development Program International Conference on Water Utilities (1992), and the evaluation of 20 years of World Bank-funded Water Supply Projects (1992); the findings of the Water Utilities Data Book for the Asian and Pacific Region (1992); and the post evaluation of ADB water supply projects.⁶ The rural WSS subsector lays strong emphasis on community-based approach. “Basic human rights and environmental renewal” is one of the four elements of ADB’s water strategy.⁷ The Strategy states that the three main problems facing the water sector are (i) financial sustainability, (ii) water resource availability, and (iii) equitable access; and it seeks long-term planning. The strategy notes that water rights for domestic and industrial water supplies should be secured for at least 50 years, and tariffs need to be set to reflect the financial costs (and preferably the economic costs) of water. Distortions in tariffs, where one part of a community cross-subsidizes another, need to be smoothened out, and all schemes should make adequate supplies available in poor areas. The poor can, and are willing, to pay for water. In rural areas, special efforts are needed to reduce the distance to water supplies, wherever possible, and to encourage conservation approaches, such as rainwater harvesting. It also considers that complementary education in hygiene is essential to derive the full health benefits of improvements in infrastructure.

5. In 2006, an independent expert panel conducted a comprehensive review of ADB’s Water Policy implementation, and noted that the Policy promotes efficiency to ensure quality, access and affordability, and sustainability in water service delivery for domestic, industrial, and

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⁴ OED conducted its first rigorous impact evaluation in 2007, and analyzed the effect of microfinance on poor rural households and the status of women.
agricultural use. The review noted moderate progress to increase coverage of domestic water service delivery in both rural and urban areas in the developing member countries (DMCs). However, it did not find empirical evidence to suggest that poor people necessarily benefit from such increases in coverage. The review further stated, “ADB’s Water Policy does not provide a clearly formulated and strong focus on operation and maintenance (O&M), or energetically promote the evaluation and use of alternative technologies where appropriate. These key factors are critical to ensure affordable and equitable services, and inherently linked to efficiency and cost-effectiveness in water service delivery.” The panel provided five recommendations to ADB, namely, (i) increase ADB’s commitments, and develop ADB’s capacity; (ii) develop long-term partnerships with DMC stakeholders and donors; (iii) focus the implementation of integrated river basin management on stakeholder needs and ownership; (iv) promote “business unusual;” and (v) improve processes to ensure effective policy implementation. ADB supports the general thrust of the panel’s report. In particular, ADB’s vision in the water sector is in line with the three key messages of the panel: (i) water, as a resource and as a service, is a key driver to change and development in the Asia and Pacific region; (ii) ADB, in its water investments, should continuously balance its dual roles as a development institution and as a bank; and (iii) ADB, and its DMCs, should significantly increase its investments in water as a service and as a resource.

6. **Overview of ADB Operations in WSS.** ADB began its first assistance to the WSS subsector in 1968. Between 1968 and 2007, ADB approved: (i) 120 loans (99 urban and 21 rural WSS) for 112 projects ($4 billion), (ii) 6 grants ($20.7 million), and (iii) 184 technical assistance (TA) projects. Altogether, 26 countries availed ADB assistance. The Philippines, People’s Republic of China, Indonesia, Thailand, and Korea were the top five recipients. The loan amount includes 66 loans ($2.41 billion or 59%) funded from ordinary capital resources, and 54 loans ($1.59 billion or 41%) from the concessional Asian Development Fund. The loan amount included four private sector loans ($107.5 million). Appendix 3 shows further details.

7. The support for urban WSS has dominated ADB water and sanitation portfolio (86%). The assistance for rural WSS commenced in 1977 (Appendices 3, 4, and 5). In addition, several urban and rural infrastructure projects provided assistance for WSS. Between 1990 and 2007, ADB has supported 14 rural WSS projects (17 loans of $600 million) in nine countries. In addition, 11 countries have received $9.9 million in TA for 22 projects. These projects have supported: (i) construction or rehabilitation of WSS facilities, (ii) health and hygiene awareness

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9 Available: [http://www.adb.org/Water/Policy/panel-report.asp#a3](http://www.adb.org/Water/Policy/panel-report.asp#a3)
10 Promoting “Business Unusual” implies Leveraging innovations to increase access, affordability, efficiency, and cost-effectiveness, including nuanced guidance on subsidy use, promoting public-private partnerships, alternative financing modalities under innovation and efficiency initiative, robust O&M arrangements, and scaling up of alternative technologies.
11 The WSS subsector falls under water supply and sanitation and waste management sector, which as of 2007 accounts for 5.3% ($6.8 billion) of total ADB loans. Besides WSS, the sector comprises integrated (1.04% or $1.35 billion), and waste management subsectors (1.06% or $1.06 billion), representing 2.1% of total ADB loans. For the purpose of this study, discussions are limited to the WSS subsector only.
12 The sources of TA funds have included ADB’s internal resources (41.4%), Japan Special Fund (45.6%), and other sources (13%), including bilateral agencies and United Nations Development Program. Of the 184 TAs, 109 (59%) were classified as project preparatory ($43.3 million) and 75 were advisory ($33.4 million). Nepal, Indonesia and the Philippines are the top TA recipients among DMCs, accounting for 33% of total WSS TAs. The most number of TAs approved were in 1993 (12) and 2006 (11). In addition, ADB also funded 15 regional TA projects ($12.2 million).
raising, (iii) institutional capacity building, and/or (iv) access to microcredit for income-generating activities. Appendices 4 and 5 provide a list of projects and TAs approved for ADB assistance in the rural WSS subsector.

8. OED evaluation studies have highlighted a number of lessons from ADB WSS operations in several DMCs. Active participation of stakeholders in all stages of project cycle, demand-driven selection of feasible and cost-effective schemes, integration of water supply and sanitation in WSS schemes, effective mechanism for water use fee collection, community management, O&M of WSS schemes, sensitivity to ethnic and cultural norms and water quality monitoring and treatment, and the source and/or point of consumption appear prominent and are useful for future WSS project designs and implementation. In addition, cost recovery, sustainable financing mechanism for O&M, enhancing willingness to pay for safe drinking water and sanitation, effective local community organizations (COs) and supporting but capable public institutions are also important considerations in future WSS projects. A list of selected lessons from OED studies are provided in Appendix 6.

II. Rationale for the Study

9. Globally, there are 1.1 billion people without access to safe water supply, and 2.4 billion without adequate sanitation. Of these, around 700 million are without water supply, and 2 billion without adequate sanitation in the Asia and Pacific region. The problem is particularly grave and pressing in the rural areas where 70% of the world’s poor reside. While the emphasis has been on expanding the coverage, in its 2006 review of ADB’s Water Policy, an independent expert panel did not find empirical evidence to suggest that poor people necessarily benefit from increases in coverage. ADB’s experience in WSS is outlined in Appendix 7. Similarly, in its 2007 thematic evaluation of WSS sector, the European Commission (EC) study noted that in absence of valid impact data, no definitive statement can be made on the role of EC investment in WSS on better health. However, available information pointed to a qualified success that EC investment has made a positive contribution to better health of the target groups. The experience of other agencies in WSS is discussed in Appendix 8. Third, rigorous impact evaluation in water and sanitation sector is rare (Pattanayak, et al., 2007), partly due to multiple impacts.

10. Punjab province of Pakistan represents an ideal location to conduct impact evaluation of WSS sector projects. The two sector projects were designed to address basic human needs such as WSS. While PRWSSP was rated partly successful covering seven pilot districts, the PCWSSP is expected to be rated highly successful by the operational department in a much larger area covering 30 districts of Punjab, thereby making this an interesting learning scenario to analyze factors associated with differential performance and impact. In both projects, WSS subprojects were handed over to the local community organizations for O&M. Very little is known about the sustainability of community-managed WSS schemes, particularly with respect to financing modalities.

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11. While the importance of government support for water and sanitation is growing across DMCs, a disproportionate share of ADB’s WSS resources is allocated to urban areas (86%). As a result, rural areas tend to be at a comparative disadvantage in attracting resources. The findings of the study is expected to provide a more definitive basis for public policy makers to substantiate or justify increased allocation of resources for rural WSS. Furthermore, in the absence of representative household level baseline data at present, the study will provide basis for constructing panel data for future evaluation so that a more robust impact evaluation can be conducted in the future using double difference method; which accounts for “before and after,” and “with and without” conditions. In addition, the study will independently document “good practices” and “best practices” in Punjab’s community-led rural WSS schemes so that the learning can be shared with other stakeholders and used as a model for new project designs.

III. Objectives and Scope of the Study

12. The study has six specific objectives. First, the study will (i) develop a set of pragmatic indicators which can be adopted in ADB WSS project designs for monitoring and evaluation purposes; (ii) empirically identify cultural, economic, environmental, institutional, and social factors associated with projects’ impact on health, income/consumption, education, gender roles, and other social variables (including unintended ones) using the indicators developed in (i); (iii) develop a household level benchmark for future impact evaluation study based on a panel data; (iv) assess the status of ADB supported WSS schemes, and evaluate capacities of community-based organizations in operating and maintaining the project schemes in a sustainable manner; (v) provide a set of case studies demonstrating good and best practices in rural WSS; and (vi) analyze financing modality for rural WSS service delivery in the context of Pakistan, and discuss possible alternatives that ADB can consider as it moves forward with the Water Financing Program 2006–2010 in the region. The study builds on a comprehensive literature review of WSS impact and aims to evaluate impact of ADB support to two WSS sector projects, PRWSSP and PCWSSP. The study will empirically test the validity of program linkages and expected impact. It will also draw lessons with respect to what works and what does not for future ADB assistance in the rural or community WSS subsector. The conceptual framework of the impact evaluation is discussed in the next section.

13. Punjab province of Pakistan provides an excellent opportunity for analyzing performance and impact of community-led WSS intervention aimed at improving an overall quality of life for people living in rural areas. There are various WSS schemes in Punjab that include traditional wells, ponds, rain harvest, and piped water supply. Some of the schemes are truly traditional and others are constructed by local governments (Tehsil Municipal Authorities [TMAs]), nongovernment organizations, and the provincial government (Public Health Engineering Department [PHED]). The schemes are either new constructions or rehabilitation of older schemes. Some schemes are solely for water supply, while others have sanitation integrated into water supply provisions. The PHED schemes were constructed or rehabilitated with ADB support (PRWSSP and PCWSSP). Reportedly, 335 schemes were constructed in seven pilot districts representing both barani and brackish water areas under PRWSSP, and the lessons from the project implementation were incorporated into the design of PCWSSP leading to the extension of coverage to an additional 23 districts (total of 30 districts). ADB approved the $43 million PRWSSP loan on 31 January 1995, and it closed on 5 June 2003. The $50 million PCWSSP loan was approved on 23 January 2003, and closed on 6 December 2007.

