



# Technical Assistance Consultant's Report

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Project Number: TA 6325  
September 2008

## Sustainable Replication and Scaling Up of Small Piped Water Networks

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For the Regional and Sustainable Development Department (RSDD), Regional Sustainable  
Infrastructure Division (RSID)

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**Asian Development Bank**



## Executive Summary

1. The ADB Regional Studies on small-scale water providers (SSWPs) published in 2004, concluded that city officials, formal utilities, and local banks should work with small network entrepreneurs who can immediately bring water supplies to the poor, on an agreed-upon interim basis until the water utility is able to do so. The studies determined that ADB should join with two or three cities to test and refine these recommendations. Subsequently, ADB provided 800,000USD for implementation of four small piped water network (SPWN) pilot projects in three countries – two in Philippines; one in Tien Giang Province, Viet Nam; one in Ahmedabad, India - were implemented, each covering between 200 and 650 households. This regional technical assistance included household surveys in the three countries, SSWP surveys, a development of a toolkit for a replication of the projects, and a regional forum.

2. The regional forum was conducted during 17-18 April 2008 in Manila, Philippines. Its total budget was 72,000US\$. More than fifty representatives from South and Southeast Asia and multilateral agencies attended the forum to discuss approaches for expeditious safe water delivery and to identify opportunities for replicating and scaling up of the pilot experience. It was concluded that the event successfully contributed to dissemination of the experience of the parties involved in the implementation of the small piped water networks. Thirty-three participants submitted their evaluation of the regional forum. Most of the respondents rated all components of the forum as “excellent”. Twenty-one participants overall impression was “Valuable – I intend to take specific actions”.

3. All projects have obviously improved the lives of the local people but the evaluation of improvement in quality of life was not the focus of this study. The rationale for this study is not to repeat the obvious fact that implementing water supply in low-income areas brings high social benefits but to identify which characteristics might be changed to increase the potential for their sustainable large-scale implementation in the future. The purpose of the study is not to label the pilot projects as successful or unsuccessful. The ADB staff and consultants involved in the implementation deliberately chose a variety of approaches and supported various existing programs during this experiment to see which approaches work best in which conditions. In this sense, all the pilot projects can be considered successful because they provided valuable information. There is no doubt that providing (any) form of water supply to the poor has highly positive social impacts on the beneficiaries. Obviously, implementation of these SPWNs had significant benefits on the consumers who (as is generally known to be the case in areas that lack piped water systems) had previously paid exorbitant fees, relied on illegal connections, carried water by hand, or used only very limited quantities of water, which was often potentially unsafe in terms of quality. This study does not aim to evaluate these positive impacts but focuses on what could be done to increase the potential for sustaining, replicating and scaling up of the approaches under examination. The purpose of this study is to assess the outcomes of the SPWN projects and review related documents and literature to provide actual policy recommendations for ADB for their sustainable replication and scaling up.

4. The planned outcome of the technical assistance, as specified in the design and monitoring framework, was to enable the selected population in the three countries to use piped water supply. The following three performance targets/indicators were chosen for the TA: (1) between 18,000 – 20,000 persons connected to SPWN by 2007; (2) participating homeowners associations (HOAs) and SSWPs indicate satisfaction with approach by 2007; and (3) water utilities rate small-piped water networks as a viable distribution option. As of mid-2008, the engaged SSWPs reported connecting a total of 2,161 households. At 5 members per household, this would add up to 10,805 connected persons. In Manila and Tien Giang, HOAs, SSWPs, and

water utilities have repeatedly expressed high satisfaction with the ADB's support for the pilot projects. In Ahmedabad, the main stakeholders would consider the pilot project meaningful only if it leads to large-scale ADB support in the future. In all three cases, strong interest in further financial assistance for scaling up SSWPs was noted.

5. This study introduces additional outcome indicators in an attempt to comprehensively evaluate the projects' potential for sustainability, replication and scaling up. The potential of the projects for sustainability has been assessed from financial, ecological, and social viewpoints. The selected indicators of financial sustainability are illegal losses and collection efficiency. Ecological sustainability has been judged based on the available data on physical losses of the pipe network and incentives provided against wasteful consumption. Accessibility of a water connection and affordability of the tariff has been assessed for social sustainability. The potential of each case for sustainability from each of these three viewpoints has been evaluated relative to the other cases. Lessons for replicability were derived from a comparison of the sustainability-related outcomes of the pilot systems, while considering their diverse characteristics and the socio-economic, institutional and geographic contexts in which they were implemented. Points for scaling up were proposed to minimize identified implementation obstacles and utilize the strengths of different categories of stakeholders.

6. The primary data for this project was gathered through interviews with the stakeholders, consumers, field visits and document reviews. The studied cases have been compared in terms of the local context and the project characteristics, including the stakeholders and their relations regarding tasks and responsibilities for distribution. Unique characteristics of each case have been identified and their implications shown by concept mapping. Strengths and weaknesses of the SSWPs have been highlighted in relation to the centralized organizations, and optimal task distribution has been proposed. The extent to which the findings from studying only four cases can be generalized is limited. On the other hand, the depth of available information (which enables the viewing of each pilot as a separate case study) and the variation among the projects' conditions do provide insight into the relations of local context, project characteristics (especially function distribution), and its potential for sustainability. Overall, supporting the selected SPWN projects has been found a useful experiment, which provided valuable data on the mechanism of SSWP operations. Thanks to this effort by ADB, valuable lessons about the sustainability and scalability of SSWP could be learnt.

7. In general terms, the following ingredients have been found important for the success of SSWPs' involvement in water supply. Firstly, reliable and locally well-accepted organizations need to be selected. In some cases, training may need to be provided to the SSWPs. Support of local authorities in consensus building, dispute resolution, provision of necessary approvals and permissions is of high importance. Furthermore, the involved organizations need to have access to sufficient financial capital and technical know-how to successfully start up their water supply projects. Consumers need to be informed and explained the conditions for obtaining a connection. Before the project starts, personal savings for connection fees may be encouraged. If possible experienced contractors should be selected and, depending on size, the construction process may need to be supervised by an expert. Connection fee repayment schemes and tariff schemes as well as their collection strategy need to enable financial sustainability, reasonably reward the SSWP, and fit the needs of the consumers. Relevant local authorities should protect the consumers especially in terms of water quality control but also affordability, and conduct inspections when necessary. Especially larger SSWPs may be required to regularly report to these authorities. A conflict resolution mechanism needs to be in place. Proper maintenance and monitoring is crucial. Training in these skills may be necessary as well, while repairs can be carried out by other specialists.

8. In each pilot project, ADB hired a local consultant or a non-governmental organization (NGO) to oversee the entire preparation and implementation process and funded the construction of the network. All participating parties signed a memoranda of agreement (MOA), which state their responsibilities. The conditions given in the memoranda are generally based on local existing water supply systems that the local stakeholders had been involved in. The situation in each pilot case is described below.

9. In Ahmedabad, since there is practically free water supply in all urban poor areas via standpipes at least, there is no niche for classical SSWPs. The government hires NGOs mainly to communicate with the consumers. Cost-recovery is not a goal in this government-funded program – Ahmedabad Municipal Corporation (AMC) requires contributions of only 2,100 INR while the project cost is estimated at 15,000 INR per household. Thus, the NGOs' work generally does not include the minimization of free-riding in the operational phase. Consumption is not metered, leakages not monitored and incentives or education against wasting are not provided, which has negative implications for financial and ecological sustainability. Consumers (except for slum dwellers) pay for water in the form of a "water tax" which is 30% of the property tax and is not related to the actual consumption. "Free" water and low water connection fees, on the other hand, contribute to the social sustainability in the lowest income areas. ADB provided 199,172 INR for community mobilization and 2,398,246 INR for network construction to the SAATH, an NGO which was leading the pilot project preparations and implementation. A total of 223,400 INR has been recovered from the contributions of 127 households, which will be transferred to AMC. ADB has also provided support for a household and SSWP survey (198,799 INR) and a training workshop on citizen card membership (14,818 INR). Development of a storm water drainage line around the slum has caused delays in the water connection construction. Because of that, the pilot project was not yet operational during the data gathering process for this study and thus the outcomes could not be fully evaluated.

10. In the Metro Manila, West Zone case, the central utility gives the HOA excessive responsibility for the tertiary water supply functions including financing, technical design, cost of leakages, which appears to be beyond the HOA's capabilities and the financial sustainability of the whole project is threatened. The ADB grant of 5,130,000PHP (100,000USD) was deposited in a commercial bank, which administrated the loan to the HOA for design and construction of the water network. The hydraulic zone of 651 HH is too large for an urban poor area, which makes collection efficiency low. The average NRW in this new system with pipes above the ground has already been over 15% and the HOA has been repaying only 90% of their loan amortization. The HOA copes with the situation by charging excessive tariffs (13 PHP/CU.M. additional charges instead of maximum 6 PHP/CU.M. stated in the MOA). Judging from the consumers' interviews, the high total tariff (26 PHP/CU.M.) provides incentives to save water, but its social impacts are negative. When the HOA repays the loan, the central utility (Manila Water Services, Inc) can reinvest the funds, with an approval of ADB, into another project.

11. The other engaged utility in Manila, on the other hand, hired local residents recommended by the local HOA to perform basic water supply tasks on their streets, with approximately 20HH each, for a small fee (averaging around 3 PHP/CU.M.). The outcomes have been significantly better in terms of the sustainability indicators. The collection efficiency is reportedly 100%, and average NRW is only 2%. This system has been found very effective for this context, although calling the local "street leaders" an SSWP may not be accurate. MWCI connected 1010 HH for the total of 6,009,690PHP from which ADB provided 5,130,000PHP (100,000USD). After the investment is recovered from connection fees, which are repayable within 3 years, this utility (Manila Water Corporation) too can reinvest it into another area.

12. In Tien Giang province, since there is no central water supply utility, the SSWPs have to cope on their own with numerous technical difficulties with various degrees of success. The NRW in the pilot project is estimated at 30% but no clear base for the estimation has been provided because the meters in place are reported to be unreliable. Without regular checks, concerns about the water quality have also been expressed. Using the ADB grant for decreasing connection fees in the pilot project area has decreased the willingness to pay the full connection cost in neighboring areas and complicated the expansion plans of the SSWP (Thuan Phu, Ltd). On the other hand, their work is supported by the local government that facilitates information dissemination, and by ease of payment collection and almost non-existent illegal connections in the rural area. ADB provided 1, 600,000,000 VND (100,000USD) to the Center for Rural Water Supply and Sanitation which passed the grant to the SSWP (Thuan Phu, Ltd) to connect 500HH. Thuan Phu Ltd is required to repay 30% of the funds to CERWASS within 3 years. ADB also financially covered training for 1048 trainees from 524 water stations and a survey of SSWPs.

13. As a result of this general gap in responsibility for these functions in all four projects, the renters do not have the opportunity to make their own decisions about participating in the water systems, and furthermore, some consumers are not informed about these plans and remain uninvolved. Also, the poorest ones may not be invited to join or may not even consider joining and thus must ultimately pay higher unit costs for water from others. Those who are both very poor and have a lack of social relations in the area with whom to share a water connection and its cost, find the expenditures too high and remain unconnected. The people living on the periphery of the water supply areas tend not to be included.

14. As compared to the central-level organizations, the mid-level organizations including SSWPs tend to possess the following beneficial characteristics in the studied cases: local knowledge, presence in the area, and lower opportunity cost of time. The above listed characteristics make the mid-level organization especially suitable for water supply functions, which require communication with the residents, exertion of social pressure, labor or time-intensive, routine water tasks in the area, and operations in unofficial settlements. Overall, the SSWPs in a broad sense are most efficient in functions related to limiting free-riding. The potential for free-riding depends on the context. The most relevant local characteristics are history of water supply in the area, availability of resources, and social cohesion.

15. On the other hand, as compared to the central-level organizations, the studied mid-level organizations tend also to possess some weaknesses. To be specific, lack of management, accounting, technical knowledge and/or skills, scarce financial capital and low level of access to credit have been witnessed. Therefore, when these mid-level organizations assume some water supply functions from the central organizations, the central organizations should provide training, accreditation, and support with the more demanding technical and financial functions. The local organizations should also be pro-active in protecting the rights of the consumers by information dissemination to the local residents, tariff regulation, and water quality control.

16. A general framework of sustainable replication and scaling up consists of the following three elements: (1) the local context determines which tasks can be optimally assumed by the mid-level organizations; (2) the central organizations provide an enabling environment for the mid-level organizations as well as protection of consumers' rights; and (3) ADB provides technical assistance and financial assistance to the central organizations to be able to do so. The actual recommended "action points" for ADB to develop the necessary capacity of the central organizations in the supported countries for the scaling up of SSWPs are listed below:

1. **Authorization and registration:** Identify suitable water supply authorities and share knowledge about the employment and scaling up of SSWPs. Provide the authorities with assistance for development of an authorization and registration system of SSWPs.
2. **Monitoring:** Support water authorities in developing the capacity of regular SSWPs to monitor services and address complaints, with particular attention to water quality.
3. **Regulation:** Assist these authorities in the development of business models to calculate the appropriate tariffs, connection fees, and payment schemes to protect consumers against abuse and enable reasonable profit for efficient providers.
4. **Conflict resolution:** Offer technical assistance to the law-enforcing authorities to develop the capacity for conflict resolution regarding land usage, illegal connections, and payments between the consumers, the consumers and the provider or a CBO, or between CBOs.
5. **Training:** Support organizations with the necessary know-how to train the SSWPs on NRW and water treatment.
6. **Financing:** Provide loans via the water authorities, central utilities, or local banks to the registered SSWP that comply with given output standards. Provide technical and financial assistance to local banks and NGOs to develop consumers' individual saving and micro-financing schemes for the connection fees of SSWPs.

## **Abbreviations**

ADB	Asian Development Bank
AMC	Ahmedabad Municipal Corporation
CU.M.	Cubic Meters
CERWASS	Center for Rural Water Supply and Sanitation (Tien Giang)
INR	Indian Rupees
LGU	Local Government Unit
MOA	Memorandum of agreement
MWCI	Manila Water Company
MWSS	Metropolitan Waterworks and Sewerage System
MWSI	Maynilad Water Services, Inc.
NGO	Non-governmental organization
NRW	Non-revenue water
PHP	Philippines Peso
RETA	Regional technical assistance
SPWN	Small-piped water network
SSWN	Small water networks (alternative term for SPWN)
SSWP	Small-scale water provider
VND	Vietnam Dong
USD	Unites States Dollar

## **Currency Equivalentents**

1 USD = 43.61 IND = 45.65 PHP = 16,545 VND



## Acknowledgements

This study of SSWPs was made possible largely due to the generous efforts of **Kallidaikurichi Seetharam**, the key person in the implementation of the pilot projects. Thanks to his support, valuable lessons about the sustainability, replicability, and scalability of SSWP could be learnt. His and **Tony de Vera**'s meaningful choice of various types of systems in various contexts provided valuable data on what works and what does not. The authors would also like to express gratitude to **Anand Chiplunkar** and other ADB reviewers whose comments have enriched the report, as well as **Audrey Esteban** for assistance in administration of the study.

**Kazumasa Ozawa**, the official head of the study, and **Petr Matous** assembled and led the team to design the research framework, conduct surveys, analyze the data, develop policy recommendations, and write this report. **Daisuke Nagayama**, **Caroline Tien**, and **Toshiro Ogaki** were responsible for evaluation of the systems in India, Vietnam, and the Philippines respectively. **Hoanh Thanh Chi** was responsible for administration of the survey in Vietnam. **Kanako Yoden** contributed with her experience from ADB water studies in other countries of the region and the literature review of SSWPs. **Naofumi Suzuki** participated in the designing of the research framework and structuring of conclusions. **Mihoko Kubota** assisted with the logistics of the surveys. **Hannah Idurot** assisted with the survey administration in the Philippines and **Anjali Awade** in India. **Tsuneaki Yoshida** was indispensable in initiating the whole study.

The data could be gathered only the kind of the informants named in the appendix, support from their organizations, and cooperative project beneficiaries. The authors are grateful to them as well as to ADB who funded the study.

UTCE, Ltd.  
18 September 2008  
Tokyo

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## INTRODUCTION

### Background

17. ADB Regional studies<sup>1</sup> on small-scale water providers (SSWPs) published in 2004, concluded that city officials, formal utilities, and local banks should work with small network entrepreneurs who can immediately bring water supplies to the poor, on an agreed-upon interim basis until the water utility is able to do so. The studies concluded that ADB should join with two or three cities to test and refine these recommendations.

18. Acting on this recommendation, ADB approved RETA 6265 on October 25, 2005 which aimed to demonstrate that selected urban residents can quickly connect to piped water supply and that government, formal utility, local banks, homeowners associations can work together to make this a reality. ADB provided \$800,000<sup>2</sup> to fund the RETA and its major activities include the following, which included implementation of 4 small piped water network (SPWN) pilot projects in 3 countries ( 2 in Philippines; 1 in Tien Giang Province, Viet Nam; 1 in Ahmedabad, India). Each of these projects covers between 200 and 650 households.

19. To implement the RETA, the following countries designated the following government agencies as their country counterpart to work with ADB:

- Philippines: Metropolitan Waterworks and Sewerage System (MWSS)
- Viet Nam: Tien Giang Center for Rural Water Supply and Sanitation (CERWASS)
- India: Ahmedabad Municipal Corporation (AMC)

20. For the 2 Philippine pilots, ADB entered into Memoranda of Agreements (MOAs) with the 2 concessionaires<sup>3</sup> of MWSS. For Viet Nam, ADB had a Memorandum of Agreements (MOAs) with CERWASS and for India, ADB had a MOA with Saath, an NGO selected by both the AMC and ADB to implement the pilot. Survey consultants were likewise recruited to oversee the surveys required.

### A. Focus points

21. Decentralizing the responsibility for water distribution and payment collection can have various implications for the systems' performance. In a typical SSWN system, a number of households are served by one SSWP that receives water from a central utility or a separate source. The number of households can vary from just a few to several hundred. The SSWP collects tariffs from the consumers based on the reading on their household water meters and pays the total required amount to the central utility determined from the reading on the main meter. Therefore, any water losses inside the area are shouldered by the SSWPs and translated to the central utilities' revenue. To cover this and other operational expenditures the unit rate the consumers pay to the leader is higher than the rate charged by the provider to the leader.

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<sup>1</sup> The studies were carried out in nine cities: Dhaka, Shanghai, Delhi, Jakarta, Ulaanbaatar, Kathmandu, Manila, Cebu, and Ho Chi Minh City. These were funded under RETA 6031: Promoting Effective Water Mgt Policies and Practices (Phase 1).

<sup>2</sup> \$200,000 from ADB TA fund, \$200,000 from the Government of France and \$400,000 from RETA 6219 funded by the governments of Norway and Netherlands.

<sup>3</sup> Manila Water Co. Inc. for the East Zone and Maynilad Water Services, Inc. for the west zone

22. Figure 1 illustrates why these systems are more efficient from the viewpoint of the central utility and may have better chances for economic and environmental sustainability than standard individual connections especially in the depressed areas (Matous, Ozawa 2007).

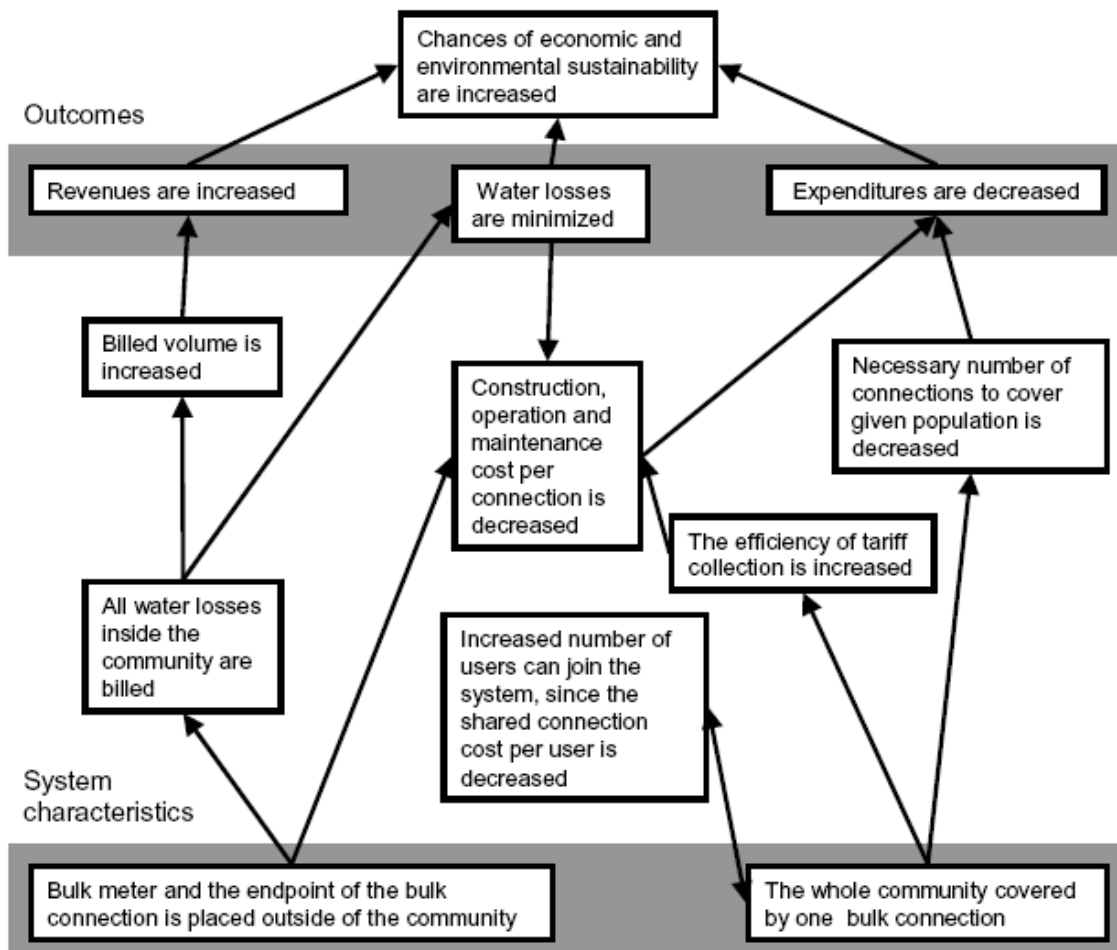


Figure 1 - The relevance of bulk water supply characteristics for economic and environmental sustainability

23. Involving SSWPs in local water supply instead of the central utilities may have the following consequences related to water supply sustainability and reaching more beneficiaries, by replicating successful cases and scaling up.