14. The evaluation will focus on communities and households served by PRWSSP and PCWSSP, and comparable control communities and households established as counterfactuals. The counterfactual communities and households will be similar to project
communities and households with the exception that these would not have ADB supported schemes. The PRWSSP envisaged benefits were (i) resource cost saving; (ii) time saving in collecting water; (iii) benefits to women; (iv) improved environment; (v) ridding villages of water pondage (mosquito breeding grounds) and bad odor; (vi) providing privacy to women; (vii) significant health benefits to household members; and (viii) improved capacity of the Public Health Engineering Department in WSS, and sustainability of water supply. Similarly, the PCWSSP was expected to: (i) increase household incomes, (ii) save time in fetching water; (iii) improve socioeconomic wellbeing, (iv) eliminate stagnant water bodies, (v) better child care, (vi) regular school attendance of girls, (vii) lower morbidity rates, (viii) reduce infant mortality rates, (ix) reduce incidence of waterborne diseases, and (x) strengthen TMAs by improving their capacity.

IV. Conceptual Framework for the Evaluation Study

15. **Impact at the Household Level.** As stated earlier, a systematic impact analysis of external support for WSS is a relatively new area and only limited analysis have been reported. Available evidence points out that impact analyses have focused on only a selected impact variables such as reduction in the prevalence of diarrhea (Jalan and Ravallion, 2003), improved health and time saving (Isham and Kahkonen, 2003), child health and income (Pattanayak et al., 2007), and willingness to pay (Gunatilake et al., 2007). However, qualitative and anecdotal impacts are reported on other aspects, including gender (U.N. 2005; ADB, 2007).

16. The conceptual framework for this study guided by literature review of WSS impact evaluation and a program theory that links goal, resources, activities, output, outcomes, and impact. While a more complex multidimensional framework of analysis will be desirable, the study design is bound by time and resource constraints. Furthermore, the status of PCWSSP in particular suggests that some of the schemes may not have matured to demonstrate some of the perceived impact (e.g., infant mortality rate reduction). An operational logic model for the study is adapted from Pattanayak et al. (2007) and is presented on page 8. The overarching goal of the two sector projects was to reduce poverty and improve living conditions and quality of life of communities in rural settlements. Both sector projects were hypothesized to have positive health, education, and economic impact. The model assumes that the gender impact is inclusive in all three impact areas. In addition, the study also plans to document any unintended positive or negative impact. The health impact is primarily expected in three ways: (i) reduction in drudgery associated with fetching water, particularly for female members of the household and children; and (ii) reduction in incidence of waterborne diseases.

diseases (e.g., diarrhea, dysentery, cholera, malaria, typhoid, etc.). The economic impact is likely to stem from an increase in net household income as a result of (i) fewer sick days of household members; (ii) reduced expenditure on health, and (iii) income from activities associated with time freed-up from fetching water. In addition, it is expected that sustainable COs would be able to generate increased amount of resources from within the community for O&M and, hence, would rely less on external support, thereby making the schemes self-sustainable. The education impact is anticipated through (i) decreased drop out, (ii) increased enrolment and retention; and (iii) completion of girls in both primary and secondary schools. The projects are expected to exert positive impact in the community with increased representation of women in the CO management bodies and more time available for childcare.

17. The model, based on project information, assumes five key outcomes: (i) improved access to clean, safe, sufficient, and regular water supply; (ii) improved self-sustaining organization and management of water supply system by active participation of household members; (iii) improved hygiene behaviors of local residents, including hand washing, feces disposal, food preparation, and water handling; (iv) improved capacity of PHED in providing quality WSS services; and (v) improved access to livelihood opportunities. These outcomes are assumed to be dependent on six outputs: (i) provision of new or rehabilitated water supply and drainage infrastructure; (ii) health and hygiene information to local residents; (iii) training materials for enhancing performance of COs; (iv) guidelines for O&M; (v) guidelines for water quality monitoring and treatment; and (vi) guidelines for effective community management. The stated outputs are dependent on project interventions based on selection of, and support for, demand-driven WSS schemes, formation of COs, construction and rehabilitation of WSS schemes, training of project staff and community members in O&M of WSS schemes, health and sanitation awareness in the communities, stabilishing linkages between households in the community and nongovernment organizations for microcredit and skill development, and capacity strengthening of PHED. These project activities are funded by ADB loan, provincial government resources, expertise from the PHED and direct/indirect contributions by the households. In all cases, WSS schemes are handed over by PHED to local COs.

18. The model also depicts the role of external factors either as mediating or intervening factors. The mediating factors can be geo-physical, environmental, socio-cultural, or institutional/legal; and the intervening factors may include events such as regional epidemics, other water/sanitation and health interventions, or other unanticipated events (Pattanayak, et al. 2007). An Evaluation Matrix for the study is presented in Appendix 10.

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21 A list of waterborne diseases is provided in Appendix 9.
Operational Logic Model for Evaluating Impact of PRWSSP and PCWSSP

Project Impact
Reduce poverty and improve living conditions & quality of life of communities in rural settlements

Project Resources
- PHED Technical expertise
- ADB Loan
- Community cash contribution
- Community participation

Target Beneficiaries
Project Households

Project Elements
- Scheme identification
- Selection of demand-driven schemes
- Formation of COs
- Construction/Rehabilitation
- Training in O&M
- Health sanitation info dissemination
- Linkages to NGOs
- PHED Capability Strengthening

Mediating factors
- Geophysical
- Environmental
- Socio-cultural
- Institutional & Legal

Intervening factors
- Other WSS initiatives
- Other events

Project Outputs
- Water supply and drainage infrastructure
- Health & hygiene information and campaign
- Training materials
- Guidelines for O&M
- Guidelines for water quality monitoring & treatment
- Guidelines for CO management
- Access to finance

Project Outcomes
- Improved access to clean, safe, sufficient, and regular water supply
- Improved hygiene behaviors
- Sustainable local WSS institution
- Improved rural livelihood opportunities
- Improved capacity of PHED in delivering WSS

Project Impacts
A. Health
- Reduced drudgery
- Reduced incidence of water-borne diseases

B. Economic
- Increased income
- Reduced external dependency for O&M
- Reduced health expenditure

C. Education
- Increased girls' enrolment and completion at primary & secondary levels
- Decreased girl dropout rates from primary and secondary schools

D. Other social
- Improved female representation in CO management
- Improved childcare
- Other unintended impacts

ADB = Asian Development Bank, CO = community organizations, O&M = operation and maintenance, PHED = Public Health Engineering Department, NGO = nongovernment organization, WSS = water supply and sanitation.
19. Since household level baseline data is not available, the household level impact will be measured by computing the difference of the value of the outcomes of interest between the treatment and comparison households, known as single difference method. This can be estimated in several ways. Following Jalan and Ravallion (2001), simple differences between treatment and comparison households such as the following can provide impact estimates:

\[
\Delta y = \sum_{j=1}^{t} \omega_j (y_{j1} - \sum_{i=1}^{c} W_{ji} y_{j0})
\]

Where:

\[\Delta y\] = change in the outcome variable of interest
\[y_{j1}\] = treatment outcome indicator
\[y_{j0}\] = \(i\)th matched comparison outcome indicator to \(j\)th matched household
\[W_{ji}\] = weights applied in calculating average of matched outcomes for non-participants
\[\omega_j\] = sampling weights used to construct the mean input estimates
\[T\] = total number of treatment households
\[C\] = total number of untreated households

20. A regression-adjusted estimator can also be obtained by estimating a regression run only for the matched comparison group. The impact estimator in this case would be:

\[
\Delta y = \sum_{j=1}^{t} W_{ji} \left[ (y_{j0} - x_i \hat{\beta}) - \sum_{i=1}^{c} W_{ji} (y_{j0} - x_i \hat{\beta}) \right]
\]

Where:

\[\hat{\beta}_{j0}\] = OLS estimate for the comparison group sample.

V. Methodology

21. The proposed evaluation will adopt a mixed method approach. Bamberger, et al. and White (2008) argue that mixed-method evaluation combines the detailed insights and holistic understanding obtained from qualitative research with the ability to generalize to a wider population offered by quantitative data collection. Thus, it allows for a more comprehensive analysis. Mixed-method designs can be employed to strengthen validity, fine-tune sampling and instrumentation, extend the coverage of findings, conduct multi-level analysis and generate new and diverse insights.

22. The study will involve four steps: (i) preparation, (ii) data collection, (iii) data analysis, and (iv) report writing. The preparation step will entail: (i) a comprehensive literature review of evaluation methodologies and impact of water and sanitation projects implemented by selected development partners; (ii) development of detail research methodology, and determination of counterfactuals, sample size, and analytical methods; (iii) identification of indicators, and preparation of qualitative and quantitative data collection instruments; and (iv) pre-testing of

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data collection instruments. The data collection step will involve: (i) collection of secondary data at the community level; (ii) conduct of focus group discussions and key informant interviews; (iii) household level data based on face-to-face interviews with responsible household male and female members; (iv) knowledge, attitude, practice (KAP) survey of community members and school children; (v) a technical survey of selected WSS schemes; and (vi) data entry, verification and triangulation, and preparation for data analysis. The data analysis step will require subjecting data to appropriate qualitative and quantitative analysis. The fourth step will involve preparation of draft report based on data analysis and information gathered, peer reviews, inter-departmental reviews, and independent external reviews. Relevance of the ADB assistance in rural WSS will be evaluated on the basis of (i) relevance at the time of project design, in terms of ADB and government policy and strategy; (ii) relevance of project design; and (iii) relevance during implementation. Effectiveness will be assessed in terms of process, as well as implementation arrangements. Cost-effectiveness measure will provide an indication of efficiency. Sustainability will be analyzed based on institutional and financial factors, as well as other enabling environment factors.