24. SSWP are better suited to reduce Non-Revenue Water (NRW) than the central utilities because of their better knowledge of the local situation. When SSWPs charge their customers for the losses incurred in the area, they motivate the consumers to become pro-active in the NRW reduction. If the SSWP is not successful in the NRW reduction anyway, it covers the losses from their own budget (which in turn is reflected in the increased consumers' payments) but the operations of the central utility are not negatively affected.

25. By cooperation with SSWPs larger urban areas may be connected to the central utility system because the utility has to deal with only one SSWPs instead of all consumers. That also saves the expenditures of the utility in the operation phase.



26. The SSWPs are more versatile than the central utility. They can adapt their operations according to the local conditions in each area and thus achieve higher efficiency.
27. SSWPs have both advantages and disadvantages in terms of legal restrictions. First, SSWPs can operate in situations where the central utility would be too limited by the government laws. Especially, where the people do not possess official titles to the land they live on, central utilities have not been allowed to enter, but the SSWPs could operate.
28. On the other hand, the current semi-official or unofficial status of the SSWPs makes it more difficult to support them, for example, by official loans.
29. To recover their initial investments, operational costs, and losses, the SSWPs usually charge additional tariff to the consumers on top of the central utility tariff. Thus, even the lowest income consumers connected to these systems pay more than high-income consumers who enjoy the comfort of individual direct connections to the central utility. Since the SSWP are generally not regulated, they may abuse their monopolistic position in the area and charge excessive fees to some or all of their customers. Also, if the SSWN system happens to operate ineffectively because of the SSWPs' low competence, the consumers shoulder the costs.
30. Previous research has found that even the SSWNs that are implemented and operated exclusively by the members of the local communities ("community-based systems") tend to suffer from high internal inequalities (Matous, Ozawa 2007). People with the best social connections within and outside the community, or the best individual social capital (Bourdieu 1986; Lin 2001) tend to get the best access to the benefits from the community-based water supply. On the other hand, the socially excluded ones are more likely to be also excluded from these systems, which would not happen in the standard system where individual consumers are directly connected to the central utility by individual connections.

## **B. Study objective**

31. The objective of this study is to assess outcomes of the SPWN projects and review related documents and literature to provide actual policy recommendations for ADB related to their "replicability", sustainability, and scalability.
32. This study aims to learn from the experience of RETA 6265: Implementing Pilot Projects for Small Piped Water Networks in India, Vietnam, and the Philippines to find which SSWN system characteristics contribute positively and negatively in which context. The challenge is quick implementation of large numbers of water supplies that have the positive economic and environmental sustainability characteristics of some SSWN and are socially inclusive at the same time.
33. There are many types of SSWPs involved in the sector, whose level of investment, initiative, financial risk, type of relation with central utilities and the resulting level of service vary considerably. The focus of this study is on the SSWPs who pioneer and operate piped water networks.
34. There is no question that it is more beneficial for the consumers to be connected to a small piped water network than to rely on expensive vended water or distant stand pipes. The rationale for this study is not to repeat the obvious fact that implementing water supply in low-income areas brings high social benefits but to identify which characteristics might be changed

to increase the potential for their sustainable large-scale implementation in the future. In this study, the advantages and disadvantages of engaging SSWPs and SPWN systems are evaluated in comparison to the traditional style of piped supply in which central utilities deal directly with individual consumers. After the literature review (chapter 2) and methodology (chapter 3), chapters 4, 5, and 6 describe the situation in the studied cases and their respective estimated potential for sustainability. Replicability and scalability is context dependent - different system characteristics are optimal in a different context. Therefore, these are generally discussed (in chapter 7) after the review of outcomes of all studied SPWNs in the different local contexts. Conclusions and recommendations for ADB are in the final chapter.

## **II. REVIEW OF SMALL-SCALE WATER PROVIDERS AND SMALL WATER NETWORKS ENGAGEMENT IN WATER SUPPLY**

35. Idea of small-scale water providers (SSWPs), a form of water supply services, is not new. They have existed where water supply services are deficient. It is a dynamics of society generated by those who need water and are willing to pay for it, and those who offer it.

36. Small-scale water providers are independent small companies, cooperatives, community groups or individuals that supply water to users (ADB 2004). They have played an increasingly vital role, thus filling the gaps left by the public sector. They are typically informal entrepreneurs, community-based organizations and NGOs.

37. While it is not a new form of services, SSWPs' roles had not been fully recognized or appreciated by government policy makers and donors, but their importance in the water sector is attracting an increasing level of attention from researchers and planners in NGOs and development agencies. In fact, quite a number of researches were conducted to understand them in the past 10 years, and several attempts have been made to incorporate SSWPs formally in development works and to make use of their strengths in serving water for low-income communities, especially in cities with large service backlogs.

38. In this chapter, an overview of SSWPs is provided, i.e. their roles in the sector, advantages and weakness over formal water utilities, constraints and risks, and scope for the future.

### **A. Formal water utilities and SSWPs**

#### **1. Limitations in formal water utilities to provide water to the urban poor**

39. Large-scale water supply utilities are conventionally recognized ones who formally provide water. However, in developing countries, water utilities have rarely achieved universal 24-hour piped water services. Millions of people, especially the poor, remain with meager or no service at all. The main reasons are: poor and inadequate WSS policies at national and local government levels; low and irrational tariffs that benefit the non-poor and disadvantage the poor; and legal and other institutional impediments in serving the poor, especially lack of land tenure (ADB 2004).

40. Although mandated to serve poor households, water utilities have less incentive to expand their service to low-income areas. Their service levels are often not tailored to demand of low-income households who consume less water. A conventional regulation does not allow communities without land title to have formal access to water services. The low-income households often dwell in peripheries of the city or disadvantaged areas, which raise cost for utilities' laying of piped-networks. Consequently, formal water utilities find that to serve low-income areas by making great efforts does not pay for them. In addition, the high installation cost is always an obstacle for those whose income is low and irregular.

## **2. Small-scale water providers**

41. Unlike formal water utilities, SSWPs can be more flexible and dynamic to serve such low-income areas. Technologies used by them are not necessarily high or innovative, but have advantages over water utilities in several points.

- Flexible response to the needs of their consumers.
- Access to areas not covered by formal water utilities.
- Profit-oriented, which makes their services efficient. For example, they maintain low non-revenue water.
- Flexible billing systems, often customized according to their customers' income characteristics. In addition, they have knowledge about their business locality and achieve minimum technical and commercial water losses.

42. Despite their vital roles, particularly in areas with low levels of service, most of them work without formal recognition from local authorities and are not subcontracted by the main water utilities.

## **3. Potential of SSWPs to contribute to universal services in the mainstreams**

43. The rise of SSWPs reflects the inability of water utilities to adequately provide water to the urban poor. In this sense, SSWPs have a potential to complement the role of formal water utilities in achieving universal services. This indicates that SSWPs can be an intermediary to enable low-income communities to access water. In addition, considering growing urbanization in developing countries, their role as an intermediary would be more valuable to quickly provide water to low-income communities.

44. In response to this, several pilot-projects and researches have been carried out in African, Latin and Asian countries, in order to learn lessons from practical cases. (ADB 2004, Solo 2003, Collingnon 2000) Most of them sought a way by which officials, such as water utilities and local authorities, and SSWPs work together in partnership for the same goal. Another focus was to show the possibility of a wide range of institutional arrangements based on local contexts as follows.

- How a partnership among city officials, formal utilities, local banks and SSWPs should be;
- What constitutes an acceptable quality of service for the poor at affordable prices;
- Who take over responsibilities of the service;
- How the public sector facilitates those discussions to meet the demand of the poor; and
- What a suitable regulatory framework for effective regulation of operations by multiple providers, if necessary.

## **B. Types of SSWPs**

### **1. Self-produced provider or reseller**

45. There are several dimensions to understand SSWPs. First, SSWPs are categorized by whether they produce water by themselves or resell water that is produced by a formal water utility. The former usually takes water from rivers or their own deep-wells and deliver it by

tankers or mid-sized cans, such as jerry cans. The reseller, in most cases, draws water from water utilities and provides it at times and places that water utilities are not unable to serve, by a track, a cart, or a fixed small-network. They have a great potential to be a partner with formal utilities, especially in cases where a formal utility fails to provide water to a certain portion of the city population or finds difficulties in expanding their services to certain areas from a legal viewpoint.

## **2. Type of entity**

46. SSWPs can be categorized by type of entity. SSWPs can be small companies, cooperatives, individuals, or community-based organizations. They are independent to the extent that some are self-employed entrepreneurs or artisans. Most of them are not subcontracted with formal water providers.

## **3. Mode of delivery**

47. SSWPs can be classified by how they deliver water to their consumers as follows, which would be the most useful classification for policy purposes.

- Kiosk and standpipe
- Vendor or tanker
- Fixed small piped-networks

48. Kiosks/standpipes can be in an individual's property or shop. This type is a very efficient means of water distribution, especially in cities with limited water resources and households expect to use the water only for basic purposes. In African countries, they are authorized to sell formal utilities' water or are subject to regulations, tariffs and other conditions imposed by a formal utility.

49. Vendors/tankers deliver water to customers' homes by a cart or truck. Home-delivered water is more expensive than that purchased at kiosk/standpipe but the customers are often willing to pay for such convenience instead of waiting in a queue and carrying heavy buckets.

50. Providers using fixed small piped-networks bring piped-water from their own sources (it could be water from water utilities) to communities where water utilities have not yet extended their networks. They offer greater convenience and service quality to their customers, but they are more exposed to expropriation as well as financial and regulatory risks. Their prices vary with the availability of water, distance to the piped network, the season, and the customers' willingness to pay. However, the price is relatively lower than kiosks and vendors. In the next section, we will focus on this type of SSWP, the scope of this TA, and discuss their advantages, weakness, risks, and regulation issues with respect to price.

## **C. The piped-network services operated by SSWPs**

### **1. Piped-network services operated by SSWPs are supposed to be efficient, effective and responsive**

51. Business of piped-network services by SSWP exhibit a wide range of diversity from one country to another. According to the reviewed literature, they are efficient, effective and responsive (ADB 2004). Because of their profit-oriented nature, they are efficient in managing their operations, indicated for example by extremely little non-revenue water. As “locals” they tend to reach low-income families whereas utilities can’t or won’t be flexible in dealing with late payers. It means that their business is not affected by customers’ tenure status, monthly income, or the community size. Their advantages are in tailoring services to local needs and environments.

52. Another type of small provider, who may not be strictly qualified as “small” or “independent”, is a contract operator or user cooperative. It is a case in which a local government decides to transfer or contract out the water supply services to third parties who are in charge of operating and maintaining the system (Solo 2003). Their water rates are usually regulated and are required to meet performance standards defined by the authority. This might not be strictly a case of independent entrepreneurs but it is true that they serve as an intermediary between main utilities and households with low levels of service. Their activities have quite valuable implications for promoting SSWPs in the mainstream of the water supply sector.

### **2. Investments**

53. SSWPs’ investment capital comes either from their equity or loans from friends and family. It is significant to note that they rarely rely on public funding or soft loan. Bank finance is difficult for them to access mainly because (i) banks will not lend to non-legal and informal business, (ii) banks are skeptical about businesses selling water to poor households, and (iii) water supply systems are not regarded by banks as valuable collateral. (ADB 2004)

54. To reduce investment and operational costs per connection, small networks use low-cost technologies that suit their customer base (ADB 2004, Solo 2003). They usually use cheaper materials, reduce connection security levels and simplify pipe laying structures.

### **3. Operation and management**

55. One of the piped-network operators’ strengths is their closeness to their customers. They do not require guarantees or land deeds, which is an important advantage over formal utilities, usually requiring that their customers have official land title. They are also good at adapting their business model in terms of service level and billing. For example, network connection fees are typically lower than a formal utility (ADB 2004), while it is a major obstacle for low-income households when connecting to a formal water utility.

56. Billing arrangements of small-scale piped-network operators are more flexible than those of formal water utilities. Network operators tailor their billing system to their customers’ income

characteristics. They collect fees daily, weekly or monthly and do not follow the water utility practice.

#### **4. Constraints**

57. SSWPs have some difficulties and constraints in their business model. Several reports mention that their informal status hampers SSWPs (ADB 2004, Solo 2003, Collingnon 2000). Formal recognition and licensing by local authorities and the main water utility would be favorable to more investment and expansion of their business. They avoid long-term investments because their property is unprotected when located in unplanned settlements. The risk of expropriation forces operators to shorten payback period. The status without formal licensing and regulation increases their operation costs and raises the rates they must pass on to customers.

58. Another constraint is the high bulk water charges of the main water utilities, which result in penalizing SSWPs' businesses. Without special negotiated rates, a small network business is charged the rate of a commercial consumer despite its purpose to supply low-income communities. Higher bulk water costs are passed on to low-income customers. Even if the rate of a domestic use is applied, the tariff charged would become excessively high in case of an increase in block tariff.

#### **D. Summary**

59. ADB regional studies on small-scale private water providers published in 2004, concluded that small private water supply piped-networks are more efficient than other types of SSWPs, justifying that only small-scale piped network is able to give underserved households what they want most and are willing to pay for. In the studies, two main recommendations are listed for creating an environment which includes small-scale piped networks in city development so that main utilities and small operators can collaborate: (i) to map how they collaborate with proper licensing and regulation; (ii) to enable legal and contractual environment by framing necessary and adequate regulations.

##### **1. Map of the collaboration among main utilities and small operators**

60. The mapping starts by recognizing the vital roles of the piped-networks and that integrating small operators in local investment plans would accelerate network expansion. The relative strengths and weakness of main utilities and small operators underpin tremendous collaborative potential. Utilities can exploit economy of scale to provide water at a relatively cheaply rate. However, there are some areas that utilities can not enter or are not competitive. Such areas are where small operators make a strong showing. They are able to manage the system flexibly with a lower risk than utilities in providing water upon immediate demand.

61. At first, SSWPs should be included in a blueprint of infrastructure development. Then, it may be useful for the local government and water utility to delineate and declare underserved areas where small operators would be encouraged to operate. In the process, the local government might be responsible for setting the level of service and how local authorities and civil society are to participate in order to achieve the most appropriate definition of the priority areas. The process should enable customer monitoring of service performance, including feedback and reporting mechanisms from the field to local authorities and the regulator.

62. The viability of the service (good quality service to the people) depends on clearly written contracts that define the operator's financial autonomy and obligations, which is to protect consumers. Another rationale for regulating SSWPs is rooted in public health concerns over the quality of water they provide (WSP 2004). The ADB studies' results point to the possibility of local government and utilities engaging local private water network operators to deliver water at prices that are not inflated by unfavorable legal and business conditions, including (i) direct contracting, where the city government contracts an operator to produce/distribute water at prices that are not inflated by unfavorable legal and business condition; and (ii) sub delegation, where the main utility sells water in bulk to a local network owner/operator. In the later scheme, the bulk supply pricing could reflect the savings accrued to the utility by foregone capital investment and O&M costs. Presuming a financially rational tariff regime exists for the utility, the bulk supply rate to the small operator could be less than the lowest block tariff to individual customers.

63. Tariffs are also important issues in the regulation because there is a real risk of overcharging, especially if the operator has a monopoly. It is therefore important to put in place not only checks, but also a regulating mechanism to ensure adherence to the contract. In fact, some research (e.g. Collingnon 2002, Solo 2003) shows that tariffs of services by independent network operators usually remain low or reasonable for customers. However, that is the case only when the market for water services is competitive. Therefore regulation to make the market open to competition has to be established. In case a scheme that does not allow a competitive market is applied, there should be alternative mechanisms to avoid unregulated prices, keeping prices reasonable and affordable for the public.

64. On the related issue, connection fees could be a great hindrance to poor households in accessing the water supply, such as in the case of normal piped-network connection. In the system of small-scale piped networks, they might still serve as an obstacle for the poor. In such case, special arrangements, for example to introduce the connection fees as part of the total investment plan to be paid by customers, would be necessary.



### III. EVALUATION METHODOLOGY

65. The main objectives of this study are to evaluate the potential of the pilot systems for sustainability, possibility for replication in other areas, and to scale them up. The framework of the evaluation is shown in Figure 2.

66. First, an agreement on the meaning of these terms in this study has to be made. Practical definitions which enable establishment of feasibly assessable indicators are proposed in the next chapter of the report. The indicators are chosen based on experience from previous studies about various types of SSWNs and the previously formed hypotheses about their positive and negative implications in comparison to standard individual systems. These indicators enable the evaluation of the potential of the pilot SSWN in achieving sustainability, “replicability”, and scalability relative to the individual systems.

67. Selecting the indicators determines which data are necessary for the evaluation. Primary data have been gathered to supplement the completion reports. The level of detail of information in the completion reports varies considerably among the pilot systems. The primary data gathering was designed to supplement the missing data and to provide all other necessary data for computation of the evaluation indicators.

68. The potential for sustainability is estimated based on current performance of each of the selected cases within the pilot systems.

69. “Replicability” of the pilot systems is evaluated by comparison of the performance of various cases under various conditions.

70. Scalability of the pilot systems is evaluated by comparison of the performance of the various cases in relation to the way they were implemented, and the burden and demands that this way of implementation places on the local institutions.

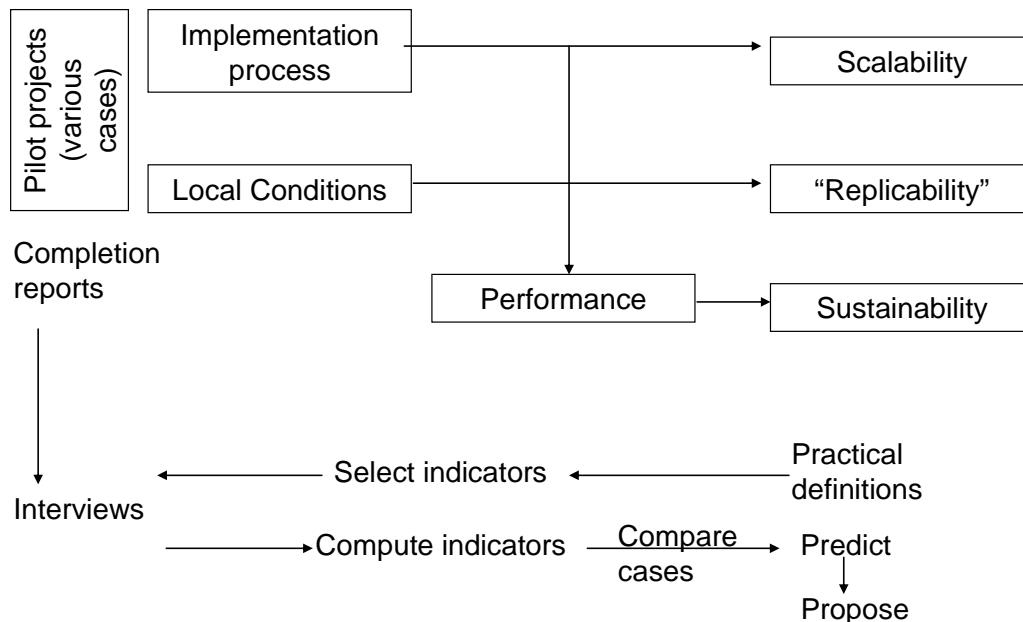


Figure 2 – Evaluation framework

## **A. Indicators of sustainability, “replicability”, and scalability**

71. The objectives of this study are to evaluate the potential for (1) sustainability, (2) replicability, and (3) scalability of the implemented pilot SSWN systems. The following section introduces specific indicators to evaluate these abstract concepts.

### **1. Sustainability**

72. To evaluate the potential of the pilot systems relative to the centralized pipe systems, the following indicators will be considered.

73. The main expected positive impact of introducing the SSWN systems, is in its impact on Non-Revenue Water (NRW). NRW is the main plague of Asian piped water supplies and possibly their highest obstacle to sustainability. The SSWP are expected to reduce the physical water losses by monitoring the pipe works in their area and motivating the customers to do so. They are also expected to reduce the legal losses by keeping closer contacts with their customers and by activating the peer-pressure.

74. Reducing the actual physical losses has implication for the environmental sustainability by reducing the pressure on the water resources and also the financial sustainability of the central utility by reducing the necessary capacity of the main lines, and the volume of water to be treated and pumped.

75. Reducing the legal losses, by cutting down on illegal connections and improving the collection effectiveness of the payments, the financial sustainability of the central utility will be improved.

76. A SSWN system is considered socially sustainable depending on the affordability and equitability of the total tariffs paid by the beneficiaries, i.e. the tariffs charged by the central utility plus the actual surcharge required by the SSWP. Special focus is on whether all social groups and individuals benefit from the projects, and if not, why not? An indicator of the accessibility of the different groups of consumers to the benefits of the pilots will be developed for the evaluation.

77. In summary, the main indicators of sustainability used in this study will be the physical and legal water losses and the actual payments of the consumers. The data on the losses will be obtained from the SSWP. The data on the actual payments will be obtained from selected consumers and the SSWP.

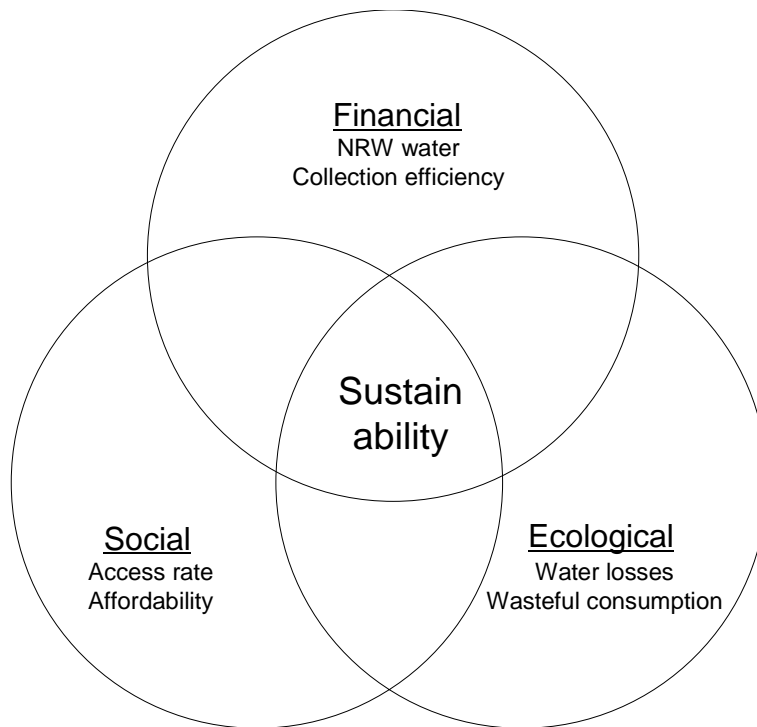


Figure 3 – Dimensions of sustainability and their main indicators

## 2. Replicability

78. The “replicability” of the pilot systems in this study is understood as the potential for sustainability of the systems in different contexts.

79. Reportedly, the pilot systems had to be adapted to the local conditions during the implementation process. How the implementation process was affected by the local physical, social, legal, and institutional conditions has been examined by semi-structured interviews with the stakeholders involved in the process. The relation between varying contexts and the SSWP performance will be judged on across the studied cases. The systems’ performance is considered as good if the systems have high potential for sustainability (described in the previous section). Thus, the systems’ performance too is evaluated based on the level of physical, and legal water losses and the efficiency and equitability of the SPWN’s operations, measured by its tariff subcharge. The evaluation scheme of the SSWN systems’ replicability is displayed in Figure 4.

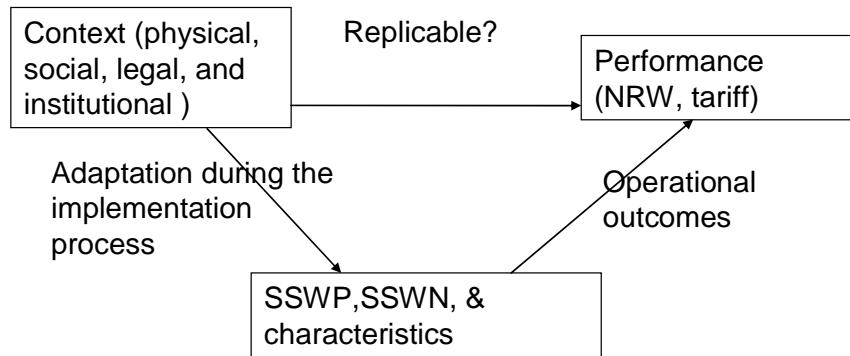


Figure 4 – Evaluation scheme of the SSWN systems “replicability”

### 3. Scalability

80. Scalability is understood in this study as the potential of multiple SPWNs to be implemented simultaneously, and thus reach more beneficiaries. Scalability is not the potential to make each SSWN larger. It is understood that there is some optimal size of the SSWN in each context and trying to reach more beneficiaries by increasing the size of each system would inevitably result in losing the positive aspect of the “*small-scale*” water network systems. It is considered in this study that the more systems that can be properly implemented by institutions of a given capacity, the better the systems are in terms of scalability. Such defined scalability is crucial for achieving MDG10.

81. Through interviews with the representatives of stakeholders involved in the implementation process, possible obstacles to the large scaled implementation of the SSWN system have been identified. Furthermore, it has been examined which SSWN systems’ characteristics and which way of implementation would be appropriate for various local institutional arrangements.

## **B. Primary data gathering**

### **1. Selection of informants**

82. The time limitations of the study would not allow an in-depth evaluation of all of the implemented systems in all areas on all people. It is neither feasible nor meaningful to try to estimate the impacts on the targeted population, by random sampling of the systems and the intended beneficiaries. Since the study purpose is to predict the pilot systems' potential for sustainability, "replicability", and scalability, the mechanism of SSWN had to be explored. Exploring the mechanism means to uncover which systems' characteristics lead to which outcomes under which conditions. To see these relations within the small number of cases, the systems and individuals with diverse characteristics needed to be purposefully selected.

83. Based on previous research (Matous and Ozawa 2007), it could be assumed that some individuals within the area obtain a direct connection from the SSWP, some obtain piped water from their connected neighbors or landlords, and some remain unconnected. The sample for this study will be selected from these three layers. Altogether, ten to fifteen consumers have been interviewed in each country. The individuals were selected from various parts of the water supply area. For example, in the Metro Manila East zone, the study area is clearly divided into small zones by streets. One person without a water connection was interviewed in each street to identify the reasons for not being included in the system. A household representative was the household member who is most involved in the water provision to the family. If that individual was not available during the time of the survey, another household member was interviewed. The main purpose of the interviews is to identify which individual characteristics combined with which SSWN characteristics lead to a direct connection, an indirect connection, or non-connection of each household.

84. In addition to the consumers and the SSWPs, the following informants have been asked for an interview. The main stakeholders could be identified and their relationships have been mapped.

- The pilot project officer (ADB)
- The international consultant
- The local consultants
- Representatives of local governmental units
- Representatives of the local banks which involved in the scheme
- Managers of the central water utility (if present)
- NGOs or CBOs involved in the scheme
- Investor/entrepreneur - water business run by non-water people

85. The actual list of interviewed stakeholders and experts in each country is in the appendix.

86. The semi-structured interview forms were adapted for different stake holders. Only the questions that are relevant for the particular informant were asked. The main interview models include questions about (1) the local context, (2) the implementation process and the institutional capacity of the stakeholders involved in the implementation, and (3) outcomes and performance.

### **2. Interview structure**

87. Information gathering by following typical fixed-form questionnaires may be misleading without good prior knowledge of the local context. To obtain the necessary information without imposing the researchers' hypotheses about the topic on the informants, semi-structured interviewing has been chosen. To learn about the internal mechanism of the SSWN as perceived by its members, it is necessary to get people to talk about as much as possible about how they view their water system. The interviews started with general questions and became gradually more focused according to the plan of all topics and subtopics that needed to be covered. The interviewer was keeping a track during the interview which of them had been covered by the speaker.

88. Framework of topics and subtopics for the semi-structured interviews is based on the overall evaluation framework as displayed in Figure 4. (See the appendices for the interview framework.) The semi-structured interview questions are divided into three categories: social context, SSWN & SSWP characteristics, and project outcomes.

89. The main purpose of asking about the social context was to explore the level of perceived cohesion in the project area which helps smooth implementation of SSWN, operation of SSWP, and free-riding and conflict prevention. The perceived social cohesion was inquired by questions on the area's history, movement of inhabitants, social diversity, social control, public safety, general trust, and organized social events.

90. The main purpose of asking about the SSWN and SSWP characteristics was to identify the technical parameters of the SSWN, learn about the leadership and enforcement of rules in the system, management capacity and baseline skills of the SSWP and its way of collecting payments, as well as promoting a sense of ownership among the consumers.

91. Answers to the previous two categories of questions highlight the relationship between the local context and the SSWN and SSWP characteristics which were chosen during the implementation process. Understanding which adaptations to the local conditions had to be made during the implementation process enables us to draw lessons for future scaling up of the systems.

92. The third category of questions that the representatives of the main stakeholders and the selected experts were asked is about the actual outcomes of the studied water supply projects in terms of water availability and the financial performance. Available measured quantitative data have been obtained. These include data on water supply coverage and pressure, SSWPs' financial balance sheet, payment collection efficiency, and NRW. In some cases, some data are missing because of the lack of monitoring by the SSWP.

93. Understanding the sustainability-related performance of the system is necessary to identify which of the SWP and SSWN characteristics found are recommendable in which contexts. Based on these findings, lessons for replicability in various contexts have been made.

94. The focus of the consumers' interviews (appendix) is the micro-mechanism of the water supply systems, which needs to be understood for estimation of their potential for social sustainability. Their main goal was to identify who benefits most and why. First, respondents' personal characteristics including their human and social capital were identified. Then, questions about their gains from the new water systems in terms of priority in access to water and financial profit from reselling were asked.

### 3. Interviewing process

95. Several repeated interviews were conducted with each SSWP, every interview taking around two to three hours. To maximize the likelihood of cooperation of the consumers, their interviews' lengths were minimized so that all of the main questions could be asked within fifteen minutes. After the informants say all they have to say to all raised topics, the researchers pointed out if there are some discrepancies in their answers, shared additional information with them, and recorded their reaction on this feedback (Figure 5).

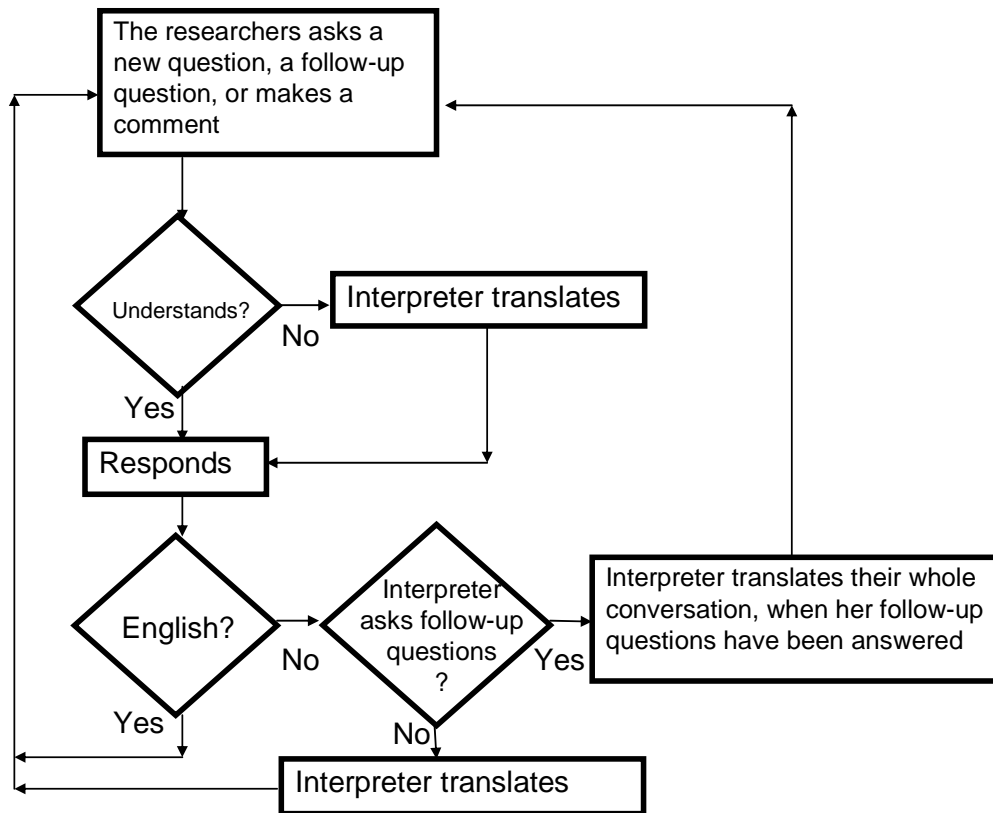


Figure 5 - Multilingual interview cycle

96. A local interpreter simultaneously interpreted all interviews. The whole process was tested in each country before the actual survey. For more reliable comparison, the survey leader was present at all of the interviews. The researchers were also taking notes during the interviews so that the informants could see them. The informants could point out any discrepancies if they didn't agree with the way their statements were interpreted. Drawings were used extensively for description of complex issues.

### 4. Field visits

97. The interviews were carried out together with observations of the pilot systems during three field visits; one to India, one to Vietnam, and one to the Philippines.

98. A field visit to each of the countries lasted around 10 days. For comparison, two areas (two different contexts) have been visited in every country. In the Philippines, the pilot projects in the East Zone and one case from the West were evaluated. In Vietnam, the pilot projects were implemented in two communes and both were evaluated. In India apart from the single

ADB pilot project (which was not yet in operation during the study), another finished program of the same organizations in another area was also evaluated.

99. The data gathering was carried out by the international team, a local research assistant and an interpreter. The first field visit was in the Philippines. All the members from the international survey team participated in the Philippine survey to develop a consensus on the methodology, which was later applied consistently also in India and Vietnam. The survey leader from the international team was responsible to supervise all the data gathering in all countries, to assure the maximum consistency of the investigation methodology and to enable critical comparison of the systems' performance in different contexts. Therefore, the surveys were scheduled not to overlap.

100. The semi-structured questionnaires were tested and finalized during the first survey in the Philippines and applied in the same form in India and Vietnam.

### **C. Analysis of sustainability, “replicability”, and scalability**

101. The obtained primary data will be combined with the secondary data from the completion reports and other related documents.

102. The analysis has been carried out by cross-sectional comparison of the performance of selected systems, with different characteristics, which were implemented in different ways in different local conditions. The comparison will be carried out among the pilots to see the relative advantages of different approaches in different conditions.

103. The difference between the two SSWN systems evaluated in each country is in terms of the social conditions of the area, and in some cases the SSWP, the central utility, and the local consultant. The SSWN systems from different countries are also different in terms of capacity of local institutions and national culture.

104. Evaluation of the situation in the areas before and after the pilot systems introduction, or comparison with other areas without piped systems, is irrelevant and is not carried out.

105. The indicators of performance, illegal and physical NRW and accessibility, are assessed for each case. The potential of the pilots for sustainability is evaluated relative to each other.

106. Comparing the performance of each system in relation to the local social conditions will illuminate which arrangement works in which conditions. This provides lessons for “replicability”.

107. Qualitative narratives of the stakeholders about the implementation process also enable the identification of which elements of the process place the highest burden on the local institutions. Through this, the limits to scalability can be found and proposals for least demanding way of implementation, which enables introduction of a large number of SSWN simultaneously, can be made.

108. This enables one to propose policies as to what type of systems, in terms of water supply functions and tasks distribution, lead to sustainability under various local conditions. Implications for large-scale implementation of these systems under various institutional constraints will be made.



109. The findings about the context, the local project characteristics and the sustainability related outcomes of each project have been summarized. Tables are visualized in the diagrams to highlight their relevance.

## **D. Study schedule**

### **1. Phase 1 – preparations**

110. The tasks in this phase were performed in approximately three weeks in April and May 2008. It consisted of the following tasks:

- a) Review the relevant RETA documents, particularly final reports/completion reports.
- b) Mobilization of local research assistants and interpreters, obtaining necessary travel documents
- c) Contacting the stakeholders/informants and asking for cooperation
- d) Preparation of the semi-structured interview forms and interview checklists

### **2. Phase 2 – field visits**

111. The tasks in this phase were carried out subsequently in approximately six weeks. It consisted of the following tasks:

- a) Contacting and interviewing the stakeholders
- b) With the help of the local consultant, an appropriate sample of inhabitants of the studied areas were selected and interviewed about the costs and benefits incurred from the projects
- c) Observation of the areas

### **3. Phase 3 – analysis and reporting the results**

112. Finally, the analysis and write-up of the findings was being performed until August 2008.

#### **IV. METRO MANILA, THE PHILIPPINES**

113. In Metro Manila, the formal water utility is the Metropolitan Water Works and Sewerage System (MWSS). In 1997, Manila Water Company Inc. (MWCI) and Maynilad Water Services Inc (MWSI) acquired the operation and maintenance of the area covered by MWSS. MWCI became the contractor for the East Zone of Metro Manila at the same time that MWSI became the contractor for the West Zone. Regional studies conducted by ADB during 2002 and 2003 revealed that only 32% of the population had water connection in Manila.<sup>4</sup> ADB introduced the pilot project of small-piped water networks (SPWN) certified by RETA 6265 to one selected area in each zone.

##### **A. Water supply in the East Zone of Manila**

114. The East Zone has approximately five million people in the cities of Makati, Pasig, Mandaluyong, Marikina, parts of Quezon City and Manila, and the municipalities of San Juan, Taguig, and Pateros. It also covers cities and municipalities in the Rizal province further east of Metro Manila. In the East Zone, 97% of the households have water connection.<sup>5</sup> MWCI's water losses (NRW) were reduced from 63% to 30% as of December 2006 after its privatization. MWCI also succeeded in increasing the percentage of customers with 24-hour water service from 26% in 1997 to 98% at the end of 2006<sup>6</sup>.

##### **B. Context of the survey area**

115. The Surveyed area, Brgy. Sitio Panghulo in Rizal, is located along the Manggahan Floodway where Manila Water Company Inc. (MWCI) started a piped network water supply service. ADB RETA 6265 introduced the pilot project to four sites including three community based organizations on the Manggahan Floodway (Chart 1).

116. The total number of target HH's is 1005 and 260 in Brgy. Sitio Panghulo. There are 19 blocks in the area, with each block consisting of around 20 residents. The area is one of the remaining regions not served by MWCII (Figure 6). The area was first inhabited in the 1980s by illegal settlers, but at present all residents have land-titles. Most of the residents work for local factories and the remaining work for sari-sari stores or water/ fish vendors.

117. The water source for this project is distributed by MWCI with alternative water sources being from private deep wells, vendors and water shared by neighbors connected to the pipe system.

118. The land in the area was developed after the immigration influx in the 1980's. Now, the streets are well managed and some even have paving due to the donations by residents.

119. There are currently three existing HOAs competing for political power, but in this project, the oldest was selected to manage the local operation.

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<sup>4</sup> The studies were funded under ADB 2002. *Technical Assistance for Promoting Effective Water Management Policies and Practices*. Manila (TA 6031)

<sup>5</sup> Project Completion Report on Asian Development Bank's "Small Piped Water Network": An MWCI Tubig Para Sa Barangay Project

<sup>6</sup> Manila Water Company <http://www.manilawater.com/>

Water source for the project	Central Utility (MWCI)
Alternative water source	Deep well, vendors, portable bulk (shared from neighbors)
History of water supply	Water from private deep well, vendors
Inhabited, density of settlement, rural x urban	Low (readjusted lands)
Main employment	Factory workers
Existing CBOs, reported conflicts	3 HOAs; conflicting for political reason among HOAs; selected one HOA for the project

Table 1 – Physical context & existing functions’ distribution

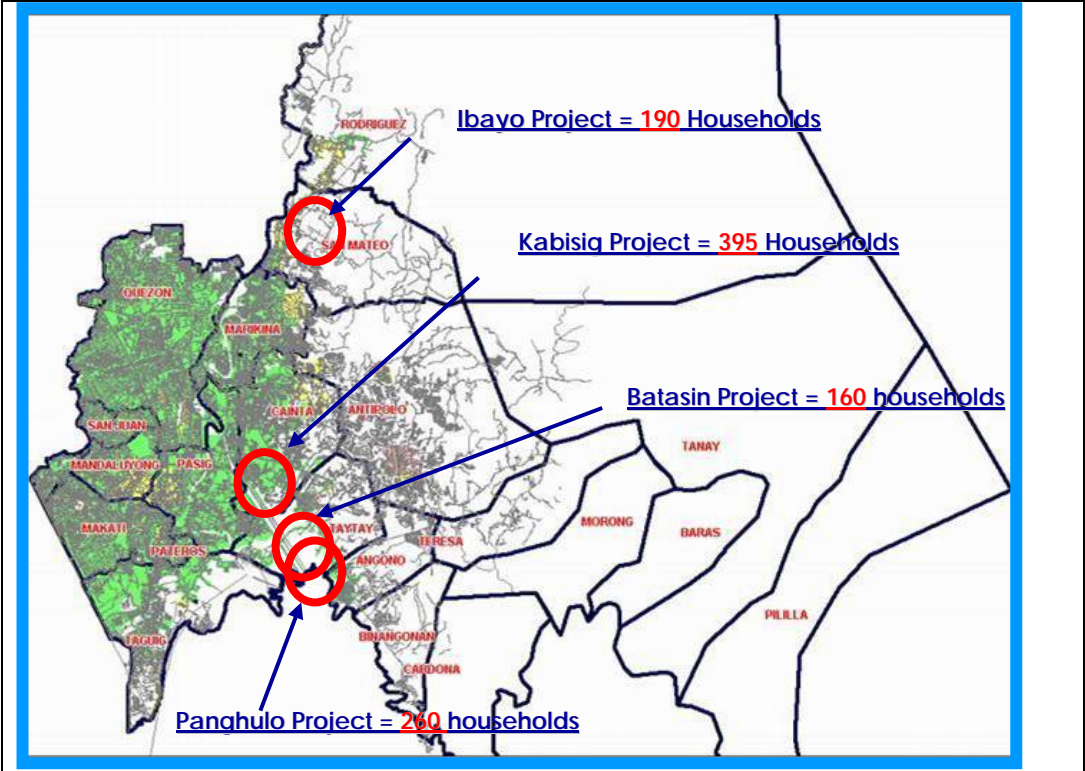


Figure 6 - Map of East Zone and the location of pilot project<sup>7</sup>

<sup>7</sup> Source: “Project Completion Report on Asian Development Bank’s Small Piped Water Network”



Figure 7 – Street meter

### C. Activities of stakeholders during the project cycle

120. In the planning phase, MWCI provided the standard technical design and quickly achieved approval from the regulator. From the financial aspect, MWCI administers the loan directly, which reduces extra costs and provides a buffer against irregular payments. A small number of stakeholders (ADB, MW, consumer representative) led the quick approval among them. There was a conflict between the three HOAs in the area, but was eventually settled through consultations and the involvement of the barangay. Finally, the oldest HOA in Sitio Panghulo was selected and asked to manage the tariff collection and the physical and legal losses<sup>8</sup>. The members of the other two HOAs, established for political purposes, joined the project for its benefits. HOA's motivation is the long-term benefits from water supply and power, rather than short-term financial profits. MWCI visited the HOA every night before the agreement and provided the block leaders with extensive training, enabling them to be well-educated about accounting methods from the start of the project.<sup>9</sup> The HOA also held a public meeting to explain the project to the community members. The Memorandum of Agreement was signed on July 11, 2006 (Figure 8).