23. An initial review of methodological approaches in rigorous impact evaluation literature suggests that the focus group discussions at the community level; key informant interviews with local leaders and knowledgeable persons in the community, including school teachers and health practitioners, would be appropriate qualitative tools for data collection. In addition, recent studies and methodological approaches indicate that a quasi-experimental research design will be appropriate for quantitative analysis (Bamberger and White 2007; Pattanayak, et al. 2007; World Bank 2006). Since both PRWSSP and PCWSSP do not have household level baseline data, the evaluation will be limited to “with” and “without” (treatment and comparison group) design (Bamberger, et al. 2006; World Bank 2006; Vaessen and Todd 2007). Selection biases in such design are inherent but these can be addressed using appropriate econometric techniques. The study will employ propensity score matching technique as well as qualitative limited dependent variable method (logit or probit) for quantitative data analysis. Propensity score matching controls for observable selection bias by ensuring that treatment and control groups are comparable in all aspects except that they have not received intervention. The method calculates probability (propensity score) that participants and nonparticipants would participate in the intervention based on a set of observable characteristics. It is the most common method used to control for selection bias in water and sanitation sector because it is quicker and cheaper to implement than other methods, and is considered scientifically robust. The method was employed in the recent OED study as well as by Pattanayak, et al. (2007), and is also supported by White, et al. (2007).

24. Structured questionnaires will be developed to gather household data. Since rural respondents do not keep records, responses to household surveys will rely on the recall method. At the community level, a set of guiding questions by focus area will be used in all

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31 Structured questionnaires are expected to standardize the information gathering and minimize non-sampling errors.
focus group discussions. Similarly, key informant interviews will be issue-specific and will be
guided by open-ended guiding questions. For local schools and community residents, a KAP
survey using a structured questionnaire will be developed, and responses will be recorded on a
Likert scale. The study will also make use of community and project level data maintained by
the COs and the project secretariat, where relevant. Efforts will be made to seek secondary data
collected by the TMAs/PHED in both project and control areas. In addition, the evaluation will
also document the status and performance of representative WSS schemes supported by ADB,
as well as from other resources. Where relevant, the results of the study will be triangulated with
findings from the Multiple Cluster Indicator Survey, a study currently conducted by the

A. Data Requirements and Indicators

25. The study will require data at three levels—individual, household, and community.
Individual level data will include KAP of health, hygiene and sanitation behavior in adults and
children, and water use for domestic purposes. At the household level, data will be collected to
reflect socioeconomic well-being of household members and would include household
composition by age, gender, education, occupation, health status, water collection and
consumption, gender roles and time spent in fetching water, consumption/expenditure patterns,
income and household asset structure, and household perception about water quality. At the
community level, data will be gathered on community attributes such as coverage of WSS
schemes, cohesiveness of COs, membership structure, gender representation, mechanisms for
O&M of WSS systems and facilities, water allocation and cost recovery practices, existence and
effectiveness of other WSS schemes in the community, and health and sanitation awareness
activities. Additional information on extent and quality of support from PHED, after the schemes
handover to the COs, will also be collected. The study will also document selected best
practices in the project and control areas and highlight key success factors. In addition, efforts
will be made to reconstruct pre-project WSS conditions in the communities prior to project
intervention. This information will be useful in cross-corroborating the attributes of control
communities for valid comparisons between “with” and “without” project scenarios.

26. The study will draw upon existing literature and consult with local stakeholders in
defining specific indicators to be used for data collection and analysis. The World Bank33 provides a good basis for identifying and defining specific indicators. Suggested health impact
indicators are (i) diarrhea (3 or more loose stools over 24 hours period in last 2 days), (ii) acute
respiratory infections—incidence of cough and cold in last 2 weeks among children under 5,
(iii) body mass index for children under 5, (iv) muscle strain or back pain, among household
members, due to water cartage. Likely education impact indicators are (i) whether school age
children (both male and female) are enrolled in school, (ii) whether children attend school
regularly; (iii) the number of day children attended school in the last month; and (iv) whether
children completed full school year. Income/consumption impact indicators proposed are
(i) household per capita income and consumption; (ii) household coping and averting costs
(expenditure on household water treatment, water storage containers); and (iii) expenditure on
medical treatment. Other gender and social inclusion impact indicators suggested include
(i) women’s perceptions about level of privacy provided by access to sanitation; (ii) women’s
perceptions about safety of using water and sanitation services; and (iii) access to water,
sanitation and hygiene services by poor, minorities and vulnerable groups.

32 Multiple Cluster Indicator Survey is expected to be completed in December 2008.
Poverty Reduction and Economic Management. Washington, D.C.
27. OED is in contact with UNICEF (Punjab), Punjab Planning and Development Board, and Punjab Bureau of Statistics; and exploring the possibility of accessing data associated with an ongoing Multiple Indicator Cluster Survey, which has a new module on water and sanitation. The evaluation will also seek to access recently collected water quality data of community water supply schemes collected under the support provide by UNICEF (Punjab). The study will explore possibility of integrating the Multiple Indicator Cluster Survey data with impact evaluation survey data in the final data analysis. Recent indications are that the Multiple Indicator Cluster Survey results will not be available until the end of 2008.

28. The study will generate six key outputs: (i) a rigorous impact evaluation report; (ii) selected case stories highlighting good/best practices in community-led rural WSS; (iii) an analytical report demonstrating preparation of rural communities for WSS project interventions, highlighting what works and what does not; (iv) a database for conducting a panel study in the future using double difference method; (v) a set of indicators for monitoring rural WSS projects; and (vi) a framework for financing modalities for rural WSS. The findings of the study will be disseminated through appropriate OED online publications. OED publications will be coordinated with the Knowledge Management Unit of OED, Water Financing Partnership Facility of Regional and Sustainable Development Department and Economic Research Department.

B. Survey Design and Sampling Procedure

29. The two sector projects, PRWSSP and PCWSSP have supported constructions or rehabilitation of 1,113 schemes in 30 districts of Punjab and these schemes are supposed to benefit approximately 226,000 households with approximately 3 million people. This includes 335 schemes in seven districts under PRWSSP, and 778 schemes in 30 districts under PCWSSP. The seven districts under PRWSSP were also covered under PCWSSP and these districts alone account for 54% of all schemes. Ten of the 23 new PCWSSP districts have nine or fewer schemes, while another four districts have between 11 to 15 schemes.

30. The study will be based on a technical survey of WSS schemes, household surveys, KAP surveys, focus group discussions and key informant interviews in seven districts—covering four PRWSSP and three PCWSSP districts. These districts have been randomly selected using stratified random selection procedure representing both sector projects (PRWSSP or PCWSSP), and water supply area (barani or brackish water). The sample size for the number of schemes and household surveys for representative project area is determined following Barlett, et al. (2001).

A total of 115 schemes will be subjected to rapid technical evaluation focusing on the appropriateness of scheme design, state of schemes at the water source, distribution and storage system, cost recovery mechanisms, repair and maintenance arrangements, likely sustainability of schemes, and water quality tests using quick testing kits. The study plans to conduct 1,100 household interviews covering 115 ADB-supported schemes, and another 1,100 households representing “control” group households in selected seven districts. The sample distribution of households by district for the project area (treatment) households is reflected in the following table. The same number of control households will be interviewed from other communities within the same districts (a total of 1,100 households). These control households will consist of communities and households that have implemented the projects, while the comparison group will be similar villages and households that did not implement the project.

31. The participants for household survey will be drawn from four groups of schemes based on the appropriateness of scheme design, state of schemes at the water source, distribution and storage system, cost recovery mechanisms, repair and maintenance arrangements, likely sustainability of schemes, and water quality tests using quick testing kits. The study plans to conduct 1,100 household interviews covering 115 ADB-supported schemes, and another 1,100 households representing “control” group households in selected seven districts. The sample distribution of households by district for the project area (treatment) households is reflected in the following table. The same number of control households will be interviewed from other communities within the same districts (a total of 1,100 households). These control households will consist of communities and households that have implemented the projects, while the comparison group will be similar villages and households that did not implement the project.

32. For qualitative information and for the purpose of data triangulation, the study will also conduct five scheme/community-level focus group discussions in each district. The sites for conducting these discussions will be determined following Barlett, et al. (2001). A technical survey will be conducted to assess the present status of WSS schemes and household surveys for representative project area is determined following Barlett, et al. (2001). A total of 115 schemes will be subjected to rapid technical evaluation focusing on the appropriateness of scheme design, state of schemes at the water source, distribution and storage system, cost recovery mechanisms, repair and maintenance arrangements, likely sustainability of schemes, and water quality tests using quick testing kits. The study plans to conduct 1,100 household interviews covering 115 ADB-supported schemes, and another 1,100 households representing “control” group households in selected seven districts. The sample distribution of households by district for the project area (treatment) households is reflected in the following table. The same number of control households will be interviewed from other communities within the same districts (a total of 1,100 households). These control households will consist of communities and households that have implemented the projects, while the comparison group will be similar villages and households that did not implement the project.

33. Since there is no baseline data at the household level, the evaluation design is constrained to utilize single difference (with and without) evaluation design. The treatment group (treatment) households and their likelihood of sustainable operations in the future is reflected in the following table. The same number of control households will be interviewed from other communities within the same districts (a total of 1,100 households). These control households will consist of communities and households that have implemented the projects, while the comparison group will be similar villages and households that did not implement the project.

34. Two hundred households per scheme.

communities will be similar to the project communities except for the provision of ADB supported WSS schemes.

Sample Size Distribution of Households of ADB Supported Schemes

<table>
<thead>
<tr>
<th>District</th>
<th>No. of Sample Schemes&lt;sup&gt;a&lt;/sup&gt;</th>
<th>No. of Sample Households for Survey&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRWSSP</td>
<td>PCWSSP</td>
</tr>
<tr>
<td>Bahwalpur</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Chakwal</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>D.G. Khan</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Fasialabad</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>R.Y. Khan</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Rawalpindi</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Sargodha</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>67</td>
</tr>
</tbody>
</table>

<sup>a</sup> Desired precision +/-10% and 99% confidence level.
<sup>b</sup> Desired precision +/-3% and 95% confidence level.