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<sup>8</sup> interview to the community leader on 11 June, 2008

<sup>9</sup> interview to the community leader on 11 June, 2008

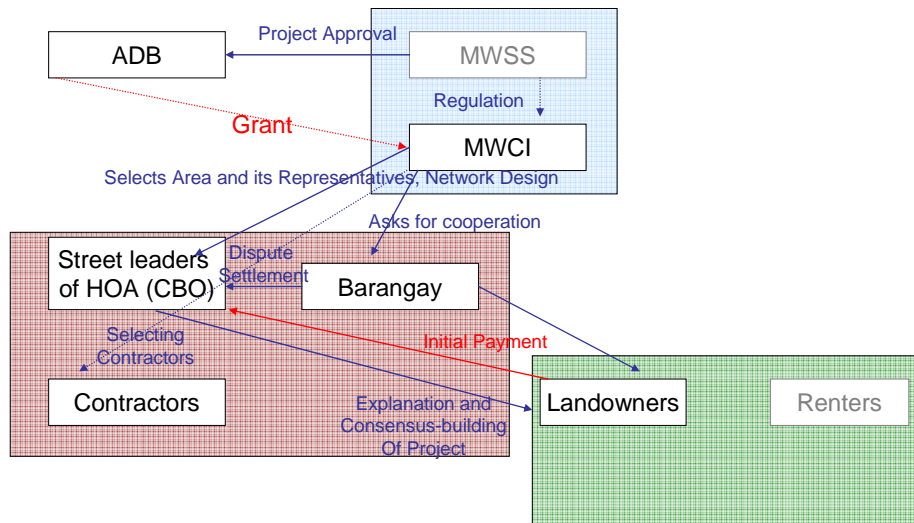


Figure 8 – Framework of stakeholders (Planning Phase)

121. During the construction phase, MWCI hired the contractor and introduced the standard system. Also, PVC pipe was set up underground. (Figure 9).

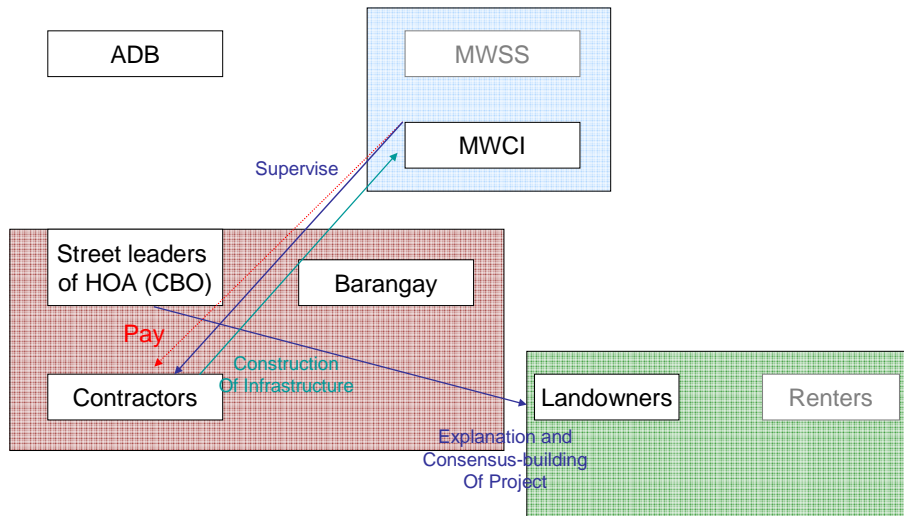


Figure 9 – Framework of stakeholders (Implementation Phase)

122. In the operation phase, the HOA selected the street leaders during one of the monthly HOA meetings. This selection was based on availability and volunteers are generally chosen first. Most street leaders are housewives, who have spent a lot of time in the area, are very familiar with the neighbors, and are generally responsible for the household's water supply. Possible requirements for street leaders are: capable in terms of free time, social connections, trustworthiness, whether they are a member of the homeowners association, and motivation for social responsibility or philanthropy. Furthermore, capable people are more prone to be selected (richer, more influence on street); also, those with more financial resources may have more philanthropic tendencies<sup>10</sup>. The street leaders get allowance from Manila Water with 2 pesos/m<sup>3</sup> to cover expenses (i.e. transportation, receipts, accounting books) but they say that it's still not enough<sup>11</sup> (Figure 10). The MWCI delegates local operations such as tariff collection and loss

<sup>10</sup> interview to the community leader and street leaders on 11 June, 2008

<sup>11</sup> interview to street leaders on 11 June, 2008

report to the community leader and street leaders. The street leader is responsible for tariff collection as well as reporting water losses on the block to the MWCI business center. Furthermore, MWCI provides support in the maintenance of the system. Water losses that are caused by physical issues such as bursts are deducted from the bill if reported immediately. Each street has a mother meter which reads all of the 20 individual household meters on the block.

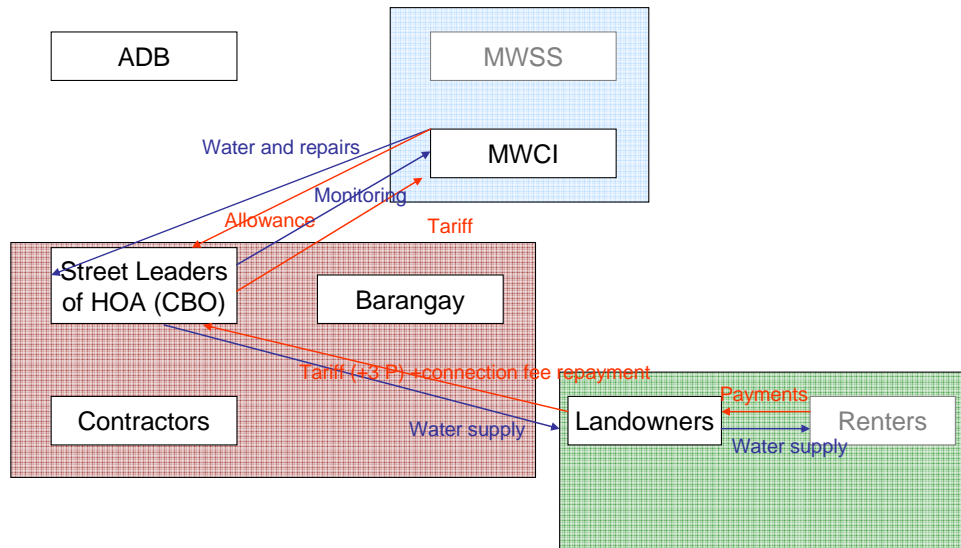


Figure 10 – Framework of stakeholders (Operation Phase)

123. The connection fee for MWCI's piped supply is divided into an initial payment of 800 pesos at the start-up stage and monthly payments of 180 pesos over 3 years, for a total of 7280 pesos. MWCI's tariff for the HOA is 10 pesos and the pass-on tariff to the community members is 12 pesos with an additional 2 pesos add-on-charge for operation. There is an average of 1-2 unconnected households per street, with a maximum of 20 households per street.<sup>12</sup> The data confirms that the communities had doubled their consumption of water when the project was completed. Furthermore, the cost of water had decreased due to lower water costs as compared to that at the inception stage of the project. The cost of water is currently almost half of what the residents were paying before<sup>13</sup>. The alternative water resource is primarily a portable bulk system that costs 35 pesos/m<sup>3</sup>.

#### D. Project outcomes

Financial	Cost Recovery	High: Low add-on-charge, but operation cost and NRW is well managed
	Collection Efficiency	High: 100% with collection by street leaders
	NRW	Low: 2% and the compensation is shared by the street members
	Subsidies	No

<sup>12</sup> Observation in the community and interview to the community leader on 11 June, 2008

<sup>13</sup> Source: Graph1 & 2, "Post Project Evaluation Report on Asian Development Bank's Small Piped Water Network"

Ecological	Water Losses	Low: Physical loss is to be reported to the business center of MWCI. MWCI provides the support for the bursts of the pipe.
	Incentive against Waste	Middle: Pay the tariff, losses are share by the members in the street
	Waste Water Disposal	MWCI is planning to introduce
Social	Accessibility	High: 1-2 HH among 20 street members are disconnected but most of them get water from families in the neighborhood or street leader.
	Affordability	High: low add-on-charge and low NRW
	Health	High: Improved than before <sup>14</sup>

Table 2 – Project outcome (MWCI)

124. Financially, especially in terms of tariff collection and water loss reporting, the street leader system works well and achieves 100% efficiency due to the cohesiveness of the community, and thus, social pressure to pay on time. Delayed and partial payments are occasionally tolerated by MWCI. The NRW is 2% and streets often cover the costs if a household cannot make an occasional payment.

125. However, the fixing political power balance of the local people, home owners and leaders can be an obstacle in the transition to a permanent system of pipe water supply from the central utility. Introducing such an independent project strengthens the power of a specific person unintentionally, even if it is motivated by philanthropy.

126. By introducing the piped network, some purified drinking water companies closed down due to competition from MWCI. This change of stakeholders should be considered in an economic context including the possibility that the local people will lose an alternative source of water.

127. In terms of ecological sustainability, water losses incurred by theft are covered by the community. Leaks, if reported immediately to MWCI, are covered by the water company. Household meters often do not function when there is a leakage, which causes 5% water loss on average (“Patak patak”). If the consumer cannot pay the bill, MWCI will publish the promissory notes. If they still cannot pay, they will be disconnected. If disconnected, the consumer has to pay 560 pesos for the reconnection fee<sup>15</sup>. Illegal connection and reselling of water are strictly prohibited, but sharing water within a family to cut the connection fee is tolerated. Furthermore, the community leader often ignores these problems to gain favour during election periods. Through regulation, the street leaders are only allowed to sell water to unconnected HHs in 20 L pails for 1 peso (50 pesos/m<sup>3</sup>). MWCI is planning to expand their focus to sanitation, now that water supply problems have been addressed.

128. Socially, the majority of the disconnected people are those with family members in neighboring areas. Furthermore, home owners who are renting out their homes often do not want to invest in a connection as they will not benefit personally<sup>16</sup>. The tariff is lower due to the community-based tariff collection and loss management Table 2 – Project outcome (MWCI).

<sup>14</sup> Project Completion Report on Asian Development Bank’s “Small Piped Water Network”: An MWCI Tubig Para Sa Barangay Project

<sup>15</sup> Interview to the MWCI officer in 11 June, 2008

<sup>16</sup> interview to the consumers in the community on 11 June, 2008

## E. Water supply in the West Zone of Manila

129. The West Zone concession area covers a total of 540.43 square kilometers consisting of 11 cities in Metro Manila and one city and 5 towns in Cavite province (Figure 1). As of December 2007, there are 703,519 water service connections (including private meters), 67,420 sewerage connections and a workforce of 1,555. MWSI receives 98% of its water from the Angat Dam and the remaining 2% is sourced from deep wells. As of June 2007, 42% of the customers have a 24-hour, uninterrupted water supply, while 40% have intermittent water due to low pressure, or no water at all due to the inadequacy of the water supply. Roughly 944,000 West Zone residents get their water from private water connections, deep wells, and water vendors<sup>17</sup>.

## F. Context of the survey area

130. The pilot project involves the service connections for the residents of 650 HH in Barangay 167, Llano, Caloocan City (Chart 1). In the 1970s the area was agricultural land and 90 % of the population came from the area. In the 1980s the area became more industrialized and 30% of residents worked in factories<sup>18</sup>. The population at present is at around 40,000. Barangay 167 is being developed by the Makawili Jay C Foundation, Inc. (NGO) under their Community Mortgage Program (CMP). The area is being further developed and the water mainline is expected to be extended into this area in the near future.

131. The water source for the project is provided by MWSI, and existing alternative water sources are private deep wells and water vendors. Previously, most of the residents purchased their water from the bulk water supply. There are several HOAs competing for political power, but the Makawili Jay C Foundation, Inc. was selected as the SSWP for the project.

Water source for the project	Central Utility (MWSI)
Alternative water source	private deep well, vendor
History of water supply	Bulk water
Inhabited, density of settlement, rural x urban	High density and narrow street; suburb
Main employment	More than 30% factory workers
Existing CBOs, reported conflicts	HOA (Makawili Jay C Foundation, Inc.); several existing HOAs conflicting for political reason

Table 3 – Physical context & existing functions' distribution (MWSI)

<sup>17</sup> MWSI <http://www.mwsi.com>

<sup>18</sup> interview to budget officer on 9 June, 2008



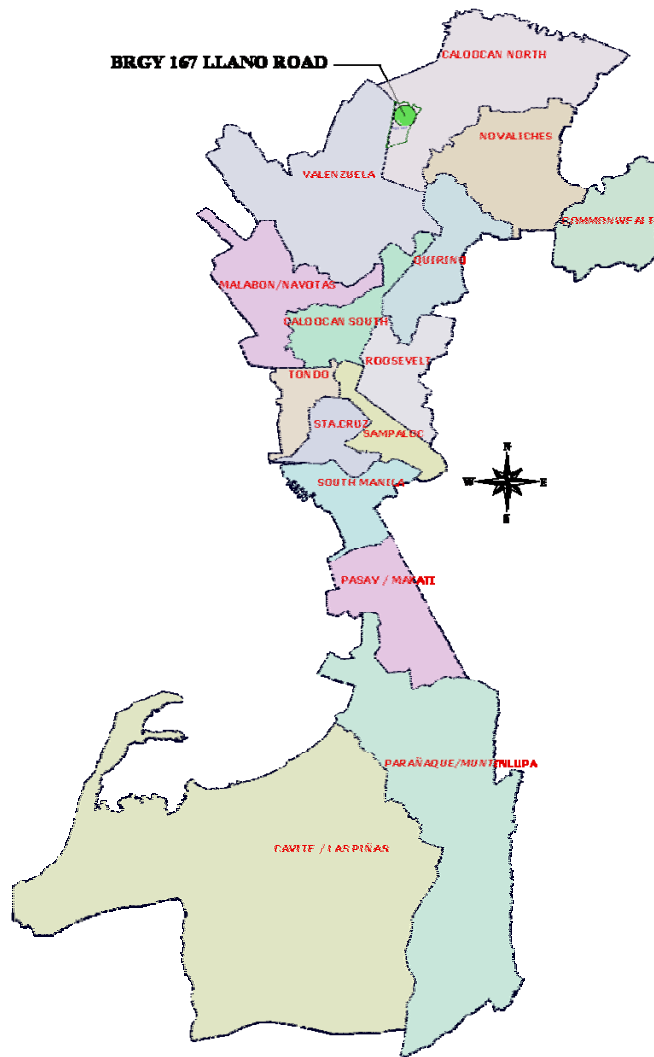


Figure 11 – Map of West Zone and the location of pilot project

### G. Activities of stakeholders during the project cycle

132. The pilot project was initially introduced by the Makawili Jay C. Foundation, Inc. (NGO). This HOA was funded through financial assistance extended from ADB to MWSI. MWSI selected Llano as the pilot project area because it was well organized, marginally poor, and located near the existing mainline. The community in Tondo was originally identified for the pilot project, but the area was too large to be supported by the ADB loan.

133. On December 1, 2005, MWSI received the request from RETA 6325 and so held a public consultation as well as consultations with stakeholders until April 2007<sup>19</sup>. The scheme was translated into a Memoranda of Agreement (MOA) between ADB and MWSI, and among MWSI, Makawili JC and Metrobank, capturing all implementation arrangements and conditions as well as defining the responsibilities of each party for the MOA, finally signed on March 2007 (Figure 13).

<sup>19</sup> See the details on “ADB Regional Technical Assistance for Implementing Pilot Projects for Small-Piped Water Networks (RETA 6265) Barangay Llano Pilot Project”



Figure 12 – Street of Makawili, Llano

134. In the planning phase, HOA hired an engineer to design the network. ADB lent the loan to HOA through Metro Bank, because MWSI was undergoing rehabilitation and thus could not directly receive the loan from any organization. The bank added a charge for administering the loan that had to be covered by MWSI<sup>20</sup>(Figure 14).

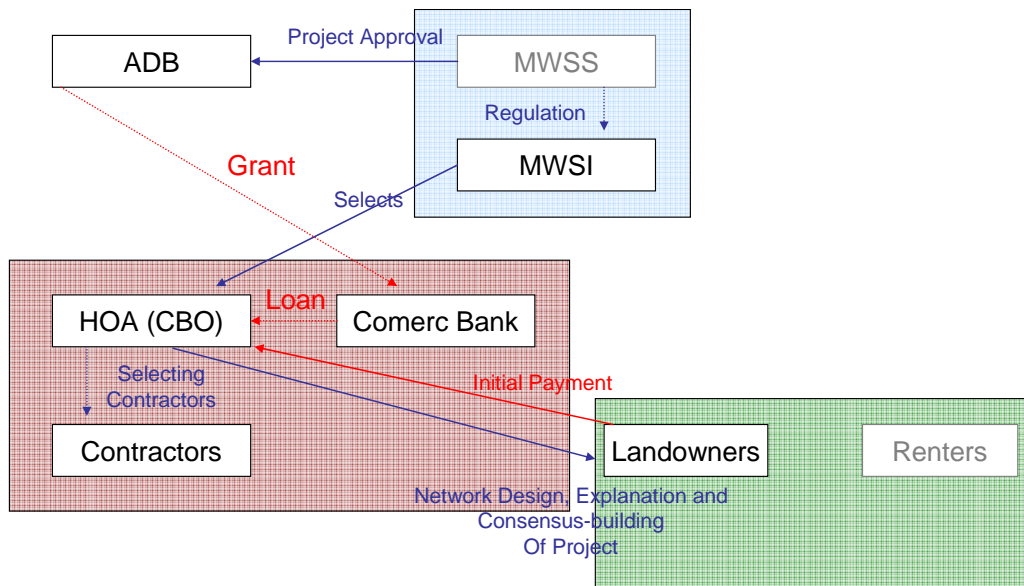


Figure 13 – Framework of stakeholders (Planning Phase)

135. In the implementation phase, the large number of stakeholders greatly increased the time for the MOA negotiation, which resulted in a significant delay compared to usual operations, even though the SWPN was an attempt to provide quick water access to the poor. The HOA gave an explanation to the landowners and managed the consensus-building, but there was still a lack of information dissemination among consumers regarding the tariff system, particularly in terms of the connection fee. This is primarily due to the fact that 60-70% of community members did not attend HOA meetings. This was due to that fact that many people hold multiple jobs, and

<sup>20</sup> interview to MWSI officer on 12 June, 2008

thus do not have time available for attendance<sup>21</sup>. As in the MWCI case, home owners have the right to decide to introduce the pipe system; on the other hand, the renters are never involved in decision making. Also, MWSI does not provide training to the HOA or its residents (Figure 15).

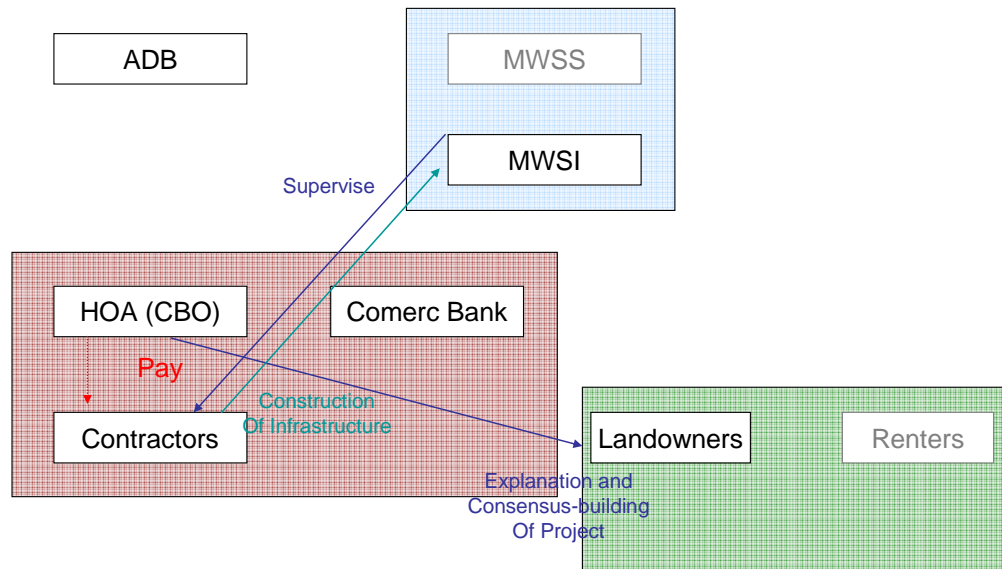


Figure 14 – Framework of stakeholders (Implementation Phase)

136. In the construction phase, the costs are doubled compared to other MWSI pro-poor projects. MWSI generally encourages residents to contribute construction labor for water supply in the “Byontoobig” Project (Community-Based Water Supply Scheme), which reduces the construction cost by 50%<sup>22</sup>. But for the ADB pilot project, the agreement was to hire a contractor for construction.

137. In the operation phase, because the tariffs are not regulated, there is a high add-on-charge that helps MWSI recover its expenditures, gain revenues, and provides a buffer against potential financial risks. The maintenance is up to the HOA and the NRW is reported at 15% (Figure 15).

<sup>21</sup> interview to the founder of Makawili Jay C. Foundation, Inc on 12 June, 2008

<sup>22</sup> interview to the MWSI officers on 12 June, 2008

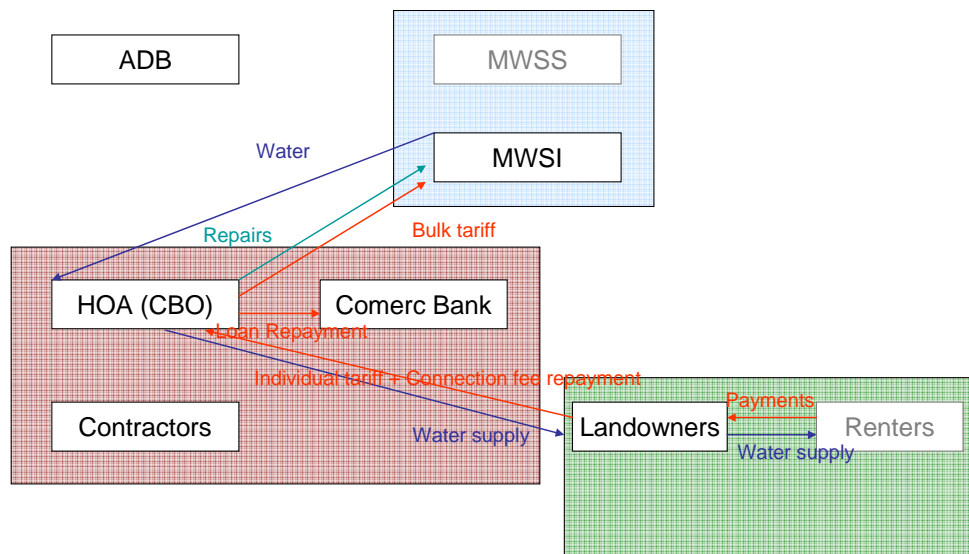


Figure 15 – Framework of stakeholders (Operation Phase)

138. MWSI provides water at 14 PHP/m<sup>3</sup> and the connection fee is 6000 PHP (1500 PHP first payment, later, 4500). Further, MWSI charges 201 PHP/month to pay back for the water meters over the course of 3 years. The existing private water supplier, Casimiro, provides water at 35 PHP/m<sup>3</sup>, with a connection fee of 4000 PHP. Filcruz (private deep well) provides water at 30 PHP/m<sup>3</sup>, with a connection fee of 500 PHP. Although bulk supply is a temporary arrangement in one of neighboring areas, individual supply was switched to bulk. Stolen water meters are a common occurrence.

139. The charge for deep well providers is just slightly higher than the MWSI tariff because the HOA intentionally charges a fee slightly higher than the competition level. However, deep-well consumers do not have to pay a connection fee and water quality was not an apparent issue, as they drank mineral water regardless of water supply source<sup>23</sup>.

## H. Project outcomes

Financial	Cost Recovery	Most of the revenue come from overcharge by 13 PHP/m <sup>3</sup> (never regulated)
	Collection Efficiency	Low: 3 collectors for 650 HH
	NRW	15 % NRW: because the loss management is totally up to HOA
	Subsidies	No
Ecological	Water Losses	Low but costs recovered by high add-on-charge
	Incentive against Waste	High: they pay the tariff with high add-on-charge
	Waste Water Disposal	No Treatment
Social	Accessibility	Low: the lack of information
	Affordability	Low: high add-on-charge

<sup>23</sup> interview to the consumers in the community on 12 June, 2008

Table 4 – Project outcome (MWSI)

140. For sustainability, the financial costs are recovered by the high add-on-charge, which is not regulated. There are collection difficulties due to a lack of human resources and effective community organization. For billing and collection, MWSI has only three collectors for the large area of 650 HH and has requested that the Business Center Head increases the number of collectors<sup>24</sup>. The management and payment of losses is entirely up to the HOA, causing inefficiencies resulting in 15% NRW. Thus, MWSI often has difficulties making the required payments back to Metro Bank. With regards to technical issues, the GI pipe implemented has a short lifespan. Socially, the incentive to pay the bill on time is low due to lack of social pressure from neighboring residents. These factors combined to result in the low financial sustainability of the system.

141. In terms of ecological sustainability, physical losses are to be reported to the business center of MWSI. Even though the pipe used is an above-ground pipe, there have been no cases of breakage.

142. Socially, 300 HH are unconnected because those houses were still under construction, according to the chairman of Makawili Foundation. (Table 4)

Financial Sustainability	
Legal Losses	
Monitoring	Low density and small area – street leaders supervise illegal connection (sharing among family is not prohibited)
Minimization	No illegal connection due to peer pressure
Connection Fee and Tariff	
Collection	Monthly collection
Explanation	HOA and MWCI is responsible for the explanation, and the residents understand the system well
Ecological Sustainability	
Physical Water Losses	
Technical Design	Standard; PVC pipe good for maintenance
Construction	Efficient Construction with constructor selected by MWCI
Maintenance	Maintenance is performed by the constructor hired by MWCI
Monitoring	Meter and loss calculation at street level
Training of the providers	MWCI provided the training to HOA
Wasteful Consumption	
Measuring Consumption	Accurate measurement with household meter and street meter
Charging based on Consumption	Average 12 pesos/m <sup>3</sup> .
Choosing an Appropriate Tariff Scheme	MWCI introduces its own system adding 2 pesos/m <sup>3</sup> for operation cost
Education on Saving of Water Resources	No; the residents have incentive to reduce

<sup>24</sup> interview to the MWSI officers on 12 June, 2008

	wasteful consumption for saving money
Water Source	
Permissions for Water Extraction	MWSS regulates the water business and MWCI is allow to extract and supply water
Social Sustainability	
Accessibility	
Information Dissemination	Formal information through HOA meeting
Conflict Resolution	Street leaders and HOA work for the conflict
Connection Fee Regulation	No regulation by MWSS; MWCI introduces their own system
Loans for Connection Fee	3 years loan: possible with full coverage by ADB grant
Affordability	
Tariff Regulation & Enforcement	No regulation by MWSS
Health	
Water Quality Control	Satisfies the high quality standard of MWSS

Table 5 – Sustainability factors (MWCI)

Financial Sustainability	
Legal Losses	
Monitoring	High density and large area; ad hoc monitoring with no inspector; stolen meter was observed
Minimization	N/A
Connection Fee and Tariff	
Collection	Monthly collection; inefficient with 3 collectors form MWSI
Explanation	HOA is responsible for the explanation but some poorer residents don't get full and accurate information of connection fees
Ecological Sustainability	
Physical Water Losses	
Technical Design	Engineer hired by HOA; GI pipe expensive and strong but difficult for maintenance and sustainability
Construction	Constructor hired by HOA costs much more than involving constructor provided by MWSI
Maintenance	Maintenance is performed by the constructor hired by MWSI
Monitoring	Only household meter
Training of the providers	No training for the residents
Wasteful Consumption	
Measuring Consumption	Household meter calculation
Charging based on Consumption	Average 14 PHP/m3
Choosing an Appropriate Tariff Scheme	MWCI introduces high add on charge for cost recovery of operation, collection and repair
Education on Saving of Water Resources	No; the residents have incentive to reduce

	wasteful consumption for saving money
Water Source	
Permissions for Water Extraction	MWSS regulate the water business and MWSI is allowed to extract and supply water
Social Sustainability	
Accessibility	
Information Dissemination	Formal information through HOA meeting with 70% attendance from total residents; some poorer residents doesn't get full and accurate information of connection fee
Conflict Resolution	HOA works for the conflict
Connection Fee Regulation	No regulation by MWSS; MWSI introduces their own system
Loans for Connection Fee	3 years loan: possible with full coverage by ADB grant
Affordability	
Tariff Regulation & Enforcement	No regulation by MWSS
Health	
Water Quality Control	N/A

Table 6 – Sustainability factor (MWSI)

143. In the studied Metro Manila cases, firstly, the SSWPs (or the HOAs) cooperate with private central water supply utilities, which aim at full cost recovery of their expenditures. Secondly, there is no established regulatory system of the SSWP in the Philippines. The first characteristic alone motivates the water suppliers to achieve independent financial sustainability. Combined with the second characteristic, however, it creates potential for abuse of their monopoly, which would make the systems socially unsustainable in the long-term.

144. Figure 16 displays the distinguishing characteristics of the Philippine cases, which are not present in the other two studied cases. Related issues are linked in the diagram. Characteristics on the left side are more related to the wider institutional context of the water supply in Metro Manila which was outside of the influence of the pilot projects. The issues on the right side of the diagram are more specifically related to the particular studied projects.

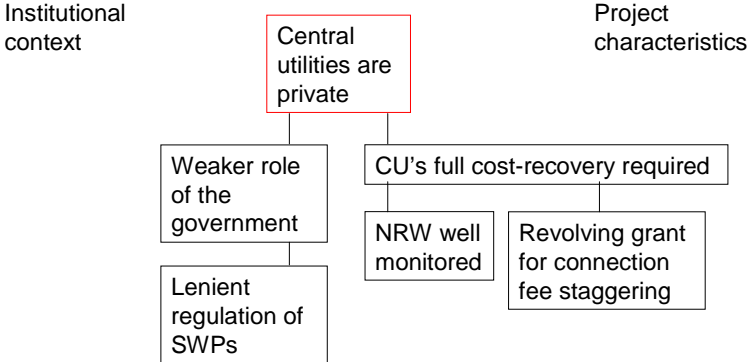


Figure 16 – Special conditions of the studied cases in Metro Manila

145. The potential negative outcomes and their relationships with the special condition in Metro Manila, compared to the conditions in the other surveyed regions, are visualized in Figure 17. The diagram shows a vicious cycle of the most blighted areas without access to basic public infrastructure. In such areas, the lowest-income inhabitants tend to install illegal water connections to satisfy their basic needs and those with official connection often fail to have the necessary cash when the monthly water bill arrives. To achieve full-cost recovery under such conditions, private operators have to take special costly measures to prevent free-riding, which subsequently need to be recovered from increased water tariffs. Moreover, since tariff regulation of the SSWP is not in place, profit driven organizations may charge their customers prices at levels far beyond the minimum for the cost recovery. The higher the price becomes, the higher the motivation is for low-income local inhabitants to seek ways to obtain water while avoiding the payments, which results in further increase of operation and maintenance costs for the provider.

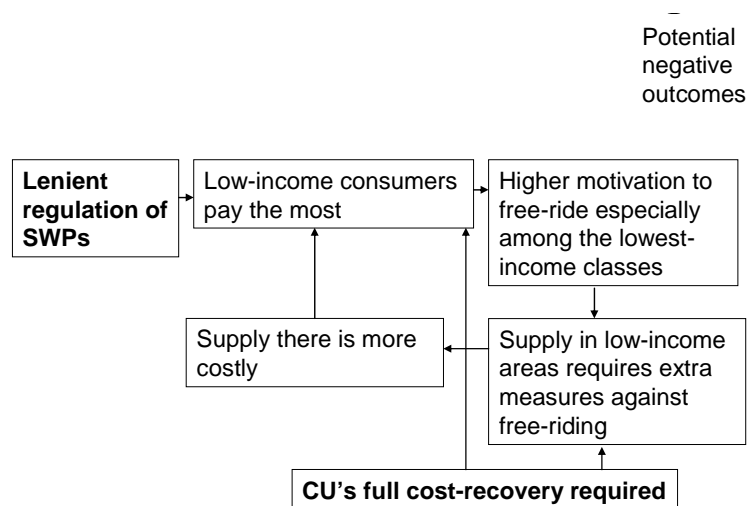


Figure 17 – Implications of the special conditions in Metro Manila

146. Many of the urban poor cannot afford the lump-sum connection fee payments. One way for them to cope with their unfortunate situation is to install an illegal connection. One unique characteristic of the Philippine pilot project helps in avoiding this regrettable but prevalent phenomenon. The ADB technical assistance has been used in the Philippines pilot project to stagger the connection fee payments over three years. When the whole connection fee is not required to be paid in one instalment, most inhabitants of the project area can afford it without straining their household budget.

## I. Comparative analysis of the two cases in Metro Manila

147. During the data gathering, it was uncovered that the Makawili Foundation, the HOA employed in the MWSI pilot project, had not been completely repaying its loan from the commercial bank, through which the ADB assistance was channelled. This is despite the fact that it has been charging higher tariffs to its customers than allowed in the MOA. Meanwhile, the MWCI case has been operating without any reported complication related to financial sustainability, although their total charged tariff is only half of the tariff charged in the MWSI area (13 and 26 PHP respectively). This section analyses the roots of the difference in the potential for sustainability in these two cases.



148. In the case of MWSI pilot project, the CBO was given almost complete responsibility over implantation and operation of the SPWN, with comparatively little influence and assistance from the central utility (Figure 18).

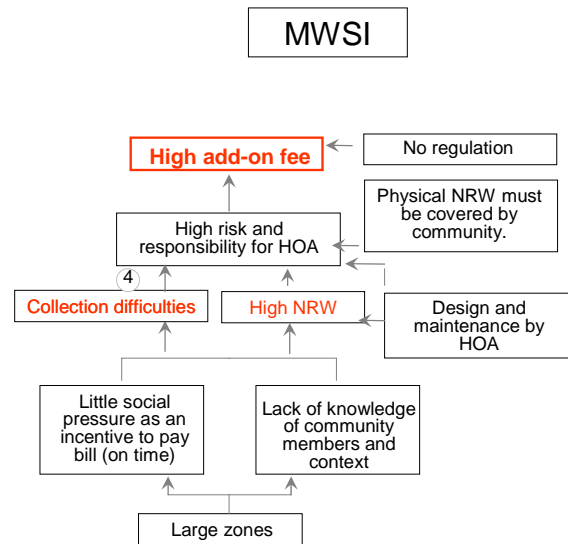


Figure 18 – Characteristics of the MWSI case and their implications as compared to the MWCI case

149. The hydraulic zones in this case are several times larger than in the MWCI case. Only 2 bulk meters serve over 650HH. There is no necessary amount of social cohesion among so many households in an urban area to prevent free-riding and efficiently monitor the system. Since the HOA is completely financially responsible for all implementation and operation, including all losses, and having no cash reserves, it needs to accumulate sufficient revenues to recover all of its expenditures and prepare for possible high losses caused by random pipe bursts in the future. The HOA needs to do all of these demanding tasks without being trained for it. To cover all of this plus income for its members, the HOA takes the advantage of the absence of a tariff regulatory system for the SSWP, and charges high add-on on the tariff. Incidentally, the total tariff in this community (26PHP/m<sup>3</sup>) is just below the tariff of the competitor. Local deep-well operator tariff is 28PHP/m<sup>3</sup>.

150. The MWSI project has been suffering from an average of 15% NRW, although all facilities are newly constructed by an accredited contractor which complies with the central utility standards. The HOA charges an additional 15PHP to the central utility's 11PHP on every cubic meter, which is well over the 6PHP maximum add-on charge specified in the MOA. Despite this, the HOA has not been able to repay their loan according to the required schedule.

151. In the case of MWCI, the HOA introduced a reliable person from each street with a maximum of 20HH to become a "street leader". The HOA does not bear any risk associated with the project implementation and operation and therefore does not need to charge any extra payment to the customers. The street leaders spend only a couple of hours every month to collect money from their neighbours with whom they frequently interact anyway. Free-riding prevention is simple in a small closed neighbourhood. The leaders get paid approximately 3PHP/m<sup>3</sup> for their work every month after paying the bill of their street (which includes these additional 3PHP) to MWCI (Figure 19).

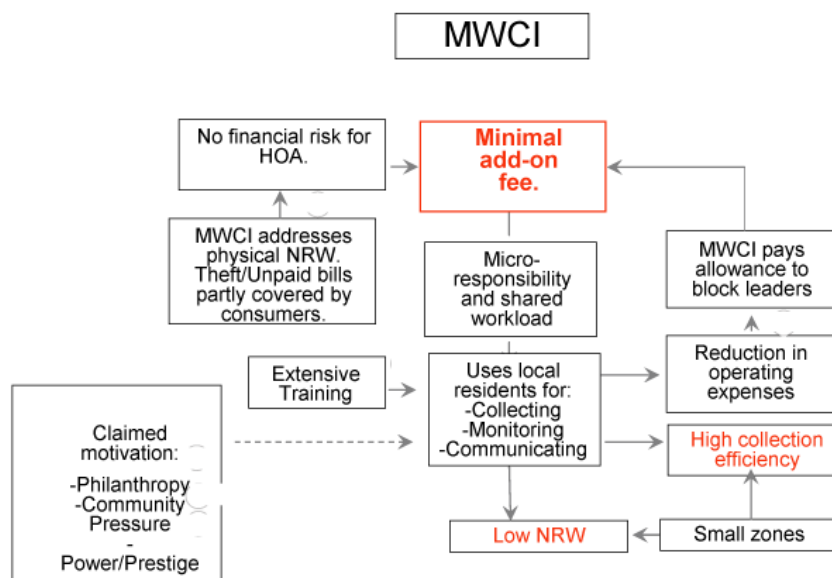


Figure 19 - Characteristics of the MWCI case and their implications as compared to the MWSI case

152. At the macro level, firstly, establishing a regulatory of the SSWPs' operations is necessary to achieve both financial and social sustainability. This topic is a subject in the chapter discussing scaling up. Secondly, staggering the connection fee has proven to be significant in contributing to an increase in access rate within the project area, defined as necessary for social sustainability. Despite this, there are still some households in the project area without any connections, which is the case also in the other studied projects. Overall analysis of the all four cases in the three countries shows why still less than 100% of households get access to the water supply.

153. Comparison of the two cases within Metro Manila, provides lessons about appropriate distribution of responsibilities between a non-subsidised central water supply utility and a local CBO as an SSWP in an urban poor area.

## **V. AHMEDABAD, INDIA**

154. The project in India was distinct from those conducted in the other two countries from several aspects, including the reformative nature of the local municipal body, readily available cost-free water services, absence of water-meters and the success of the domestic initiative known as the Slum Networking Project (SNP).

### **A. Water supply in Ahmedabad**

155. In Ahmedabad, the central organization to provide basic infrastructure services to the people is the local municipal body, the Ahmedabad Municipal Corporation (AMC). AMC was established in 1950 under the Bombay Provincial Corporation Act, and its organizational structure is based on the legislative wing, headed by the mayor, and the administrative wing, headed by the Municipal Commissioner, who is an IAS (Indian Administrative Service)-appointed official from the state government.

156. The AMC had been suffering from serious financial deficit of about 9.2 million US dollars in the early 1990s, but after ambitious reforms by the Municipal Commissioner at that time, the financial condition has been resuscitated to a 50 million US dollar surplus. This can be accredited to the initiative to become the first municipal body to issue municipal bonds without the guarantee of the state government, accompanied by rigorous administrative reforms and the ventures with various public-private partnerships for the betterment of fiscal conditions. The AMC has also enjoyed revenue from the OCTROI, which is a tax system on all goods crossing the municipal boundaries of Ahmedabad. The OCTROI was abolished in 2006 due to criticism from business leaders claiming that OCTROI brings commercial disadvantages to the entirety of Ahmedabad, and was completely replaced by funds from the state government.

157. There are currently four ways by which the residents of Ahmedabad access water. The first way is through the official individual pipes, provided by the AMC. This water supply is funded by the AMC, but water meters are absent in the entire water supply network (in fact, metering is not practiced in the entire nation of India). Water is provided every day for two hours from 6:00AM to 8:00AM, and 30 minutes in the afternoon. Residents pay an extra 30% on their property taxes as water usage fees.

158. The second way to access water is through public stand posts that are located throughout the city, and this water supply is provided for free.

159. The third way to access water is the use of private water supplies, usually seen in the areas newly incorporated into the boundaries of the AMC-serviced area. Residents of these areas, previously unable to receive water services from the AMC due to their not being included in the AMC-serviced area, had to either rely upon water services provided by their former municipal (or village) body, or provide water for themselves. Many of them formed housing communities in which households collectively financed their own water supplies.

160. The fourth way to access water is the use of illegal connections. The illegal connections are usually connected to the water pipes provided by the AMC, and some of the slums treated under the Slum Networking Project had previously been obtaining water from these illegal connections.

161. Although it seems that water is readily available in Ahmedabad, there are two main points for improvement. The first point is the lack of water supply to the urban poor who do not

own property, or are not able to pay the property tax which entitles them to adequate water supply. The RETA6265 pilot project and the slum networking project are projects that attempts to overcome this issue. The second point is that because water meters are absent, non-revenue water cannot be detected and efficiency of the water supply is questionable.

## B. Overview of SNP

162. The Slum Networking Project (SNP) is an integrated slum upgrading project started by the AMC in 1997, where slum residents are able to receive basic infrastructure services (i.e. individual water supply, sanitation, street lights, road pavement) if the entire slum community agrees to participate both on a consensus and financial-basis.

163. The actual cost per household for the SNP service is approximately 15,000INR, and slum residents must pay 2,000INR for infrastructure and 100INR as seed money for the Community-based organizations (CBO). These contributions not only help the AMC in financial terms, but also cultivate a sense of ownership among the slum residents. The remaining 13,000INR comes from AMC funds and financial support from domestic and international funding organizations such as the ADB in the RETA6265 pilot project. Collection efficiency for the SNP is in the range of 85% - 95%, but as time proceeds, many of the SNP sites reach efficiency at the vicinity of 100%.

## C. Context of the survey area

164. Chamundanagar was first inhabited in 1973 by residents from Naran Kura, a village in the vicinity. There were about 50 houses at that time, and housing registration began in 1990. Currently, there are about 180 to 200 households in the community. The area is not subjected to the town planning scheme of Ahmedabad, so there are no plans in the near future to redevelop the area to the extent to which residents would be relocated.

Local Context	
Water Source for the Project	Individual Water Supply (Ahmedabad Municipal Corporation)
Alternative Water Source	Public stand posts, private water supplies, illegal connections
History of Water Supply	Water has been supplied in most areas, except for the areas newly incorporated into the AMC area
Inhabited, Density of Settlement	Densely populated, with about 200 settlements in the slum area
Main Employment	Land owners and Shoe-makers
Existing CBOs	None existing, but local leaders were existent
Reported Conflicts	None except for one household in which the landowner told the renters that they had paid the necessary fees, when in fact they had not

Table 7 – Local context

165. The residents of Chamundanagar can be roughly categorized into landowners and renters. About 50 families live by renting houses, and the remaining 150 are landowners. Landowners pay a property tax of about 400INR per year per 50 square yards. The price of land is about 10,000 to 12,000INR per square yard.

166. The main occupation of Chamundanagar is shoemaking. Shoemaking is fairly\_high-paying, and the residents of Chamundanagar are generally at a higher economic status than residents of other slum communities. Most of them belong to the Hindu Rabarrie and Hindu Malbari Castes. The educational level of the residents range anywhere from being illiterate to holding Masters degrees. Many of the CBO leaders are generally at the higher spectrum in terms of education.