31. The participants for household survey will be drawn from four groups of schemes based on their proportional representation: (i) new water supply only, (ii) new WSS, (iii) rehabilitated water supply only, and (iv) rehabilitated WSS. The data will permit comparative analysis of water supply only and WSS scheme, thereby highlighting contribution of sanitation on impact variables. Similar comparison is also possible between new and rehabilitated schemes. The household survey will not cover “only sanitation” schemes because there are only 16 such schemes in the districts selected for the study.

32. For qualitative information and for the purpose of data triangulation, the study will also conduct five scheme/community-level focus group discussions in each district. The sites for focus group discussions will be selected randomly from the list of all schemes within each district. In addition, 10 key informant interviews will be conducted in each district. The key informants will include school teachers, health workers, local community leaders, TMA staff, and PHED staff. To assess the impact of health and hygiene awareness campaigns, the KAP survey will be conducted with 50 adults (25 male and 25 female) and 50 children (25 girls and 25 boys) in each district. The survey will cover similar number of participants from the control group. The study will also document a sample of individual experiences from WSS activities based on oral history and narratives. A technical survey will be conducted to assess the present status of handed over schemes and their likelihood of sustainable operations in the future.

C. Estimation Methods

33. Since there is no baseline data at the household level, the evaluation design is constrained to utilize single difference (with and without) evaluation design. The treatment group will consist of communities and households that have implemented the projects, while the comparison group will be similar villages and households that did not implement the project. Similarity between treatment and comparison households will be achieved through a propensity score matching that will be done using pre-implementation<sup>36</sup> project household-level data.

---

<sup>36</sup> The superiority of pre-implementation village-level data than post-implementation data as matching variables has been argued in Pattanayak, et al. (2007). The obvious reason is that post-intervention data may be affected already by the project. The fact finding mission seems to indicate that pre-implementation data may be poor or
Jalan and Ravallion have argued for the superiority of a matched sample, compared to an unmatched sample in the estimation of the impact of interventions. It should be noted, however, that since matching is only based on observed community and household characteristics, the impacts of unobserved characteristics are not accounted for. A multinomial method will be adopted to reflect impact of the four types of schemes. As there are very few only “sanitation schemes,” these will not be covered in the study because expected number of parameters to be estimated is likely to exceed the number of observations.

34. The actual estimation procedure will be refined after the specific impact variables, and their determinants are identified in the preparation stage. Data permitting, the study will also explore alternative estimation methods.

VI. Staffing and Scheduling

35. An Evaluation Specialist will lead the proposed impact evaluation study, with support from a Senior Evaluation Specialist, and assistance from international and national consultants on an intermittent basis. An Economist from the Economic Research Department of ADB will provide technical support during the course of the study. The international consultants will provide assistance with: (i) refinement of research methodology, (ii) determination of impact and determinant indicators and their measurement, (iii) drafting of data collection instruments, (iv) incorporating feedback from pre-testing of questionnaires, (v) qualitative and quantitative data analysis, (vi) report writing, and (vii) preparation of result dissemination material. The terms of reference of the study team and consultants appears in Appendix 11.

36. The study will require the input of one or two international consultant(s) with strong quantitative and qualitative evaluation skills, and proven experience in (i) evaluation methodologies; and (ii) conducting impact evaluation using both qualitative and quantitative methods using sample surveys, statistical and econometric tools, focus group discussions, and key informant interviews. S/he will have prior experience in conducting rigorous impact evaluation. A domestic firm or group of experts will be required for (i) pre-testing data collection instruments in Pakistan, (ii) translating applicable instruments in Urdu, (iii) conducting household surveys, (iv) KAP surveys, (v) key informant interviews, (vi) data entry and verification, and (vii) reporting study findings. Services of another firm or group of individual consultants with specialization in WSS will also be required for assessing the (i) status of randomly selected WSS schemes; (ii) assessing water quality at source and at consumption points; and (iii) assessment of scheme’s community organization and management, including O&M, cost recovery mechanisms, and sustainability.

37. It is estimated that the international consultants will be required for 2 person-months each on an intermittent basis. Two domestic firms or groups of survey experts will be engaged for 8 person-months. The estimated direct cost of the study is $200,000 and details are presented in Appendix 12. The Team Leader has obtained an approval for $50,000 support from the Energy, Transport and Water Division of the Regional and Sustainable Development Department. The study seeks approval of $150,000 from OED’s RETA budget. In addition, OED has already sent a letter to the Chairman of the Punjab Planning and Development Board seeking his support for conducting this regard. The Secretary, Public health Engineering Department (Punjab) has assured the OEM for his full support while conducting the study.

non-existing. If reliable pre-implementation data is not available, then there is no other recourse but to use post implementation data to implement a matching.
38. **Limitations and Opportunities**: As discussed earlier, in the absence of verifiable household level baseline data, the proposed evaluation is restricted to adopt only single difference method of analysis for evaluating impact of the two sector projects. However, the data generated by the study will serve as a foundation for conducting a more robust rigorous impact evaluation using a panel data and applying double difference method in 2012. A second limitation of the study is that the actual number of usable respondents from the household surveys may be less than the proposed 2,200 households (1,100 treatment and 1,100 control) due to usual problems associated with non-respondents and incomplete questionnaires. To address this problem, the survey sample size will be increased by 20%. A third limitation of the study is high unit cost in hiring a firm for data collection task. Efforts were made to explore other options (e.g., a research institute or a think tank) in lieu of hiring a survey firm, in order to manage the study within the proposed cost structure. However, the local reality dictates that the field work for data collection will have to be done by two competent firms.

39. **Risks and Flexibilities**: One of the major risks for the proposed evaluation is the uncertainty in security situation in Pakistan. It may obstruct or delay data collection and, hence, delay the completion of the evaluation report. As an alternative, it is proposed that the study may be conducted in another country with long experience in rural WSS, possibly Indonesia, Nepal or the Philippines.

40. **Milestones**: The study will be conducted over a period of 12 months. Tentative milestones are:

- Evaluation Approach Paper approval: II March 2008
- Preparation (refinement of methodology, evaluation indicators and measurement, field data collection instruments, pre-tests, development of analytical methods for data analysis): IV April 2008
- Data collection, entry, verification, initial findings: I August–IV November 2008
- Model testing and quantitative analysis: I–IV November 2008
- Draft report: IV January 2009
- Peer review: IV February 2009
- Inter-departmental Review: IV March 2009
- Editing: IV April 2009
- Submission to DG, OED: IV May 2009

attachments:  
Appendix 1: Loan 1349-PAK (SF): PRWSSP Basic Data  
Appendix 2: Loan 1950-PAK (SF): PCWSSP Basic Data  
Appendix 3: ADB Assistance to WSS  
Appendix 4: ADB Loans to the Rural WSS Sector  
Appendix 5: TA to the Rural WSS Subsector  
Appendix 6: Lessons from ADB Operations in WSS Subsector  
Appendix 7: ADB Experience in Water Supply and Sanitation  
Appendix 8: Experience of Other Agencies In Water Supply And Sanitation  
Appendix 9: List of Waterborne Diseases  
Appendix 10: Impact Evaluation Matrix  
Appendix 11: Terms of Reference
# LOAN 1349-PAK (SF): PUNJAB RURAL WATER SUPPLY AND SANITATION SECTOR PROJECT (PRWSSP)

## BASIC DATA

### KEY PROJECT DATA (in $ million) As per ADB Loan Documents Actual

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Total Project Cost</td>
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### KEY DATES

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<td>Loan Agreement</td>
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<td>05 June 2003</td>
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### DMC
Islamic Republic of Pakistan

### Executing Agency
Housing, Urban Development, and Public Health Engineering Department

## MISSION DATA

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<th>Type of Mission</th>
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## PROJECT PERFORMANCE REPORT RATINGS

<table>
<thead>
<tr>
<th>Implementation Period</th>
<th>Development Objective</th>
<th>Implementation Progress</th>
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<tr>
<td>01 March 1998 - 31 December 1998</td>
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<td>01 January 1999 - 30 September 1999</td>
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<td>01 January 2001 - 31 March 2003</td>
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</tbody>
</table>

DMC = developing member country, PS = partly satisfactory, S = satisfactory.
# LOAN 1950-PAK (SF): PUNJAB COMMUNITY WATER SUPPLY AND SANITATION SECTOR PROJECT (PCWSSP)

## BASIC DATA

### KEY PROJECT DATA (in $ million)

<table>
<thead>
<tr>
<th>Description</th>
<th>As per ADB Loan Documents</th>
<th>Actual</th>
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<tbody>
<tr>
<td>Total Project Cost</td>
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### KEY DATES

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<td>Loan Completion</td>
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<td>30 June 2007</td>
</tr>
<tr>
<td>Loan Closing</td>
<td>30 June 2007</td>
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### DMC

Islamic Republic of Pakistan

### Executing Agency

Housing, Urban Development, and Public Health Engineering Department

### MISSION DATA

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<tr>
<th>Type of Mission</th>
<th>No. of Missions</th>
<th>No. of Person-Days</th>
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<td>Appraisal</td>
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<tr>
<td>Inception</td>
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<td>Project Administration</td>
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</table>

### PROJECT PERFORMANCE REPORT RATINGS

<table>
<thead>
<tr>
<th>Implementation Period</th>
<th>Development Objective</th>
<th>Implementation Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 November 2002 - 30 March 2003</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>29 April 2003 - 30 May 2003</td>
<td>S</td>
<td>HS</td>
</tr>
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<td>29 June 2003 – 30 June 2007</td>
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</tr>
</tbody>
</table>

DMC = developing member country, HS = highly satisfactory, S = satisfactory.
ADB ASSISTANCE TO WATER SUPPLY AND SANITATION

Figure 1: ADB Water Supply and Sanitation Loans, 1968–2007


Figure 2: Total Number of ADB Water Supply and Sanitation TAs, 1972–2007

Figure 3: Water Supply and Sanitation: ADB Loans by DMC
(As of December 2007)


Source: Loan and Grant Financial Information Services.
Figure 4: ADB Water Supply and Sanitation TAs: Top Ten DMC Recipients  
(As of December 2007)

BAN = Bangladesh, INO = Indonesia, LAO = Lao People’s Democratic Republic, NEP = Nepal, PAK = Pakistan, PHI = Philippines, PRC = People’s Republic of China, SRI = Sri Lanka, THA = Thailand, VIE = Viet Nam.