Figure 20 - Main street of Chamundanagar

#### **D. Activities of stakeholders during the project cycle**

167. In the planning phase of RETA6265, ADB played an active role in negotiating with the state government and AMC in order to specify the details of the project, the NGO to work with, and other details regarding the institutional structure of the project.

168. SAATH, the NGO appointed for RETA6265, acted as the middleman to select contractors, identify leaders of the slum community to explain the project to, and discuss details about municipal regulations and specifications with the AMC. The CBO, assisted by the NGO, explained the project to individual households and built a consensus in the entire community to accept the project. The SEWA Bank, a private bank operated by an NGO by the name of SEWA (Self Employed Women's Association), provided individual accounts for the residents, to which individual contributions for RETA6265 would be deposited.

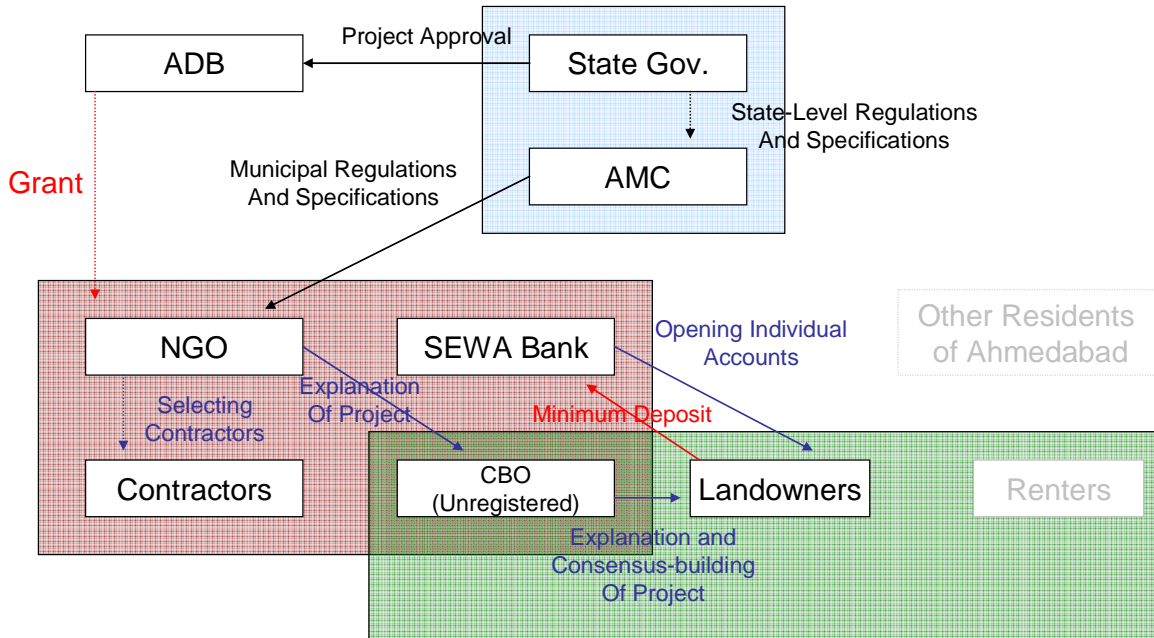


Figure 21 – Structure of stakeholders (Planning phase)

169. In the implementation phase, landowners pay their contributions of 2,100INR. Deposits are made to the SEWA bank, and SEWA bank transfers the collected sum to AMC. At the time of investigation, there was only 1 household that had not yet made their contribution. This was largely due to the fact that the residents were renters, and the landowner had told them that the contribution was already paid, when in fact, it was not. It can be expected that this issue would be solved in the near future, and 100% collection efficiency will be accomplished.

170. In this phase, the CBO continues to act as the middleman between the residents and the NGO, while the NGO assists the CBO in officially registering as the CBO of Chamundanagar. The NGO also makes payments to contractors and consultants, while contractors begin work on the infrastructure.

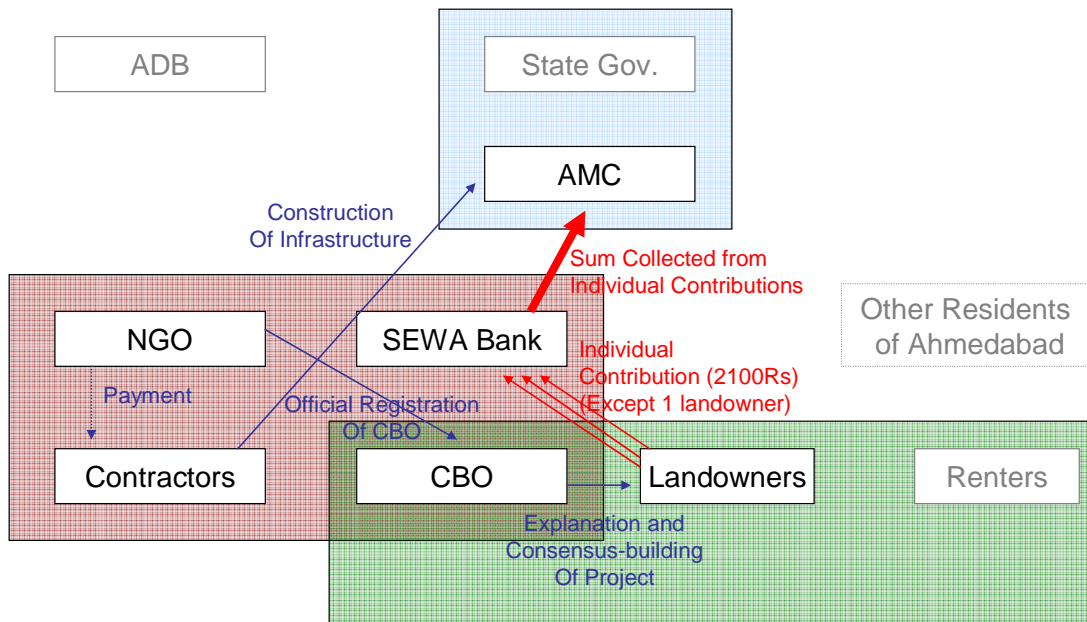


Figure 22– Structure of stakeholders (Implementation phase)

171. The actual water services had not yet been provided at the time of investigation, but was planned to begin in late July.

172. In this section, several of the key characteristics that distinguish the case in India from the other cases will be discussed.

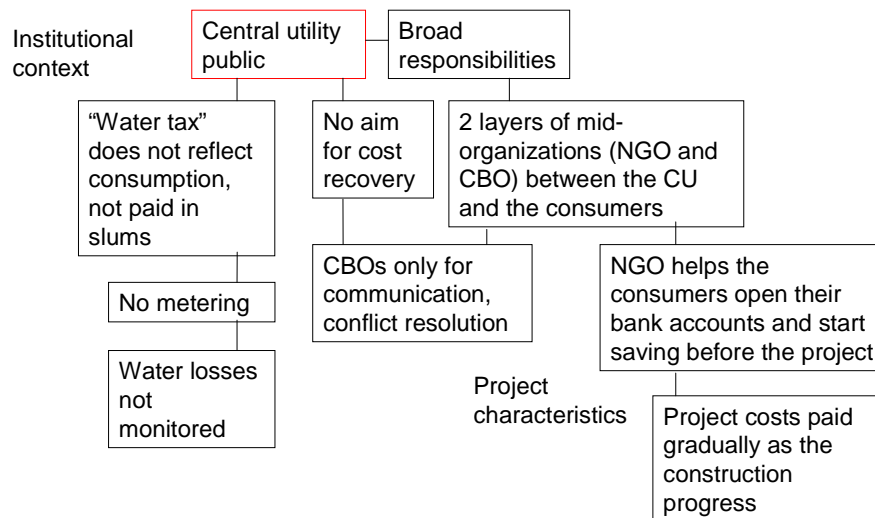


Figure 23 – Special conditions of the Ahmedabad case

173. In the case of India, the Ahmedabad Municipal Corporation provides a high subsidy in which, as before mentioned, slum residents need to provide only 2,100INR out of the entire 15,000INR costs to receive basic infrastructure services.

174. Because water usage taxes (30% of property taxes) are imposed on legal residents of Ahmedabad, this is like a system of cross-subsidy between the wealthy and the slum dwellers of Ahmedabad. Area upgrading by provision of infrastructure immediately increases the market value of the land but the property tax and water tax are determined by the municipality and are not directly based on the prevailing market value of the land. The property tax and water tax are “mixed” in the overall budget of AMC (together with finance from other sources) and used for all of its operations. (Thus, income from the “water tax” is not necessarily used just for water supply). The user charges of 84 INR per year, although very low, are reportedly not paid by the slum dwellers. According to AMC representatives, non-payers are never disconnected.

175. In the case of India, water meters are absent in the entire nation of India, partly due to the fact that water is commonly perceived as something that is provided by nature, and what is provided by nature should not be measured and charged.

176. In the case of Chamundanagar, the CBOs acted as the ones to convince the residents into a unanimous consensus to implement the project. In the implementation and operation phases, the CBOs are merely middlemen who act mainly in times of conflict management.

177. A unique scheme of the case in India is bringing the SEWA Bank into the picture as a small-scaled private bank that would open accounts for slum dwellers, and assist in the collection of money on behalf of the Ahmedabad Municipal Corporation.

178. One of the surprising findings of this research was that the water system in Chamundanagar was not yet operational at the time of the evaluation.

179. Though the amount of non-revenue water and trends in water consumption cannot be monitored due to the absence of water meters, it can be easily speculated that public awareness on wasteful consumption is not strong, and that water is often used wastefully in the 2.5 hours that it is available per day.

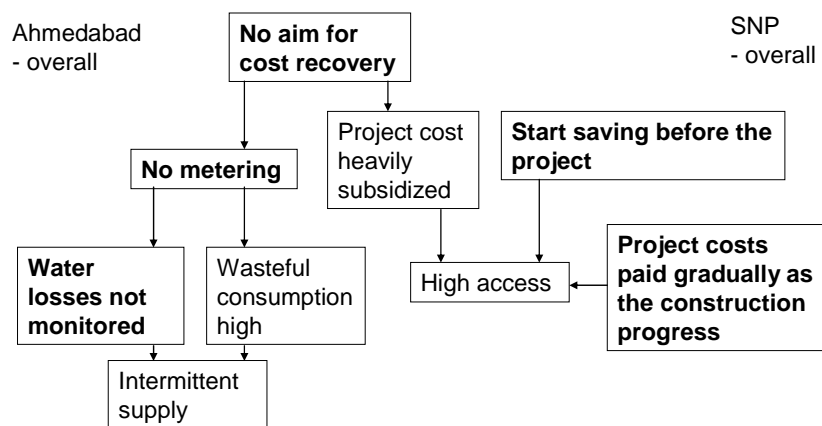


Figure 24 – Implications of the special conditions of the case

## E. Project outcomes

180. The efficiency of water use can be speculated that it is not high, largely due to the absence of water meters. Without water meters, consumers would have low incentive to avoid



water waste. If the project is to be scaled up, this efficiency issue must be overcome, because Ahmedabad is a relatively dry area, and ecological sustainability may be in question in the future. NGOs and professors have explained that the residents of Ahmedabad are prepared to pay for what they use, considering that they pay for electricity based on consumption, and has been accustomed to capitalistic values.

Financial	Cost Recovery	Only 2,100INR out of 15,000INR is recovered from individual contribution, and water is not metered. Full cost recovery is not pursued
	Collection Efficiency	High (due to effective NGO and CBO intervention)
	NRW	Not measurable (Water meter absent)
	Subsidies	Cross-subsidy through water usage tax (30% of property tax)
Ecological	Water Losses	Not measurable (Water meter absent) but can be speculated that there is a high level of loss
	Incentive against Waste	Low (Water meter absent)
	Waste Water Disposal	SNP includes waste water disposal
Social	Accessibility	Only a small portion of the 1,000,000 slum residents are provided with SNP
	Affordability	2100INR is affordable to most residents, especially because they need not pay lump sum
	Health	Water quality from AMC is high

Table 8 – Project outcomes

<b>Financial Sustainability</b>	
LEGAL LOSSES	
Monitoring	Neighbors need to unanimously agree to the scheme, so free-riders are nonexistent
Minimization	No illegal connections due to unanimity in the planning process regarding installation of the water system in entire community
CONNECTION AND TARIFF	
Collection	Initial Fee and Annual Fees
Explanation	CBO in charge of explanation
<b>Ecological Sustainability</b>	
PHYSICAL WATER LOSSES	Cannot be measured due to absence of water meters
Technical Design	Designed by Saath (NGO) in accordance with official AMC regulations
Construction	Efficient construction with consultants
Maintenance	Maintenance on a three-fold scheme with CBOs and the NGO doing daily monitoring, and AMC in case problems are detected
Monitoring	Monitoring also done on three-fold scheme
Training of Providers	NGO training not present, but CBOs are supported by NGO

WASTEFUL CONSUMPTION	
Measuring Consumption	No meters present
Charging based on consumption	None due to absence of meters
Choosing an Appropriate Tariff Scheme	Contributions are specified by the SNP scheme of AMC
Education on Water Resource Conservation	N/A
WATER SOURCE	
Permissions for Water Extraction	No permission
<b>Social Sustainability</b>	
ACCESSIBILITY	
Information Dissemination	Information spread via word of mouth, especially through the CBO
Conflict Resolution	Almost no conflict due to efficient CBO operation
Connection Fee Regulation	Connection fees specified by AMC's SNP scheme
Loans for Connection Fee	Loans available through SEWA bank, but usually not used due to high affordability
AFFORDABILITY	
Tariff Regulation / Enforcement	Framework is specified by SNP scheme of AMC
HEALTH	
Water Quality Control	Water quality is high

Table 9 – Functions distribution

181. The Slum Networking Project has been scaled up to over 30 sites up to date, but according to some NGO workers and local residents, there is a lack of NGOs to participate in the scheme, leading to retardation in the scaling up. There are only three NGOs that are actively participating in the scheme – SAATH, Mahila Housing Trust, and World Vision. According to some slum residents, they were told to wait for 1 year before implementation when they made a petition to a specific NGO.

182. AMC has the financial basis to scale the project up, and the project has gained much international attention, so scaling up should be feasible as long as the human resources are readily available. Providing training for NGOs on CBO-formation, relationship with the AMC, and various other skills needed for the SNP scheme may be an effective way to remove this bottleneck.

183. Replicability in the Indian context may be possible, given that the municipal body implementing the project has a strong financial backbone. Ahmedabad is a municipal body with

one of the healthiest fiscal conditions in the country, allowing them to subsidize the SNP scheme to provide service to the urban poor for less than 20% of the actual costs. In order to propose a scheme that is replicable in the international context, a pilot project must be done in which a similar scheme is applied to one of the rural villages of India, or at a municipal body in which the fiscal conditions are at a level similar to other cities in the world who are in need.

## **VI. TIEN GIANG PROVINCE, VIETNAM**

### **A. Water supply in Tien Giang**

184. Tien Giang was the province in Vietnam chosen for the ADB pilot project. The communes within the province involved in the study were Tan Huong and Tan Ly Tay. According to the local consultant who was responsible for implementation of the pilot project, Ho Chi Minh City was originally selected for the pilot project implementation. However, a suitable area, in which supporting SSWPs would not conflict with the expansion plans of the official central municipal utility, could not be found. Therefore, Tien-Giang Province has been proposed. This province is supposedly most progressive in terms of “socialization” (a locally preferred term for introduction of private sector participation in service provision), especially in the water supply sector. Thuan Phu Ltd. Co was reportedly selected because of their longest experience in the sector and their construction capacity.

### **B. Overview of SSWPs**

185. There are currently 4 types of SSWPs in the Tien Giang province: Private water enterprises, public water enterprises, cooperatives, and home owner associations. Private water enterprises are enterprises owned by an individual. There are six of these kinds in the province. Public water enterprises are those entities that are owned by the State. Cooperatives are owned by multiple shareholders, ranging from individuals to legal entities. They operate and manage on a voluntary basis and have regular meetings where members can express their ideas and decide on the nature of the operation. Home owner associations are small networks of around 10 households that provide funds to install a water station consisting of a water tower, treatment system, and distribution network.

186. In terms of providing water service to a community, private water enterprises are most ideal because they inherently have the management knowledge to ensure quality work (i.e. in regards to collection efficiency, technical issues). Furthermore, because the Tien Giang government is trying to promote increased privatization as a way of socializing the water supply sector, the State is encouraging the growth of private water enterprises. Home owner associations and cooperatives are the least ideal options because, due to their inherently voluntary management structure, they often lack the managerial and technical experience needed to effectively operate a water supply service.

187. Officially established in 1997, Thuan Phu Limited Company originally started as a means for Nguyen Phuong Binh, the current head of the company, to provide water for his friends and family. It is the main private water provider for the two communes involved in the project and currently services over 1,500 customers. It is composed of two divisions: construction and water, with construction being its central focus. Technically, 94% of its employees work in the construction sector; however the construction division often provides labor for water related projects. Correspondingly, the construction sector accounts for the main bulk of revenue for the company.

188. Thuan Phu Limited Co. was selected by ADB to be the official SSWP for the pilot project for several reasons. It is the first private water supplier in the province and according to some, also the strongest. Also, as compared to other SSWPs in the region, Thuan Phu Ltd. Co. is of a good size to handle the water demand in the region, though not so large as to be unmanageable. Furthermore, its in-house construction crew was viewed as an asset which

could provide the labor required for the pilot project. By putting construction and water supply in the hands of the same entity, there was a single point of responsibility and communication for optimal quality, cost, and efficiency. Also, Thuan Phu Ltd. Co. had strong relations with the government, which helped to facilitate project flow.

189. There are currently four means by which the inhabitants of the province obtain their water. The first is through individual piped connections from the ADB RETA 6265 pilot project. The water is delivered by Thuan Phu Ltd. Co. and provides residents with 24-hour access. The second method is via private or personal water supplies. Households in the pilot areas used and often still use a combination of surface water from ponds/lakes/shallow wells, groundwater from deep wells, water from vendors, or rainwater. Rainwater and water from vendors were generally used for consumption while surface/groundwater was used for bathing and cleaning. Furthermore, even those who have a piped connection now continue to use rainwater as their dominant source of water for consumption, with water from the project serving as a supplement for their supply when rainwater stock was not adequate. The third method is water supply via adjacent neighboring connections. This is achieved by connecting a pipe or hose to an adjacent household that had a piped water supply. This approach is not often used as the regions selected are of fairly low population density, making it rare to find homes within close proximity to each other. However, obtaining water through a neighbor's connection is not technically illegal and is, in fact, tolerated by the water provider. The last reported method of water supply is through an illegal connection. While the water provider does not believe that there are any current cases of illegal connections, Le Anh Dao, the head ADB consultant for the pilot project believes they do exist.



Figure 25 – Rainwater catchment jars

### **C. Context of the survey area**

190. The Tan Huong commune has 3550 households and Tan Ly Tay commune has 2700 households. The residents of both communes are primarily land-owners, with between 80-90% having land tenure documents. Both regions are composed of well-established, intransient populations whose families have resided in the areas for over 300 years. Both communes have similar economic classes, with an average yearly income of approximately 7,000,000 VND (~US \$418).

191. The main occupation of Tan Huong is farming, supplemented with jewelry making. In Tan Ly Tay, the primary occupation is also farming, supplemented with handiwork around the community. Aside from small occasional issues, there have been no reported cases of serious crimes.

<b>Physical Context</b>	
Water Source for the Project	SSWP (Thaun Phu Limited Co.)
Alternative Water Source	ponds/lakes/shallow wells, deep wells, water from vendors, rainwater.
History of Water Supply	Personal/private water supply (see "Alternative Water Source")
Inhabited, Density of Settlement	Intransient Population; Low Density
Main Employment	Primarily Farming; supplemented with jewelery making (Tan Huong) and handiwork (Tan Ly Tay)
Existing CBO's	None existing
Reported Conflicts	No reported conflicts

Table 10 – Physical context



Figure 26 – Street in Tan Ly Tay commune

## D. Activities of stakeholders during the project cycle

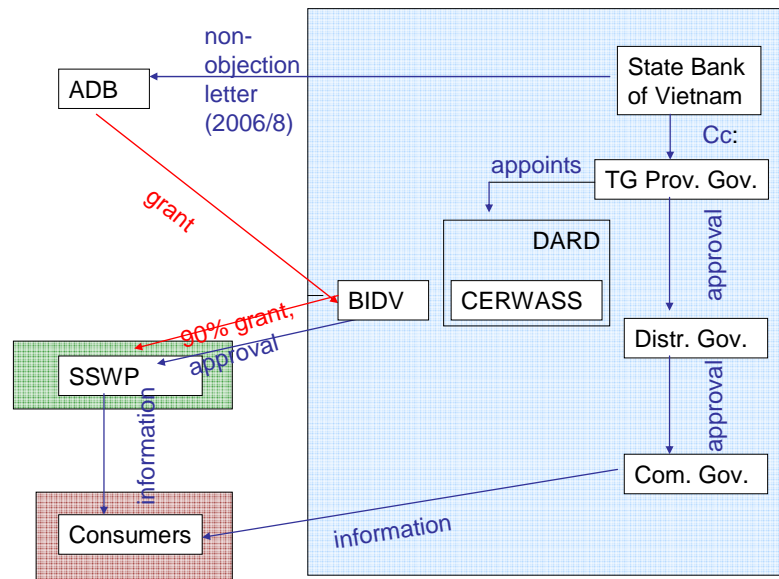


Figure 27 – Stakeholders' tasks in the planning phase

192. ADB first received a non-objection letter through the State Bank of Vietnam, which enabled them to provide 90% of the grant to the Centre for Rural Clean Water and Environmental Sanitation (CERWASS); CERWASS was appointed by the People's Committee of the Province to work on the ADB project, because of its responsibilities for water supply in rural areas. This grant was passed on to the selected SSWP (Thuan Phu Ltd. Co.) through a local Vietnamese public bank. The remaining 10% of the grant will be provided after successful completion of the project. Along with providing the piped connection, the SSWP is also responsible for communicating information regarding the project to the consumers, in terms of costs, schedules, logistics, etc.

193. Under the existing scheme, much of the stakeholders' roles are not changed. The primary difference is that the local commune and district governments are not involved, and rather, much of the approval processes and information dissemination rested on the Department of Agriculture and Rural Development and the SSWP.



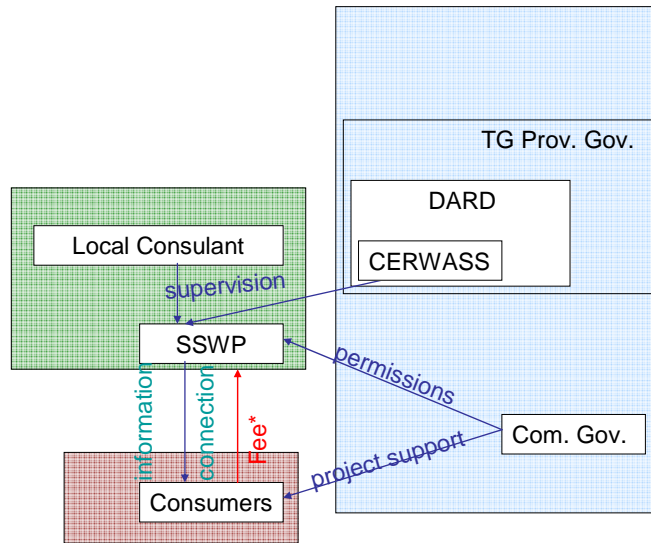


Figure 28 – Stakeholders’ tasks in the construction phase

194. After the planning phase, ADB no longer has an active role in the project. Rather, most of the responsibility rests on the SSWP and the local commune government in regards to working with the consumers and collecting the connection fees. The commune government serves as a mediator by providing the requisite permissions to the SSWPs and providing support and information to the consumers.

195. Under the existing scheme, the provincial government plays no part during the construction phase. Rather, the commune government is the only entity from the administrative/public sector that has any responsibilities.

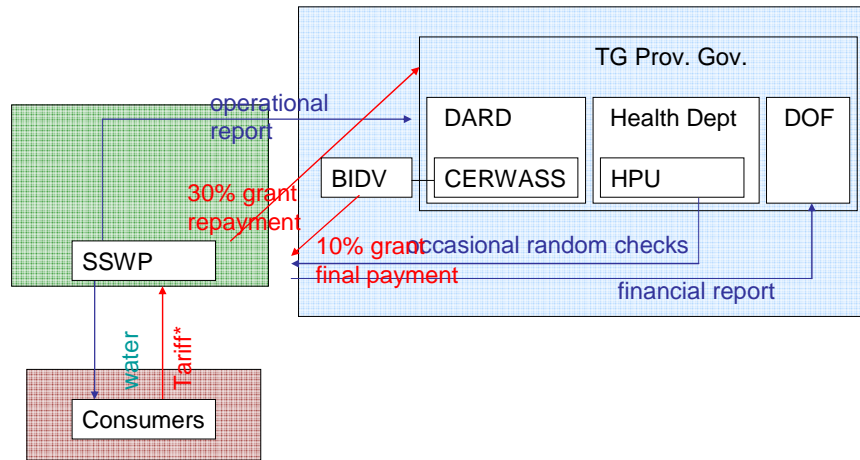


Figure 29 – Stakeholders' tasks in the operational phase

196. At the start of the project, the Ministry of Finance regulated a general price frame through meetings with Department of Agriculture and Rural Development. Then, the People's Committee of the Province determined the exact price that the SSWP must thus follow. During this phase of the project, the piped connections are in operation and tariffs can thus be collected. At this point, the SSWP should begin to make the 30% grant repayment, in installments of 10% each year over three years. After the SSWP's financial report is received and approved by the Department of Finance, the local bank provides the remaining 10% of the grant. According to the interview with the director of Thuan Phu Ltd., the company is making profit from water supply, although construction is still the main business and main source of revenues for the company. Based on the data provided by the company, the construction expenditures are covered by the connection fees. The average operational cost for supplying of one cubic meter of water is 2500 VDN, while the tariff is 3000 VDN.

197. All stakeholder responsibilities and activities are the same in the existing scheme, aside from the grant repayment.

<b>Financial Sustainability</b>	
<b>LEGAL LOSSES</b>	
Monitoring	Low density region – neighbors can easily perceive free-riders/illegal connections
Minimization	No illegal connections due to strong enforcement and low density community
<b>CONNECTION AND TARIFF</b>	
Collection	Monthly collection
Explanation	The SSWP along with the commune government are responsible for information dissemination. However, some interviewed consumers still unaware of connection fee/water costs

<b>Ecological Sustainability</b>	
<b>PHYSICAL WATER LOSSES</b>	
Technical Design	Good technical know-how; construction material budget constrained.
Construction	Efficient construction due to SSWPs in-house construction company.
Maintenance	Maintenance performed by SSWPs in-house construction company.
Monitoring	No concrete monitoring system in place due to inaccurate meters.
Training of Providers	SSWP was already in existence.
<b>WASTEFUL CONSUMPTION</b>	
Measuring Consumption	Inaccurate meters prevent precise measurements from being taken.
Charging based on consumption	3000 VND/m <sup>3</sup>
Choosing an Appropriate Tariff Scheme	Framework regulated by Ministry of Finance and exact price chosen by People's Committee of the Province. All SSWPs must comply.
Education on Water Resource Conservation	N/A
<b>WATER SOURCE</b>	
Permissions for Water Extraction	Permissions issued through Commune Government.
<b>Social Sustainability</b>	
<b>ACCESSIBILITY</b>	
Information Dissemination	Information spread via word of mouth, media, monthly community meetings.
Conflict Resolution	High levels of enforcement. Low levels of serious crime.
Connection Fee Regulation	400,000 VND + 10,000 VND/m <sup>3</sup> to extend pipe from mainline.
Loans for Connection Fee	70% of ADB grant used to decrease connection fee.
<b>AFFORDABILITY</b>	
Tariff Regulation / Enforcement	Framework regulated by Ministry of Finance and exact price chosen by provincial People's Committee. All SSWPs must comply.
<b>HEALTH</b>	
Water Quality Control	Every 6 months, Dept. of Health checks quality through random sampling of residents.

Table 11 – Functions distribution

198. The studied Tien Giang case is unique in that the region is largely rural, with low-density settlement patterns. The government, in particular the Commune and Provincial bodies, has a strong presence in the project in terms of price regulation and information dissemination. As there is no central utility, the SSWP works closely with the appropriate governmental bodies to plan, implement, and construct the water system. Furthermore, because the SSWP has been operating in the province for over 10 years, the ADB grant is primarily used to decrease the

connection fee. These factors combined contribute to a high water access level as well as regulated and affordable water costs and connection fees. However, because the SSWP originated as a means of supplying water to friends and family, NRW was not and currently is not monitored, resulting in lack of information regarding the project's sustainability. Another downfall of this case is that the water quality is checked irregularly and arbitrarily, resulting in potentially negative health impacts to the consumers.

199. Figure 30 below highlights the studied region's characteristics and their relations. From the chart, it can be observed that distinct implications arise from the province's rural context.

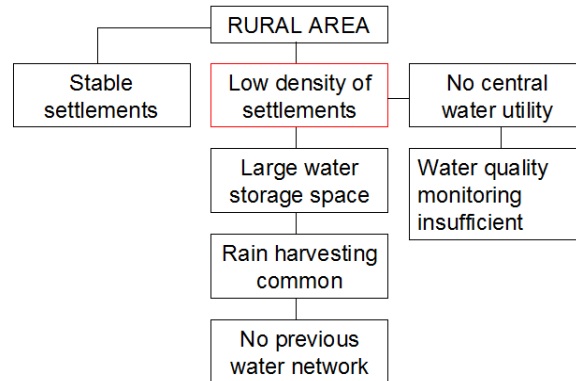


Figure 30 - Regional characteristics of Tien Giang Province

200. A significant distinguishing aspect of the Vietnamese case is the strong role that the government plays throughout the project. During the planning phase, the government is responsible for establishing an appropriate water tariff. This form of price regulation prevents the SSWP from overcharging the consumers. Furthermore, the commune government holds regular community meetings to discuss general issues, such the introduction of the pilot project. During the project's operation phase, the government enforces high penalties and strong enforcement against illegal connections. The roles of the government in the project are displayed in the figure below.

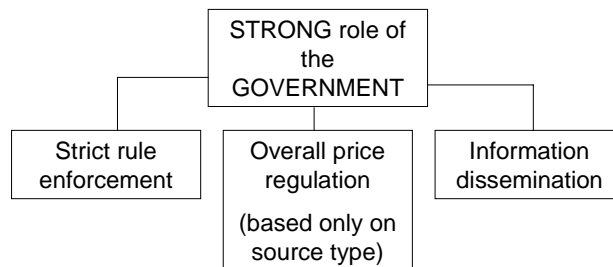


Figure 31 – Political roles in the Vietnam pilot project

201. Full cost recovery of the ADB grant was not a priority of the SSWP. Rather, only 30% of the grant was recovered, and the remaining 70% was used to reduce the connection fee from 600,000 VND to 400,000 VND. This lowered fee allowed most consumers to pay off the connection cost at once, though it was possible to also pay in installments.

202. Due to a combination of the project's rural context and the high level of involvement from the government, illegal connections and free-riding was not an issue in this case. Firstly, the government imposes high penalties on those with illegal connections. Also, the high affordability of the water supply coupled with existing rainwater harvesting practices in the area lead to an absence of incentives for illegal connections. Furthermore, the low-density of settlements in the region as well as its intransient population enable neighbors to know each other well. Thus, free-riders are easily detected and, because the water is very affordable, inhabitants would not want to risk the embarrassment of being caught with an illegal connection.

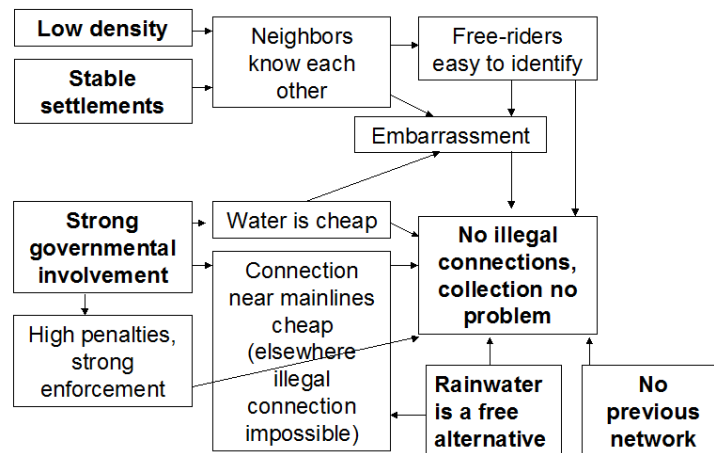


Figure 32 – Contextual implications

203. In the Tien Giang case, the SSWP has complete responsibility for project planning, information dissemination, construction, billing, and collection. As previously noted in the Metro Manila chapter, MWSI and its HOA also had near complete responsibility over implementation and operation of the SPWN. However, the Vietnam case proved to be more successful partly due to the existing rural conditions of the region as well as the regulation of water tariffs and connection fees. Furthermore, the Thuan Phu SSWP is an established water supplier with over 10 years of technical and project management experience. Thus, it is more competent and efficient than an HOA. Lastly, it is believed that an HOA with complete responsibility, as in the Manila case, would not operate well in the Tien Giang province.

### E. Project outcomes

Financial	Cost Recovery	30% of grant repaid through tariffs.
	Collection Efficiency	High according to SSWP.
	NRW	30% reported NRW; however, no supporting data. Figure based on empirical assessment.
	Subsidies	No
Ecological	Water Losses	Not measurable due to inaccurate meters.
	Incentives Against Waste	Low. No reported incentive against waste.
	Waste Water	N/A

	Disposal	
Social	Accessibility	High accessibility along main pipelines. Reduced accessibility in peripheral regions.
	Affordability	Connection fees and tariffs affordable for majority of households. Affordability issue arose when households are far from mainline and had to pay fee to extend pipe.
	Health	Random bi-annual water quality checks performed by Dept. of Health.

Table 12 – Sustainability indicators

204. Full cost recovery is not pursued. Rather, Thuan Phu Ltd. Co. repays 30% of the grant to the provincial government, in 10% installments over the course of 3 years. The remaining 70% goes into reducing the connection fee. Before the pilot project, the connection fee was 600,000 VND. Under the ADB project it is 400,000 VND. There is a high rate of collection efficiency, though substantive data was not available.

205. The NRW was 30% as reported by Thuan Phu Ltd. Co.; this was unverified due to lack of supporting data, and rather, was based on the company's empirical assessments. However, according to Le Anh Dao, the existing pipes are composed of low quality materials due to initial budget constraints. Additionally, the meters used are also of poor quality and thus do not always read accurate outcome and consumption amounts.

206. There were a seemingly high number of connected people along main pipelines, though the exact number of connections could not be determined. The few that were without connections had homes far from the main lines. Because of their distance from the existing pipes, in order to get a connection established, they would have had to pay the standard connection fee (400,000VND) + fee to extend the pipe (10,000 VND/meter). Under the pilot project, customers had a choice in how they paid their connection fee: they could pay it at once or through installments. Most preferred to pay the fee in one installment. With the exception of those who lived in peripheral regions, the residents of both communes felt the tariffs and connection fees were affordable. The total tariff required was 3,000 VND/m<sup>3</sup> under the ADB project. Under the existing scheme, the tariff was dependent on treatment costs (i.e. source of water) and was more or less the same regardless of SSWP. For ground water sources, the tariff was 3000 VND/m<sup>3</sup> and for surface water sources, the tariff was 3500 VND/m<sup>3</sup>.

207. There was a reportedly very low rate of illegal connections or water theft. This was due in part to the general affordability of piped connections and also because of an aversion to the high monetary penalties resulting from illegal connections, which could run up to 10x the cost of the water consumed, as well as a fear of being cut off from the supply. Furthermore, because rural communities are inherently close knit and illegal connections are easily detected, the embarrassment resulting from comments from neighbors was another incentive to not obtain water illegally.

208. To check for water quality, the Health Preventive Unit under the Department of Health is responsible for sampling water every 6 months. However, as this is done through random selection of residences and primarily when there are complaints or claims made, the quality of the checks are not optimal in ensuring proper water quality. Furthermore, the water sourcing the piped connections was not treated prior to distribution. However, there did not seem to be any resulting health problems. Some of the consumers that were interviewed were aware that the

quality of rainwater was not ideal for consumption, either through media sources or in conversation with others. Thus, they admitted they had wanted to switch to a piped connection, regardless of cost.

## VII. MODEL OF SUSTAINABLE REPLICATION AND SCALING UP

### A. Overall relationship of water supply sustainability, functions distribution, and local contexts

209. The concept of sustainability has been defined in the beginning of this report as being composed of financial, ecological, and social dimensions. Water supply has to be sustainable on all of the three dimensions to achieve overall sustainability. Each dimension has several aspects. Various functions in the water supply have to be successfully carried out to achieve the sustainability on each dimension. Each function can be split into a number of tasks that have to be done. The specifics of necessary tasks vary based on the local context of each case. For example, the function of collection of payments, which is generally common across water supply systems, may need to be composed of extra tasks in very poor area to be achieved successfully – such as collection on a daily basis. These relations of gradually increasing numbers of concepts are illustrated by a pyramid in Figure 33.

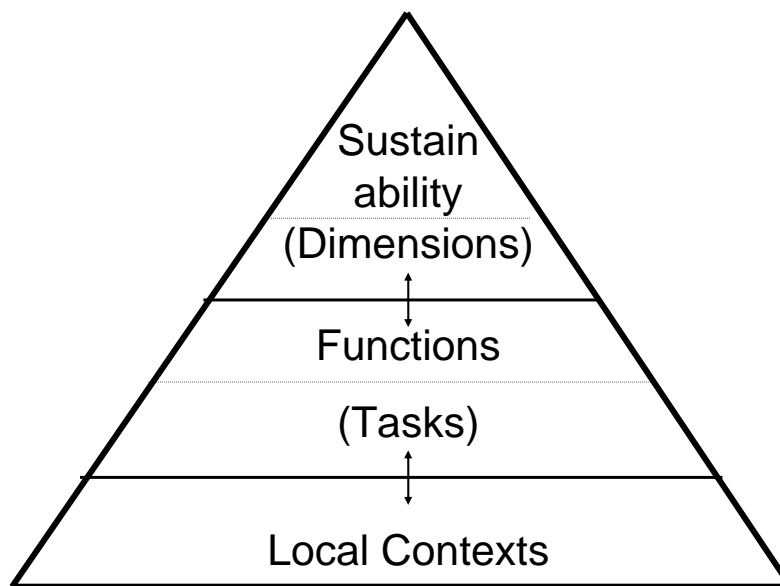


Figure 33 – General model of water supply sustainability, functions, and context

#### 1. Necessary functions for water supply sustainability

210. The functions which generally need to be carried out for a water supply to be sustainable are summarized in Table 13. They are structured according to the categories chosen for evaluation of sustainability in the research framework. Carrying out successfully the function in each domain of sustainability requires different capabilities on the part of the stakeholder who is responsible for them (the column in the far right). Several tasks may be necessary for successful carrying out of some functions. These can be shared among several stakeholders.



<i>Sustainability domain</i>	<i>Category</i>	<i>Functions</i>	<i>Capabilities</i>
<b>Financial</b>	Legal losses	Monitoring	Local knowledge and social relations
		Dealing with delinquents	
	Connection fee and tariff	Explanation	
		Collection	
<b>Ecological</b>	Physical water losses	Training of providers	Technical and financial proficiency
		Technical design	
		Construction	
		Maintenance	
	Wasteful consumption	Monitoring	
		Measuring consumption	
		Charging based on consumption	
		Designing an appropriate tariff scheme	
Water source	Education on saving of water resources		
	Permissions for water extraction		
<b>Social</b>	Accessibility	Information dissemination	Financial capacity, technical and financial proficiency, authority
		Conflict resolution	
		Connection fee regulation	
		Loans for connection fee	
	Affordability	Tariff regulation & enforcement	
Health	Water quality control		

Table 13 – Necessary functions for sustainable water supply

**2. Relevance of the local context**

211. As mentioned in the beginning of this chapter, the water supply functions are relatively general, while specific tasks on the other hand, are more context-dependent. As a result, as has been observed in the studied cases, necessary capabilities of the providers vary depending on the context. It has been identified that based on the local social and physical context, the providers need to carry out a variety of tasks especially related to free-riding prevention and reduction, conflict settlement, obtaining of raw water as well as treatment, financing, and dealing with various technical issues.

212. Specifically, the most relevant physical and social contextual characteristics which influence the relative importance of the water supply tasks are:

- Type of water source (e.g. the central utility)
- Availability of alternative water sources, (e.g. rain harvesting, wells, other piped networks)
- History of water supply (e.g. tradition of obtaining “free” water from illegal connections)
- History of habitation, density of settlement (e.g. low dense rural area with large distance and free spaces between houses)
- Main employment (e.g. most of the inhabitants earn less than the minimum wage)
- Presence of community organizations (e.g. community organization created for the project)

213. Inclination for free-riding among consumers, for example, is affected by several of these contextual characteristics. Consequently, there are varying requirements on the providers to possess good local knowledge and social relationships to be able to carry out necessary tasks for free-riding prevention and reduction.

214. The relevance of the variation in the characteristics described above could be seen in the studied pilot project. Apart from these, legal status of the inhabitants (such as possession of land tenure) has been identified by the informants as an important variable. Since formal organization cannot operate without necessary permissions, water supply to illegal squatters is often left to informal SSWPs. (This could not be observed in this study - all of the ADB projects have been implemented under legal conditions.)

### 3. Stakeholders in water supply

215. The stakeholders identified in the studied water supply projects varied from state government to poor urban renters, and the scope of their activities varied accordingly. The stakeholders could be approximately classified into three categories: central, middle and local. The central-level stakeholders are for example state governments, central water supply utilities, or public water supply-related organizations. The local stakeholders are mainly the actual individual consumers. The mid-level consists of various organizations with functions in between the central and local level. Small private organizations, NGOs, or CBOs belong to this category.

216. All of the officially designed SSWP providers in the pilot project carry out some functions on this middle level. Some of these pilot SSWPs, such as the HOA in the East Zone of Manila, or the NGO in Ahmedabad would not be considered SSWP according to the definitions identified in the literature review. What they have in common is that they operate between the central and local levels (but they are not the only organizations in the projects that do so.) The Indian example is displayed in Figure 34.

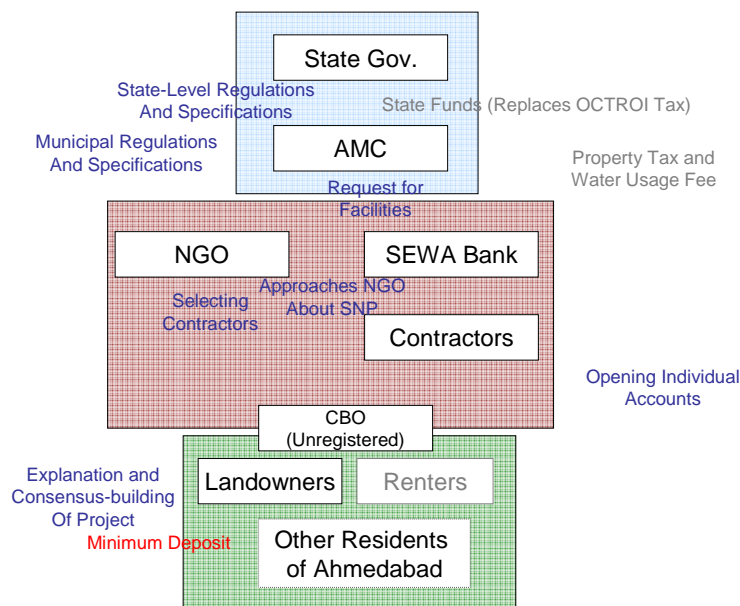


Figure 34 – The stakeholders in the planning stage of the pilot project in Ahmedabad

### B. Functions' and tasks' distribution for sustainability

217. This section examines the optimal distribution of the water supply functions among the stakeholders in terms of sustainability in different contexts. The criteria for the functions allocation is effectiveness, efficiency, and accountability. Effectiveness and efficiency defines

as to which degree the function can be carried out at certain costs. Only some stakeholders can be given the right or responsibility over some functions. Therefore, accountability to the consumers also has to be considered for the allocation of functions.