Source: Loan and Grant Financial Information Services.

Figure 5: ADB Rural Water Supply and Sanitation Loans, 1977–2007

BAN = Bangladesh, INO = Indonesia, KAZ = Kazakhstan, MAL = Malaysia, NEP = Nepal, PAK = Pakistan, PHI = Philippines, SRI = Sri Lanka, UZB = Uzbekistan.

Source: Loan and Grant Financial Information Services.
Figure 6: ADB Rural Water Supply and Sanitation Loans, 1977–2007

ADB = Asian Development Bank, No. = number.
Source: Loan and Grant Financial Information Services.
# ADB LOANS TO THE RURAL WATER SUPPLY AND SANITATION SECTOR

(As of December 2007)

<table>
<thead>
<tr>
<th>Loan Number</th>
<th>Country</th>
<th>Project Name</th>
<th>Fund Type</th>
<th>Amount $ million</th>
<th>Date Approved</th>
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<tr>
<td>0316 MAL</td>
<td>Sabah Water Supply</td>
<td>OCR</td>
<td>15.30</td>
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<td>0500 MAL</td>
<td>Rural Water Supply Master Plan</td>
<td>OCR</td>
<td>2.81</td>
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<td>0719 NEP</td>
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<td>0812 PHI</td>
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<td>1165 NEP</td>
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<td>20.00</td>
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<td>1349 PAK</td>
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**ADB** = Asian Development Bank, **ADF** = Asian Development Fund, **BAN** = Bangladesh, **INO** = Indonesia, **KAZ** = Kazakhstan, **MAL** = Malaysia, **NEP** = Nepal, **OCR** = ordinary capital resources, **PAK** = Pakistan, **PHI** = Philippines, **SRI** = Sri Lanka, **Supp** = supplementary, **TA** = technical assistance, **UZB** = Uzbekistan.

Source: Loan and Grant Financial Information Services.
## TECHNICAL ASSISTANCE TO THE RURAL WATER SUPPLY AND SANITATION SUBSECTOR

(As of December 2007)

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Project Name</th>
<th>Type</th>
<th>ADB</th>
<th>JSF</th>
<th>Others</th>
<th>Source</th>
<th>Total</th>
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<td>Socioeconomic Survey and Evaluation of the Island Provinces Rural Water Supply Sector</td>
<td>AD</td>
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<td>2375</td>
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<td>AD</td>
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<td>Community Environmental Health Improvements for the Provincial Towns</td>
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Source: Loan and Grant Financial Information Services.
<table>
<thead>
<tr>
<th>No.</th>
<th>Country</th>
<th>Project Title</th>
<th>Type</th>
<th>Loan Amount</th>
<th>Ex-Loan Amount</th>
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<tbody>
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<td>4186</td>
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<td>4215</td>
<td>PRC</td>
<td>Community Water Services and Health Project: Meeting the MDG in the Decentralized Context</td>
<td>AD</td>
<td>150,000</td>
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<td>4317</td>
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**Total**: 2,505,000 7,871,000 1,020,000 11,396,000

AD = advisory, CAM = Cambodia, CFWS = Cooperation Fund for the Water Sector, INO = Indonesia, KAZ = Kazakhstan, KOR = Korea, MAL = Malaysia, NEP = Nepal, PAK = Pakistan, PHI = Philippines, PP = project preparatory, PRC = People's Republic of China, PRCF = Poverty Reduction Cooperation Fund, SRI = Sri Lanka, THA = Thailand, UZB = Uzbekistan, VIE = Viet Nam.

Source: Loan and Grant Financial Information Services.
LESSTONS FROM ADB OPERATIONS IN WATER SUPPLY AND SANITATION SUBSECTOR


(i) Stakeholder roles in planning, implementation and operating water supply systems have been limited. The study noted that perhaps the greatest obstacle to successful participatory development is convincing institutional players that it is indeed possible. Maximizing stakeholder involvement in project decision-making and implementation goes against the institutional culture in some developing member countries (DMCs). Success stories from Malaysia and the Philippines show that often just one committed person can lead the way and achieve customer participation. Consistent with ADB policies that specify the importance of such participation, project designs should make a more concerted effort to realize this objective.

(ii) An effective demand-side management (DSM) program is a simple and cost-effective alternative to supply expansion, particularly in water-scarce areas. DSM succeeds with political support and appropriate campaigns to promote customer awareness of the need for conservation, as observed in Dalian. Particularly in water-scarce areas, all ADB-financed medium- to large-scale water supply and sanitation (WSS) projects should include a DSM program of achievable and cost-effective actions, appropriate to the situation, to develop demand-side alternatives to supply-side expansion of system capacity. The program’s activities should be prioritized according to their net impact in terms of the amount of water potentially saved and according to their cost-effectiveness in decreasing cost per unit of water saved. Project preparatory technical assistance documents should address the full range of tasks needed to design and implement a DSM program, including (i) technical assessments and recommended actions; (ii) financial (for instance, water tariff structure) and economic assessments; (iii) customer conservation awareness campaigns; and (iv) political support requirements.

(iii) Asian Development Bank (ADB) needs to give serious attention of implementing effective sanitation, hygiene, and health promotion programs in its WSS projects. The traditional emphasis on simply providing adequate quantities of good quality water is not enough to achieve the full benefits of improved individual and community health. Carefully crafted sanitation, hygiene, and health promotion programs, such as the Society for the Promotion of Area Resource Center’s projects in India, are needed for project beneficiaries to become much more aware of the critical links between water, sanitation, hygiene behavior, and health.

(iv) Most WSS projects experience significant delays in implementation. These delays result from an interplay among institutional, design, policy, and administrative factors that include institutional and capacity constraints commonly encountered in DMCs, overly complex project designs, proliferation of policy requirements of both external funding agencies and recipients, administrative procedures that are not always well understood, and cumbersome domestic procurement procedures and decision-making processes. Insufficient attention by ADB to project management and monitoring causes slow loan disbursements, adversely affecting project implementation and performance. In turn, this can
lead to increased project overhead costs and customer dissatisfaction. ADB should consider how best to address this complex but important set of issues. Success stories from nongovernment organization-implemented projects in India point to innovative approaches, such as turnkey contracts, that ADB might consider as elements in a more streamlined approach to project management for expeditiously implementing WSS projects.

2. Experience from the Greater Mekong Subregion based the valuation study of Selected Advisory Technical Assistance for Institutional Development and Capacity Building in the Water Supply and Sanitation Sector (Available: http://www.adb.org/Documents/TPARs/REG/tpa_reg_200307.pdf) revealed that the community health and hygiene programs, associated with water supply and sanitation projects, will be more effective when they can be implemented by a professional organization, which is already operating the same or similar types of activities. Where this arrangement is possible, there is a good chance that such activities will be continued after the completion of the advisory technical assistance. The study also highlighted that coordination and timing between an advisory technical assistance (ADTA) and the associated project is also important. ADTAs should be implemented only when the new water supply infrastructure provided by the project is in place. If an ADTA is related to technical matters, it is more appropriate for it to be implemented before or at the beginning of the project so that project implementation may receive the greatest benefit from the ADTA. If an ADTA is providing support for management and financial matters, coordination with an attached or related project may be less significant.

3. Country/Project level OED studies also provide many useful lessons. Key highlighted lessons from Indonesia include: improvement in operations and maintenance, reduction in level of unaccounted for water, cost-effective and environmentally responsible approach, need for identifying and instituting performance indicators for institutional strengthening, and participation of local communities in the planning, design, and implementation of projects (http://www.adb.org/Documents/PERs/ie-59.pdf); caution in adopting standard technical designs to suit local conditions, building appropriate organizational set up and strengthening, effective coordination at all levels of project implementation, recognizing risks and effective risk monitoring and mitigation measures, emphasis on demand-driven and consumer-oriented approach, recognition of local knowledge in the design process, and assessment of implementation capacity of the government at all levels and due adjustment to implementation modalities (http://www.adb.org/Documents/PCRs/INO/pcr_IN26102.pdf).

(i) Project evaluation from Nepal indicates that the participation of local communities from the start of rural water supply projects is a basic determinant of success. Using demand management in the design and implementation of such projects could improve both performance and sustainability. Significant advantages would be secured in offering service options that provide alternative water consumption levels and in structuring water charges to reflect levels of water consumption. Synergies would be obtained by coupling these innovations with building the users' awareness of the efficient use and conservation of the resource. Furthermore, where the availability of source water poses no problem, rural piped systems should be designed to an appropriate supply capacity with allowance for some proportion of household connections beside public standposts (PSPs) and for an adequate average water consumption level. If the design capacity is limited and only PSPs are allowed, the operational efficiency could be threatened. Many among the intended beneficiaries would not get their share of the water supply. The recovery of costs would be jeopardized as less could be
collected from higher income households (http://www.adb.org/Documents/PERs/PE494.pdf).

(ii) The evaluation of Rural Water Supply and Sanitation Sector Project in Indonesia (http://www.adb.org/Documents/PCRs/INO/prc_IN26102.pdf) also provided some technical lessons for designing future projects. These are: (i) lowland villages need a different approach from highland villages both in technical and social mobilization terms; (ii) Perusahaan Daerah Air Minum (PDAM) (regional water supply enterprise) schemes need a different approach from community-managed schemes; (iii) systems based on pumps/treatment plants need to be avoided in small communities and, if unavoidable, need extra attention; (iv) special attention needs to be given to ethnic and cultural differences between areas in the approach, as some communities need more focus in terms of health and hygiene education, and mobilization; (v) willingness of the community to utilize public hydrants should be fully researched; (vi) house connection-based systems need to be offered, based on the principle of recovery of investment and operational costs by the beneficiaries; (vii) pour-flush sanitation systems should not be provided without a suitable water supply; and (viii) school toilets with a connecting water supply have a higher chance of success than public toilets/wash areas.

4. The two rural water supply and sanitation sector projects in the Philippines also provide useful lessons for future ADB operations (http://www.adb.org/Documents/PERs/PE441.pdf and http://www.adb.org/Documents/PERs/pe-536.pdf). Key lessons are:

(i) Formation of water user groups and the commitment of their members to pay necessary fees should be a precondition for approving a subproject. Such commitments are necessary for cost recovery and cost recovery is necessary for good O&M. The failure to enforce such requirements, both by the government and ADB, has contributed to the less than fully satisfactory performance of the project.

(ii) The design criteria, once established, should be reflected in subproject selection and appraisal criteria and the appraisal of subprojects. The criterion for the distance from households to point sources is particularly important as it determines the number of point sources to be constructed, the magnitude of investment needed, travel time for fetching water, and the level of water consumption. While the present criterion requires a maximum distance of 250 meters, the average actual distance to the point sources constructed was only around 50 meters. This suggests that the point sources may have been provided at closer intervals than intended. The selection of the sites for point sources should attempt to provide them primarily to those households beyond the optimum distance from the point sources with a view to maximizing cost-effectiveness.

(iii) On the planning side, the process of site selection needs to be more demand-driven. The process of consultation with local communities and local government units should be strengthened and structured, and should permit the examination of wider options including different types of level-I facilities and higher level options. Nongovernment organizations may have a useful role to play in this connection. The process also needs to take into consideration community plans to obtain alternative sources of water to avoid developing several different water facilities in an area. Where available, more springs should be developed, and the watershed areas need to be protected. Extension of spring development to
communal standpipes or house connection is something that people appreciate and are ready to pay for and should be promoted wherever practicable. The provision of rainwater collectors, on the other hand, has to be reexamined in view of their frequent failure. Unless cost recovery of rainwater collectors can be solved, investment in them is likely to be wasteful.

(iv) Rural water supply facilities (wells, spring development, etc.) benefit a large number of people; save time used for fetching water; and promote greater use of water for washing, bathing, and other purposes. Health benefits are the main justification for rural water supply projects, but unless water quality is properly monitored and controlled, the provision of such facilities may not significantly reduce the incidence of mortality and morbidity. A more thorough investigation and testing of water quality is needed during planning and construction phases even if this involves bore hole testing in areas with hydro-geological problems. A number of improvements are needed to maximize project benefits and cost effectiveness. The national health agency’s resources and capacity for bacteriological testing could be strengthened, or alternatively, the feasibility of using local government units or private contractors for such monitoring should be explored.

(v) The responsibilities assigned to the concerned agencies at the central and provincial levels should be clarified; adequate personnel and other resources should be provided; and a system of accountability must be established. This will also have to involve the reeducation of the beneficiaries on the status of ownership of the facilities. Training for testing the quality of water and for organizing water user groups needs to be strengthened and sustained.

(vi) The capacity of an executing agency to meet the requirements of a sector loan including the selection and appraisal of subprojects requires more careful analysis. Where such capacity is considered insufficient or doubtful, assistance to enhance such capacity should be provided together with the loan. ADB should also supervise implementation of sector loans more closely. An appropriate procedure needs to be established to ensure that applicable loan covenants for subproject appraisal are complied with.

(vii) Protecting the investment and the quality of water through proper O&M is an urgent requirement. Institutions for the collection of water charges need to be established and they should remain active to ensure cost recovery and proper O&M. Water sources may be contaminated because of poor drainage around point sources and poor water users’ habits. More stringent guidelines should be applied in the design, construction, O&M, and training of water users. Alternatives are costly rehabilitation and contaminated water sources.

(viii) There should be adequate community participation at all stages of the project cycle to foster ownership of project facilities.

(ix) Simple community-level treatment solutions to improve water quality—filtering, chlorinization, removal of iron, sterilization of bacteria—are basic requirements that should be incorporated in rural water supply projects to ensure that the facilities are not abandoned.

5. Forming community-level water users associations and building capacity for improving their skills should precede the actual construction of the water facility. These community organizations responsible for the O&M of projects should first be legally constituted and registered. They require the mandate to regularly collect tariffs which should be set according to the level of service and cover expenses for regular and periodic maintenance. This is a prerequisite for the sustainability of the facilities. The handing over of the facility to the
community should be supported by a “successful test of sustainability” for financial and technical aspects for at least 1 year.
ADB EXPERIENCE IN WATER SUPPLY AND SANITATION

1. **Asian Development Bank (ADB) Water Policy.** In 2001, ADB outlined its vision for integrated water management in the Asia Pacific region in its Water Policy. The policy recognizes the region’s need to formulate and implement integrated, cross-sectoral approaches to water management and development. The Policy advocates that (i) water is a socially vital economic good, (ii) water needs careful management, and (iii) a participatory approach will help conserve and protect water resources. The principle elements of the Policy\(^1\) are to (i) promote a national focus on water sector reform; (ii) foster the integrated management of water resources; (iii) improve and expand the delivery of water services;\(^2\) (iv) foster the conservation of water, and increase system efficiencies; (v) promote regional cooperation, and increase the mutually beneficial use of shared water resources within and between countries; (vi) facilitate the exchange of water sector information and experience; and (vii) improve governance and capacity building.

2. ADB views water from two perspectives: (i) as a resource or an integral part of the ecosystem, and (ii) as a service or an economic good. As a resource, water management is critical to meet the needs without creating conflict or an additional environmental stress. As a service, water promotes accountability and autonomous service providers, proper regulation, and advocates consumer share in operation and maintenance. ADB’s Water policy is indirectly related to other ADB existing policies on natural resources such as fisheries,\(^3\) forestry,\(^4\) and the environment\(^5\) on aspects related to water use, water management and water quality. Likewise, ADB’s Health Policy\(^6\) also highlights the importance of access to safe water and better sanitation as prerequisites for better health. Consistent with the Water Policy, ADB’s Water Financing Program for 2006–2010 aims to double investment in irrigation and drainage to improve health and livelihood in Asian communities. ADB’s Sanitation Agenda plans to provide safe water supply and sanitation to 200 million people. ADB has established networks among ADB water professionals and nongovernment organizations\(^7\) involved in water issues. Recently, ADB has jointly organized with the Investment Committee of the Organisation for Economic Cooperation and Development\(^8\) an expert’s meeting to advance the debates on private sector partnership in the water supply and sanitation sector.

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\(^2\) Water service delivery covers sanitation as well.


\(^7\) The NGOs include Global Water Partnership, Gender in Water Alliance, and Water Aid.

EXPERIENCE OF OTHER AGENCIES IN WATER SUPPLY AND SANITATION

1. In Sri Lanka, an evaluation of Community Water Supply and Sanitation Project of the World Bank (1998)9 concluded that women's involvement in system management is critical for performance—women are the primary water collectors in most rural households, and have the most interest in ensuring that the water and sanitation service matches their needs and performs well. Furthermore, the study also noted that community-based water supply and sanitation (WSS) services are likely to perform better and have stronger impacts in communities with high levels of social capital. The existence of social networks improves group organization and service functioning, since community members are accustomed to working together as a group. Also, social ties among community members deter free riding, and encourage community members to hold to their commitments. Therefore, in the design of projects that finance community-based WSS services—and in particular in the design of social mobilization efforts—the existing levels of social capital in communities needs to be taken into account. In communities with low level of social capital, special efforts may be necessary to motivate and mobilize community members. Success in one community activity often leads a village to success in a subsequent activity. Similarly, Sara and Katz (1998)10 showed that demand-responsive community-based WSS services are likely to have sustainable impacts on poverty alleviation and that sustainability of services was markedly higher in communities where households had made informed choices about whether to build a water system and about the type and level of service.

2. Based on a seven-country thematic evaluation11 of the WSS sector, European Commission (EC) concluded that EC involvement and investment in the sector has been positive and successful, but not so with regard to sanitation, unless sanitation has formed an integral part of a WSS action. The study notes that the financing and implementation of basic WSS infrastructure works in the urban and rural areas has improved the livelihoods of many beneficiaries, but sustainability remains the great challenge. Furthermore, in absence of valid impact data, no definitive statements can be made on the role of EC investment on better health, but available information points to qualified success that of EC investment in WSS has made a positive contribution to better health of the target groups. On gender inequalities, the evaluation concludes that EC assistance have had positive impact on reducing drudgery for women and children and progress has been made at the project and program level but not at the institutional or decision-making level. Furthermore, the study concluded that rigidity in project designs do not permit alternative solutions or the promotion of new technologies and ideas.

## LIST OF WATERBORNE DISEASES

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<th>Disease and Transmission</th>
<th>Microbial Agent</th>
<th>Sources of Agent in Water Supply</th>
<th>General Symptoms</th>
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<tbody>
<tr>
<td>Amebiasis (hand-to-mouth)</td>
<td>Protozoan (<em>Entamoeba histolytica</em>) (Cyst-like appearance)</td>
<td>Sewage, non-treated drinking water, flies in water supply</td>
<td>Abdominal discomfort, fatigue, weight loss, diarrhea, gas pains</td>
</tr>
<tr>
<td>Campylobacteriosis (oral-fecal)</td>
<td>Bacterium (<em>Vibrio cholerae</em>)</td>
<td>Untreated water, sewage, poor hygiene, crowded living conditions with inadequate sewage facilities</td>
<td>Watery diarrhea, vomiting, occasional muscle cramps</td>
</tr>
<tr>
<td>Cholera (oral-fecal)</td>
<td>Bacterium (<em>Vibrio cholerae</em>)</td>
<td>Untreated water, sewage, poor hygiene, crowded living conditions with inadequate sewage facilities</td>
<td>Diarrhea, abdominal discomfort</td>
</tr>
<tr>
<td>Cryptosporidiosis (oral)</td>
<td>Protozoan (<em>Cryptosporidium parvum</em>)</td>
<td>Collects on water filters and membranes that cannot be disinfected, animal manure, seasonal runoff of water.</td>
<td>Flu-like symptoms, watery diarrhea, loss of appetite, substantial loss of weight, bloating, increased gas, stomach</td>
</tr>
<tr>
<td>Cyclosporiasis</td>
<td>Protozoan parasite (<em>Cyclospora cayetanensis</em>)</td>
<td>Sewage, non-treated drinking water</td>
<td>cramps, nausea, vomiting, muscle aches, low-grade fever, and fatigue</td>
</tr>
<tr>
<td>Giardiasis (oral-fecal) (hand-to-mouth)</td>
<td>Protozoan (<em>Giardia lamblia</em>)</td>
<td>Untreated water, poor disinfection, pipe breaks, leaks, groundwater contamination, campgrounds where humans and wildlife use same source of water. Beavers and muskrats act as a reservoir for Giardia.</td>
<td>Diarrhea, abdominal discomfort, bloating, gas and gas pains</td>
</tr>
<tr>
<td>Hepatitis A (oral-fecal)</td>
<td>Virus (<em>Hepatitis A</em>)</td>
<td>Raw sewage, untreated drinking water, poor hygiene, ingestion of shellfish from sewage-flooded beds</td>
<td>Fever, chills, abdominal discomfort, jaundice, urine dark</td>
</tr>
<tr>
<td>Salmonellosis (oral transmission)</td>
<td>Bacterium (<em>Salmonella species</em>)</td>
<td>Contaminated water, shellfish, turtles, fish</td>
<td>Gastroenteritis, fever and rapid blood-poisoning.</td>
</tr>
<tr>
<td>Shigellosis (oral-fecal)</td>
<td>Bacterium (<em>Shigella species</em>)</td>
<td>Sludge, untreated wastewater, groundwater contamination, poorly disinfected drinking water.</td>
<td>Fever, diarrhea, bloody stools</td>
</tr>
<tr>
<td>Schistosomiasis (immersion)</td>
<td>Schistosoma</td>
<td>Contaminated fresh water with certain types of snails that carry schistosomes</td>
<td>Rash or itchy skin. Fever, chills, cough, and muscle aches</td>
</tr>
<tr>
<td>Typhoid fever (oral-fecal)</td>
<td>Bacterium (<em>Salmonella typhi</em>)</td>
<td>Raw sewage (carried and excreted in feces by humans), water supplies with surface water source.</td>
<td>Fever, headache, constipation, appetite loss, nausea, diarrhea, vomiting, abdominal rash</td>
</tr>
<tr>
<td>Viral gastroenteritis (oral-fecal)</td>
<td>Viruses (includes Norwalk and rotavirus family)</td>
<td>Sewage, contaminated water, inadequately disinfected drinking water (mostly surface water sources).</td>
<td>Repeated vomiting and diarrhea over 24-hour period, gastrointestinal discomfort, headache, fever.</td>
</tr>
</tbody>
</table>

Note: Waterborne diseases arise from the contamination of water by human or animal feces or urine infected by pathogenic viruses or bacteria, and which is directly transmitted when the water is drunk or used in the preparation of food.

**IMPACT EVALUATION MATRIX**

<table>
<thead>
<tr>
<th>Evaluation Question</th>
<th>Information Required</th>
<th>Information Source</th>
<th>Data Source and Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Health Impact</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a. Did the Project reduce drudgery of girls and women in the project area?</td>
<td>Time spent in fetching water</td>
<td>Household respondents in project and nonproject communities</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method</td>
</tr>
<tr>
<td>1.b. If yes, what factors contributed to achieving this result?</td>
<td>Age, educational attainment, household composition, source and proximity to water, amount and frequency of water supply, health and sanitation awareness, drainage and sanitation facilities, stagnant water bodies, water quality</td>
<td>Project staff, household respondents in project and nonproject communities, CO executive members</td>
<td>Key informant interviews, focus group discussions and household survey, CO records</td>
</tr>
<tr>
<td>2.a. Did the Project reduce incidence of water-borne diseases in the project area?</td>
<td>Incidence of major water-borne diseases (diarrhea, dysentery, cholera, typhoid etc)</td>
<td>Village health centers, household respondents, health practitioners</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method, KAP survey, CO records</td>
</tr>
<tr>
<td>2.b. If yes, what factors contributed to achieving this result?</td>
<td>Educational attainment, household composition, source and proximity to water, amount and frequency of water supply, health and sanitation awareness, drainage and sanitation facilities, stagnant water bodies, water quality</td>
<td>Project staff, household respondents in project and nonproject communities, CO executive members, Punjab Bureau of Statistics, community leaders</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method, KAP survey, CO records</td>
</tr>
<tr>
<td><strong>B. Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.a. Did the Project increase school enrolment rate at the primary and secondary levels?</td>
<td>School enrolment rates at the primary and secondary level</td>
<td>School teachers, household heads, school records</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method</td>
</tr>
<tr>
<td>1.b. If yes, what factors contributed to achieving this result?</td>
<td>Time spent in fetching water, attitude towards girls’ education, proximity to school</td>
<td>Project staff, household respondents in project and nonproject communities, CO executive members, Punjab Bureau of Statistics, community leaders</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method</td>
</tr>
<tr>
<td>1.c. Did the Project increase school completion rate at the primary and secondary?</td>
<td>School completion rates at the primary and secondary level</td>
<td>Project staff, household respondents in project and nonproject communities, CO executive members</td>
<td>Key informant interviews, focus group discussions and household survey based on recall method</td>
</tr>
<tr>
<td>1.d. If yes, what factors contributed to achieving this result?</td>
<td>Time spent in fetching water, attitude towards girls’ education, proximity to school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.e. Did the Project decrease drop out rates of boys and girls from primary and secondary schools?</td>
<td>Drop out rates from primary and secondary schools</td>
<td></td>
<td></td>
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<tr>
<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1.f. If yes, what factors contributed to achieving this result?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### C. Economic

<table>
<thead>
<tr>
<th>1.a. Did the Project enable household members in undertaking IGAs?</th>
<th>Employment creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.b. If yes, what factors contributed to achieving this result?</td>
<td>Time available for IGA, access to finance, skills and knowledge, and market, childcare arrangements</td>
</tr>
<tr>
<td>1.c. Did the Project reduce expenditure on health in the project area?</td>
<td>Household health expenditure</td>
</tr>
<tr>
<td>1.d. If yes, what factors contributed to achieving this result?</td>
<td>Quality of healthcare, income from IGAs, access to and adequacy of quality water</td>
</tr>
<tr>
<td>1.e. Did the Project increase household income or consumption in the Project area?</td>
<td>Household income by source</td>
</tr>
<tr>
<td>1.f. If yes, what factors contributed to achieving this result?</td>
<td>Time available for IGAs, access to finance, skills and knowledge, and market, household resources, childcare arrangements</td>
</tr>
<tr>
<td>1.g. Did the Project reduce external dependency for O&amp;M?</td>
<td>Time series amount collected from CO members for O&amp;M of the WSS schemes</td>
</tr>
<tr>
<td>1.h. If yes, what factors contributed to achieving this result?</td>
<td></td>
</tr>
</tbody>
</table>

#### Key informant interviews, focus group discussions, household survey based on recall method, CO records

### D. Other Social

<table>
<thead>
<tr>
<th>2a. Did the Project improve childcare provisions in the project area?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.b. If yes, what factors contributed to achieving this result?</td>
<td></td>
</tr>
</tbody>
</table>

#### Childcare practices, time available for childcare

#### Educational attainment, household composition, source and proximity to water, amount and frequency of water supply, drainage and sanitation facilities, stagnant water bodies, water quality, time spent in fetching water

#### Community leaders, health practitioners, Project staff, household respondents in project and nonproject communities, CO executive members, Punjab Bureau of Statistics, community leaders

#### Key informant interviews, focus group discussions, household survey based on recall method, CO records

### CO = community organization, IGA = income generating activity, KAP = knowledge-attitude-practice, MICS = Multiple Indicator Cluster Surveys, No. = number, O&M=operations and maintenance, UNICEF = United Nations Children's Fund, WSS = water supply and sanitation.
### D. Other Social

<table>
<thead>
<tr>
<th>Question</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.a. Did the Project improve women’s representation on CO management committees?</td>
<td>No. of women representatives on CO management committees</td>
</tr>
<tr>
<td></td>
<td>CO records</td>
</tr>
<tr>
<td></td>
<td>Interview with CO management committee members</td>
</tr>
<tr>
<td>1.b. If yes, what factors contributed to achieving this result?</td>
<td>Childcare practices, time available for childcare</td>
</tr>
<tr>
<td></td>
<td>Community leaders, health practitioners,</td>
</tr>
<tr>
<td></td>
<td>Key informant interviews, focus group discussions, household survey based on recall method, CO records</td>
</tr>
<tr>
<td>2.a. Did the Project improve childcare provisions in the project area?</td>
<td>Educational attainment, household composition, source and proximity to water, amount and frequency of water supply, drainage and sanitation facilities, stagnant water bodies, water quality, time spent in fetching water</td>
</tr>
<tr>
<td></td>
<td>Project staff, household respondents in project and nonproject communities, CO executive members, Punjab Bureau of Statistics, community leaders</td>
</tr>
<tr>
<td>2.b. If yes, what factors contributed to achieving this result?</td>
<td></td>
</tr>
</tbody>
</table>

I. TERMS OF REFERENCE—CONSULTANTS

A. International Consultant (Impact Evaluation Survey Specialist)

1. The Impact Evaluation Survey Specialist would perform following tasks:

   (i) Conduct an in-depth critical review of theoretical and empirical literature on the impact of water and sanitation interventions on gender, health, income/consumption, education and other socioeconomic development areas.
   (ii) Identify modalities and key determinants of impact due to water and sanitation.
   (iii) Based on (ii) above, refine the conceptual framework and evaluation matrix for the impact evaluation study with clear identification of indicators and their measurements at all levels.
   (iv) Based on (iii) above, develop appropriate survey instruments for field data collection using both qualitative and quantitative methods. These would include knowledge-attitude-practice (KAP) surveys, household surveys, focus group discussions and key informant interviews.
   (v) Pre-test data collection instruments in a rural Philippines community.
   (vi) Provide guidance to data collection team in the field by email to ensure collection of quality data for the evaluation.
   (vii) Develop a road map for qualitative analysis of field data, including selection of appropriate analytical techniques.
   (viii) Based on field data, prepare a set of 6 case studies to demonstrate successful water supply schemes with demonstrated impacts for potential adaptation and upscaling.
   (ix) Analyze qualitative and quantitative data and information collected from the field and prepare draft evaluation report in association with the international econometrician/impact evaluation specialist).
   (x) Revise the draft evaluation report incorporating review comments from internal and external reviewers.
   (xi) Prepare draft of a set of user friendly publications for dissemination of evaluation findings.
   (xii) Undertake any other tasks assigned by the Team Leader pertaining to the impact evaluation study.

2. The consultant will work under the direct supervision of the Team Leader and s/he will be supported by an Advisory Panel based in Pakistan.

B. International Consultant (Econometrician and Impact Evaluation Specialist)

3. The Econometrician and Impact Evaluation Specialist would perform following tasks:

   (i) Conduct an in-depth critical review of methodological, theoretical and empirical literature on the impact of water and sanitation interventions on gender, health, income/consumption, education and other socioeconomic development areas.
   (ii) Identify modalities and key determinants of impact due to water and sanitation.
   (iii) Based on (ii) above, refine the conceptual framework and evaluation matrix for the impact evaluation study with clear identification of indicators and their measurements at all levels.
   (iv) Based on (iii) above, develop appropriate survey instruments for field data collection using both qualitative and quantitative methods. These would include
KAP surveys, household surveys, focus group discussions and key informant interviews.

(v) Guide in pre-testing data collection instruments in a rural Punjab and incorporate changes arising from pre-tests.

(vi) Provide guidance to data collection team in the field by email to ensure collection of quality data for the evaluation.

(vii) Develop a road map for quantitative analysis of field data, including selection of appropriate analytical techniques.

(viii) Analyze quantitative data and information collected from the field and prepare draft evaluation report in association with the international impact evaluation survey specialist.

(ix) Revise the draft evaluation report incorporating review comments from internal and external reviewers.

(x) Prepare draft of a set of user friendly publications for dissemination of evaluation findings in association with the international impact evaluation survey specialist.

(xi) Undertake any other tasks assigned by the Team Leader pertaining to the impact evaluation study.

4. The consultant will work under the direct supervision of the Team Leader.

C. National Consultants (a group of national Water Supply and Sanitation Specialist or a firm)

5. The tasks of the Water Supply and Sanitation Specialists would be the following:

(i) Prepare a list of all water supply and sanitation schemes handed over by Public Health Engineering Department to local community organizations (COs) in six pre-determined districts of Punjab, Pakistan under ADB supported Punjab Rural Water Supply and Sanitation Sector Project (PRWSSP) and Punjab Community Water Supply and Sanitation Sector Project (PCWSSP).

(ii) In consultation with the Team Leader, identify and develop a set of evaluation indicators reflecting quality of construction, community organization, status of scheme since handover including drainage and sanitation around water supply areas, water quality, water distribution arrangements, operations and maintenance mechanisms, cost recovery arrangements, and other sustainability related issues.

(iii) Prepare a water supply and sanitation survey instrument to gather relevant data in a systematic way.

(iv) Pre-test the survey instrument and translate the instrument in Urdu.

(v) Inspect a list of pre-identified schemes and conduct survey of approximately 130 schemes selected for household and KAP surveys through focus group discussions, meetings with COs and other key informants.

(vi) Identify critical technical, managerial and community factors exerting impact on the performance of water supply and sanitation schemes.

(vii) Prepare an analytical technical report based on the survey data.

(viii) Prepare 10 best practices adopted in other water supply and sanitation schemes, including those completed with external, NGO or national resources and compare their performance with ADB supported schemes.

(ix) Provide a set of key lessons for ADB for future operations, particularly in the area of technical design, operation and maintenance, cost recovery, capacity
D. Domestic Consultant (Firm/Group of Experts)

7. The tasks of the domestic consultant/s would be the following:

(i) Assist in the preparation of pre-coded data collection instruments: household survey, KAP survey and water supply scheme survey, focus group discussions and key informant interviews.

(ii) Pre-test the survey questionnaires and improve the draft questionnaires.

(iii) Translate all field instruments in Urdu.

(iv) Develop a sample selection plan in consultation with the Team Leader and identify participants for household and individual interviews.

(v) Follow the advice and guidance of the Team Leader.

(vi) Recruit and engage experienced enumerators and data collection supervisors and provide training as required.

(vii) Lead, manage and conduct (a) a survey of 2,600 households (1,300 in project and 1,300 in control area, respectively); (b) a survey of 1,400 individuals assessing their knowledge, attitude and practice in hygiene and sanitation; (c) key informant interviews with relevant individuals, including local teachers, health practitioners, and local community leaders.

(viii) Ensure data completeness, quality, and consistency to the highest standard in all surveys.

(ix) Maintain confidentiality of information and data and provide a safe and secure area to store the completed questionnaires.

(x) Input and process data accurately using user-friendly and most popular software.

(xi) Provide the raw data and data dictionary to the Team Leader on a CD-ROM.

(xii) Generate summary statistical tables as agreed with the Team Leader and Advisory Panel.

(xiii) Provide survey data in usable form to the international consultant.

(xiv) Prepare a comparative analytical report reflecting with and without project scenario on key parameters associated with water supply and sanitation.

(xv) Incorporate relevant comments on draft report and finalize the draft.

(xvi) Regularly update and assist the international consultants through e-mail exchange in conducting advanced statistical and econometric analysis.

(xvii) Ensure that any data collected for the study is the property of Operations Evaluation Department (OED), Asian Development Bank (ADB). Under no circumstances, the contractor will sell, publish, use or permit use of collected data for any other purpose without the written authorization of OED.

8. The firm or group of experts will perform the work under the overall supervision of the Team Leader.
II. TERMS OF REFERENCE—OED STAFF

A. Evaluation Specialist (Team Leader)

1. Introduction

9. The Evaluation Specialist (Team Leader) is expected to provide over-all guidance to the completion of the Rigorous Impact Evaluation report. He is expected to deliver an output which conforms to OED’s evolving Guidelines in conducting a rigorous impact evaluation.

2. Principal Tasks

10. The tasks of the Evaluation Specialist are the following:

   (i) Provide overall guidance to the international and national consultants in the conduct of the evaluation, including refinement of evaluation design, development of field data collection instruments, data analysis and report writing.
   (ii) Review relevant documents and obtain necessary background information through the collection of statistics and the conduct of interviews and discussions with the Government and various stakeholders as identified in the evaluation approach paper;
   (iii) Review Government plans, policies, and regulations on water supply and sanitation and water resources, and coordinate with other donor agencies engaged in the same field of assistance as applicable;
   (iv) Supervise the conduct of the Operations Evaluation Missions (OEMs) including surveys, focus group discussions, key informant interviews, site visits, and meetings with the various stakeholders including the Government and Executing Agencies and other development partners;
   (v) Review the outputs of the consultants and national evaluation officer and closely coordinate with all stakeholders involved in the study;
   (vi) In collaboration with other members of the OEM, evaluate/validate the project completion report (PCR) findings on the achievement of project outputs, including their quality and timing. Examine how the project outputs have contributed to the achievement of overall project objectives, and consequently determine its impacts on the beneficiaries;
   (vii) Take the lead in drafting the Aide Memoire, summary reports, and the Final Report by preparing relevant sections of the report;
   (viii) Identify key issues and lessons learned from the Project and formulate recommendations for future ADB assistance in the subsector;
   (ix) Respond to comments and suggestions from peer and inter-departmental reviews, including those from OED management;
   (x) Disseminate evaluation findings using appropriate method and forum under the guidance of OED management and with the support of Knowledge Management Unit/OED.
B. National Evaluation Officer

1. Introduction

11. The National Evaluation Officer will assist the Evaluation Specialist (Team Leader) in providing over-all guidance to the completion of the Rigorous Impact Evaluation. He is expected to contribute to and ensure that the final output conforms to OED’s evolving Guidelines for conducting a rigorous impact evaluation.

2. Principal Tasks

12. The tasks of the National Evaluation Officer are the following:

(i) Review Government plans, policies, and regulations on water supply and sanitation; and the Projects’ contributions to the positive development of plans, policies, and regulations, as applicable.

(ii) Review relevant documents and obtain necessary background information through the collection of statistics, and the conduct of interviews and discussions with ADB project officers and various stakeholders, where applicable, as identified in the evaluation approach paper.

(iii) Assist the Team Leader in the recruitment of consultants for the study as per ADB policy, guidelines, and procedures.

(iv) Assist in the preparation and conduct of the OEM, including surveys, focus group discussion, key informant interviews, and stakeholder interviews.

(v) If required, participate in the OEM to supervise quality consistency of surveys and interviewing for documenting best practices.

(vi) Conduct data analysis as deemed appropriate to strengthen the outputs of other OEM members.

(vii) In collaboration with other members of the OEM, evaluate and/or validate the PCR findings on the achievement of project outputs, including their quality and timing through desk review. Examine how the project outputs have contributed to the achievement of overall project objectives and how have these impacted on the beneficiaries;

(viii) Provide inputs to the preparation of the draft Rigorous Impact Evaluation Report including relevant appendixes as determined by the Evaluation Specialist.

(ix) Assist in processing identifying key issues and lessons learned from conducting Rigorous Impact Evaluation and formulate recommendations for future ADB assistance in the sector and the country as a whole for sustainable water supply and sanitation, and water resources management and development;

(x) Assist the Evaluation Specialist in responding to comments and suggestions from peer and inter-departmental reviews, including those from OED management;

(xi) Assist with the dissemination of evaluation findings using appropriate method and fora under the guidance of OED management and with the support of Knowledge Management Unit and/or OED.
C. Operations Evaluation Assistant

1. Introduction

13. The Operations Evaluation Assistant will provide a full range of secretarial support services and help coordinate activities for the Rigorous Impact Evaluation. As part of the evaluation team, she is expected to ensure the smooth flow of communications and documents related to the conduct of the evaluation, and that the format of draft reports conforms to OED’s Guidelines.

2. Principal Tasks

14. The tasks of the Operations Evaluation Assistant are the following:

(i) Ensure that all correspondence and documents, for the evaluation study, are correctly typed and prepared in compliance with ADB standards.

(ii) Collect, compile, and analyze relevant information and data related to the assigned work area to produce routine and/or ad hoc statistics/reports as instructed by the Evaluation Specialist and the National Evaluation Officer.

(iii) Ensure the effective coordination of the team’s schedule by maintaining diaries and arranging appointments, meetings, travel and accommodation as specified by the Evaluation Specialist and in accordance with ADB procedures.

(iv) Ensure that the evaluation study’s filing systems and records are properly maintained and updated in accordance with an existing framework for easy retrieval.

(v) Track the flow of documents with the use of databases for effective monitoring to meet deadlines.

(vi) Ensure that the tasks pertaining to the study are accomplished on time.