## **1. Effectiveness, efficiency, and accountability of mid-level stakeholders**

218. As compared to the central-level organizations, the mid-level organizations, including SSWPs, tend to possess the following beneficial characteristics in the studied cases:

- Local (social, geographical) knowledge (+)
- Presence in the area (+)
- Lower opportunity cost of time (+)
- Reputation within the area (+,-)
- Less legal constraints (+,-)

219. The last two characteristics can function as strengths in some situations and weaknesses in others. Since the mid-level players tend to be known among the inhabitants of the water supply areas, they can generate more trust among them but negative relationships can endanger sustainability of the project. Less legal constraints enable higher flexibility and creative approaches to legal and bureaucratic obstacles in providing water supply to the poor<sup>25</sup>. On the other hand, it also increases the risk for abuse of power coming from control over such a crucial resource.

220. The above listed characteristics make the mid-level organization especially suitable for water supply functions, which require the following:

- Communication with the residents
- Exertion of social pressure
- Labor or time-intensive, routine water tasks in the area
- Operations in unofficial settlements, strict dealing with delinquents

221. Overall, the mid-level players are most efficient in functions related to limiting free-riding.

222. On the other hand, as compared to the central-level organizations, the mid-level studied organizations tend to possess the following negative characteristics:

- Lack of management, accounting and technical knowledge and skills (-)
- Lack of financial capital and access to credit (-)
- Reputation (+,-)
- Lack of legal constraints (+,-)

223. Therefore, when the mid-level organizations assume some water supply functions from the central organizations, the central organizations need to compensate for these weaknesses by carrying out the following functions:

- Training, accreditation, and performing of sophisticated technical tasks

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<sup>25</sup> Although there is considerable variation among the local contexts and pilot projects' characteristics, none of the systems have been implemented in an area where some house owners would lack the land tenure. (Naturally, directly implementing an illegal project would be impossible for ADB.) Therefore, the study of these systems does not shed enough light on the crucial issue of water supply to households that lack land tenure. From the interviews with the local stakeholders a generally tolerated way to implement piped water supply to houses without land tenure seemed to be via so called "temporary facilities" (e.g. garden houses above the ground).

- Financial investment, provision of access to financial credit, bear financial risks
- Conflict resolution
- Payments regulation and water quality guarantee

224. Overall, the central organizations are most suitable for functions related to creation of supportive environment for the mid-level organization and protection of the consumers' right, which need to be carried out for sustainability of SPWN.

## 2. Sustainable distribution

225. The optimum distribution of functions among the central and middle level organizations should satisfy the following conditions:

- All necessary functions and tasks in the given context should be covered
- The tasks are performed by the stakeholders who are most efficient, effective and accountable
- There is no unnecessary overlap between the tasks performed by the different stakeholders

226. Figure 35 illustrates the optimal distribution of the tasks. The irregularity of the boundary of all necessary functions which need to be carried out illustrates its dependency on the local conditions.

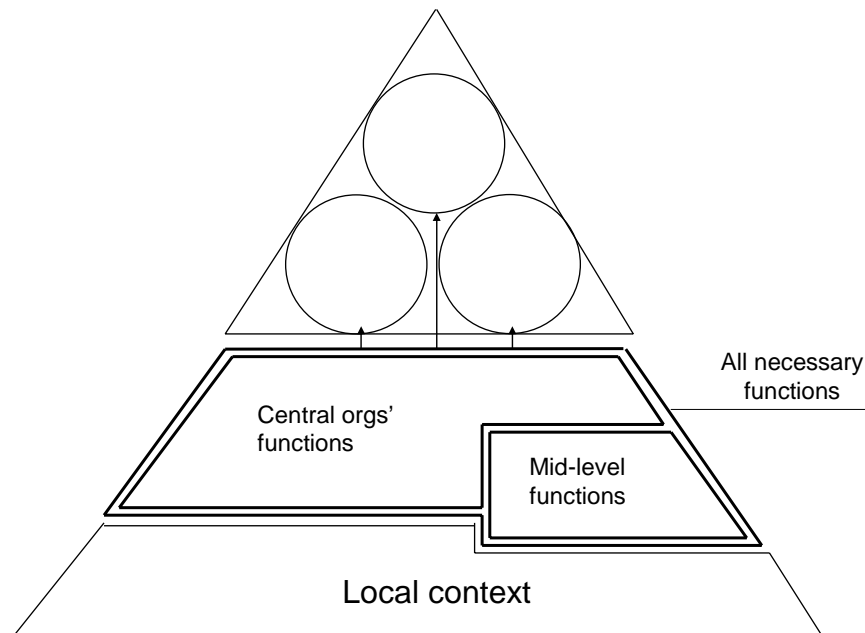


Figure 35 – Function distribution for sustainability

## C. Actual functions' and tasks' distribution

227. From the literature review and interview of the experts, an image of the typical distribution of tasks among the central organizations and the SSWPs could be formed. SSWPs

generally adopt a profitable market niche and supply water where the central organizations are not able or willing to do so. This can be done with none or some degree of cooperation with the central organizations. In more progressive cases, the mid-level organizations are hired to do more efficiently some task for the central organization. Without coordination, however, not all tasks are covered, and resources are not optimally allocated. Because of lack of communication, SSWPs sometimes end up competing with central utilities, leading to losses for both players without any extra benefit to the consumers. As a result, one or more of the sustainability dimensions tend not to be too weak (Figure 36).

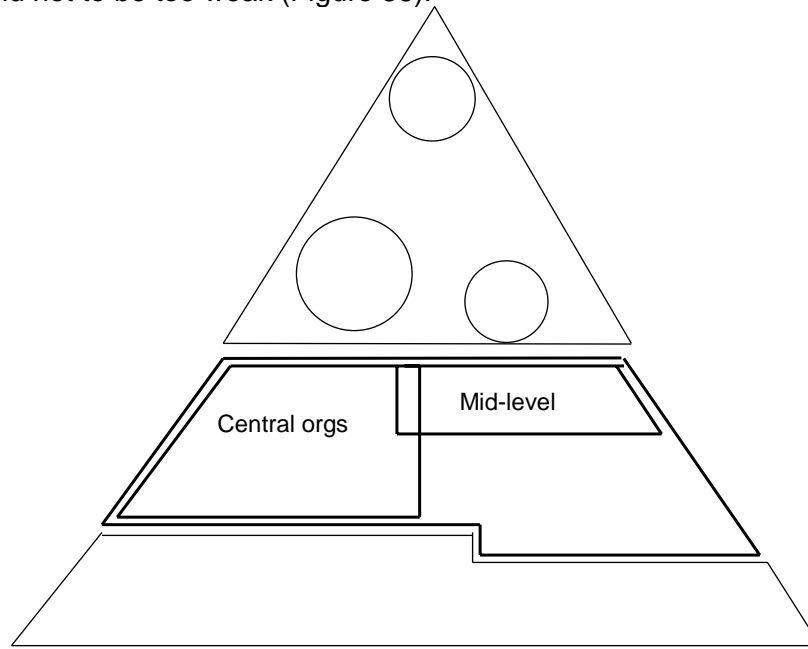


Figure 36 – Inefficient allocation of functions in an unsustainable case

228. All of the studied cases were part of existing water supply programs, only with some special adjustments in the MOAs and financial support from the ADB. In Ahmedabad, since there is practically free water supply in all urban poor areas via standpipes at least, there is no niche for classical SSWPs. The government only hires some NGO as mid-level organizations, who further contribute to the creation and registration of CBOs as another intermediary representing the consumers. NGOs are considered more efficient and effective in pursuing communication with the CBOs. Since cost-recovery is not a goal in this government-funded program, the NGOs' work does not include much of free-riding minimizations tasks. Consumption is not metered, leakages not monitored, incentives or education against wasting are not provided, which has negative implications for financial and ecological sustainability. "Free" water and low water connection fees, on the other hand, contribute to the social sustainability in the lowest income areas.

229. In Metro Manila, MWSI bestows the HOA with excessive responsibilities for the tertiary water supply functions including financing, technical design, cost of leakages, which appears to be beyond the HOA's capabilities and the financial sustainability of the whole project is threatened. The HOA copes by charging excessive tariffs, which the central organizations do not regulate. The high costs provide incentives for consumers to save water and for the SSWP to reduce leakages but its social sustainability is questionable. The difference between the sustainability outcomes of these two cases is illustrated in Figure 37.

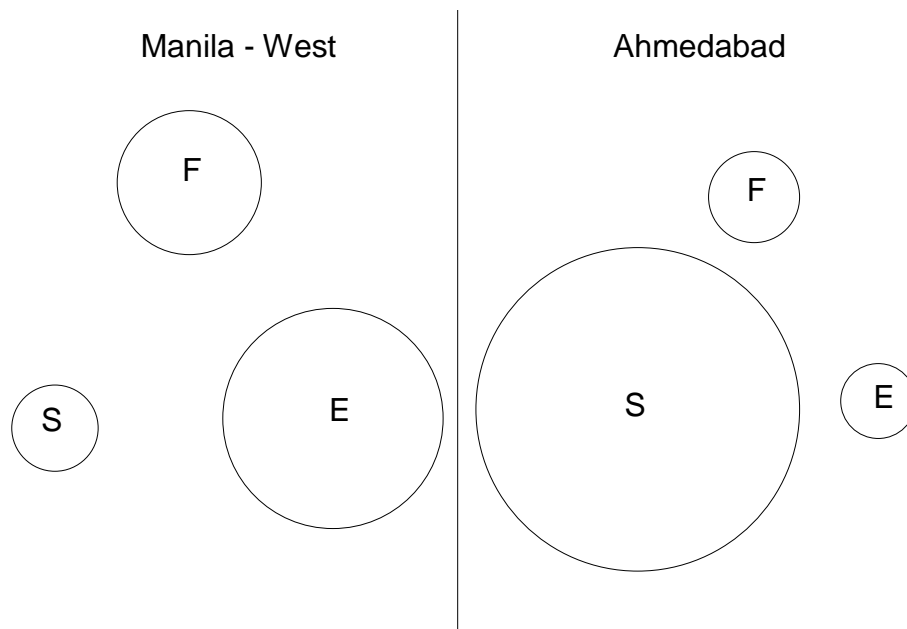


Figure 37 – Illustration of uneven sustainability outcomes of the projects in Metro Manila, West Zone and Ahmedabad

230. MWCI, on the other hand, just hired recommended local residents to perform basic local water supply tasks for a small fee. The outcomes have been significantly better in terms of the sustainability indicators. Nevertheless, calling these residents an SSWP can be considered an overstatement.

231. In Tien Giang province, since there is no central water supply utility, the SSWPs have to cope on their own with numerous technical difficulties with various degree of success. On the other hand, their situation is made easier by the local government that facilitates information dissemination, easiness of payments collection and prevention of illegal connections.

232. In summary, not all functions in these various contexts are yet appropriately covered to assure overall sustainability. In general, the following functions tend to be insufficiently performed or completely omitted:

- Regulation of tariffs, connection fees, payment schemes
- Authorization of capable mid-level organizations
- Information about the possibility to apply for a water connection, its real cost and benefits, the way to apply, and consumers' rights
- Conflict resolution between the consumers, the consumers and the provider
- Hearing of complaints about water quality, hours of service, providers' requirements

233. From the viewpoint of accountability, the central organizations (local authorities) are most suitable to take the main responsibility for these functions.

234. As a result of this general gap in responsibility for these functions, the renters do not get an opportunity to make their own decision about participating in the water systems because some consumers are not informed about the possibilities and remain uninvolved. Also, the poorest ones may not be invited to join or may not even consider joining and paying higher unit costs for water from others. Those who are both very poor and have lack of social relations in

the area find the expenditures too high and remain unconnected. The people living on the periphery of the water supply areas tend not to be included (Figure 38). This incomplete accessibility to the water systems is detrimental for their social sustainability.

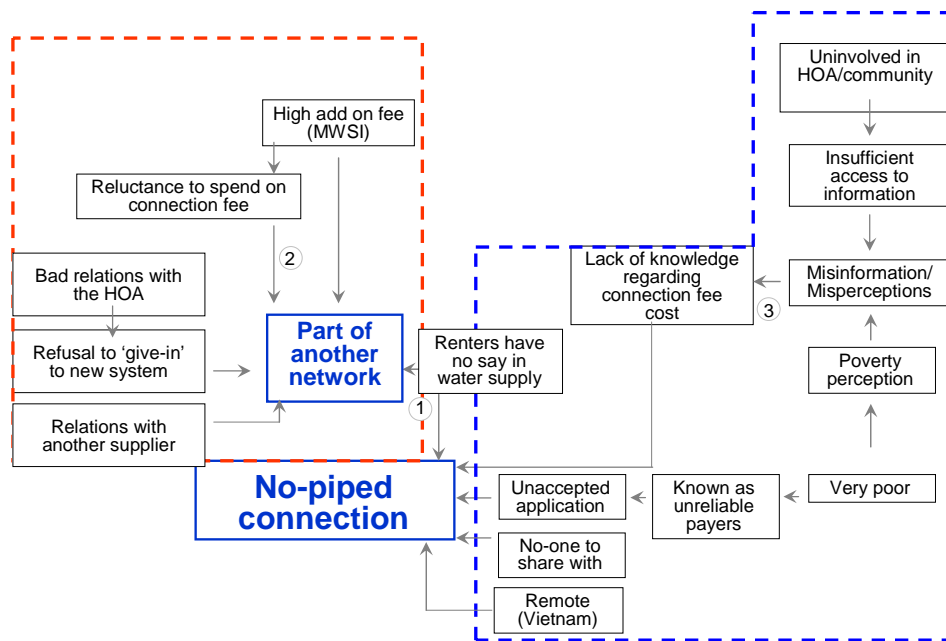


Figure 38 – Reasons for incomplete accessibility to the water system

#### D. Replication, scaling up and the role of ADB

235. The purpose of the pilot was to prove that by implementing SSWN and cooperation with SSWP, the poor can be connected to the piped water supply but if a new reticulation system is built up to the same standards as individual connections, employment of SWP does not speed up the implementation. In fact, the time required for community mobilization and legal arrangements in the planning may extend the whole process. The construction period of the studied systems was the same as in the already existing schemes in the respective countries. The additional time for MOA preparation in each case took over one year. Well-organized cooperation with the mid-level players can have positive impacts on water supply sustainability but naturally, this arrangement cannot be feasibly scaled up by ADB's direct support to each individual SSWP. In fact, direct financial support for selected cases can be counter-productive to further scaling up. In the Tien Giang case, for example, the ADB grant has been used for decreasing of the connection fees. This significantly decreased the willingness to pay the full connection fee in other areas. As a result, the provider is concerned that expansion to other areas without further grants would not enable cost recovery.

Ideally, supported pilot projects should start a chain reaction, an organic progress of self replication. The goal is to create favorable conditions. The support from international lending institutions, such as ADB, would naturally come through the central institutions, especially government institutions (e.g. NWRB, LWUA in the Philippines) but also through central water utilities or even large NGOS. These can aim to create such conditions.

236. The general process of the replication and scaling up would consist of the following steps (Figure 39):

- a) The local context determines which tasks could be optimally assumed by the mid-level organizations.
- b) The central organizations provide supporting and controlling environment for the mid-level organizations
- c) ADB provides TA and financial assistance to the central organizations to be able to do so

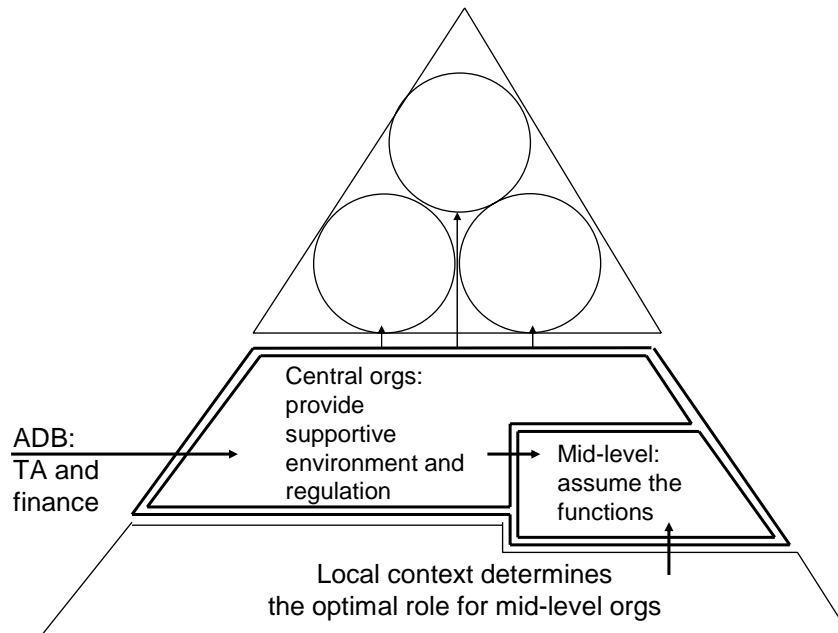


Figure 39 – General model for replication, scaling up and the role of ADB

## 1. Supporting and regulatory functions for sustainable scaling up

237. There is some trade-off between each two of sustainability dimensions (Figure 40). For overall sustainability, a water supply project has to be sustainable over all three dimensions. Balanced allocation of limited resources among the three dimensions does not occur naturally. The central organizations, with support from international institutions, need to provide financial, organizational, regulatory support as well as support in training for sustainable scaling up.



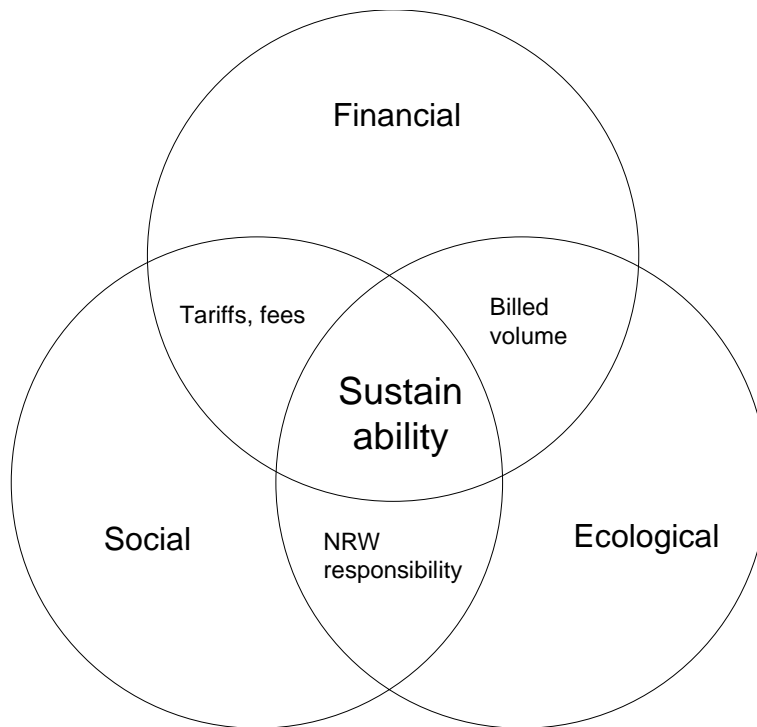


Figure 40 – Trade-off between the dimensions of sustainability

238. To achieve both financial and social sustainability, tariffs that are affordable and that enable cost recovery need to be estimated. Tariff regulation is necessary. Connection fees should enable access to everyone, but at the same time cover the construction expenditures. For example, SSWPs need access to financial credit to enable everyone's access by staggered connection fee payments.

239. Higher billed volume translates into higher revenues but puts pressure on the water resources. To achieve both financial and ecological sustainability, consumers and SSWPs need to be educated about water loss monitoring and prevention.

240. To achieve both social and ecological sustainability, tariff structure should enable anyone to afford sufficient amount of water but should motivate against waste. Designing and reinforcing an appropriate tariff structure is an important function of the central organizations. Position of meters and agreement between the consumers and the provider determines the distribution of responsibility for water losses. Leaving more responsibility on the consumers can lead to water loss reduction but in case of accidental large bursts, the sudden financial burden on the low-income consumers may be too large and become an obstacle to social sustainability. Balanced distribution of responsibilities should be guaranteed by the authorities

241. In summary, it is recommended that ADB supports by institutional development and financial assistance for existing central organizations, or the potential creation of new organizations and networks of organizations.

242. Central utilities should be made aware about the optimal task distribution in different contexts, and what is the appropriate level of responsibility that various mid-level organizations can assume (especially in terms of financing and technical functions). There are limits to the size of water supply area that the mid-level organizations can sustainably cover. For example, in blighted urban areas with high potential for free-riding, large zones are not sustainable.

243. The central utilities should be accountable for the following functions, to assure consumers rights to access in SSWP-operated schemes necessary for social sustainability.

- Regulate of tariffs, connection fees, payment schemes to protect against abuse, but enable reasonable profit for efficient providers. Design a business model for calculation of the appropriate charge. Maximum tariff should be based mainly on the cost of obtaining the source water with some consideration to which operational tasks are required in the given context. Connection fees should be generally sufficient to cover the reticulation cost but should not be charged as an upfront lump sum. (Cross-subsidies and charging of marginal cost can be considered.)
- Authorization and registration of local socially acceptable providers and organizations with sufficient capabilities to provide sustainable water supply. The registered SSWP should be provided access to official loans. However, public finances should not be spent to unconditionally subsidize operations of private-profit based operators, even for seemingly socially positive expenditures, such as one-time decrease of the connection fee
- Providing information to the consumers about the opportunity to join the scheme, specifics of costs and benefits, instructions on how to apply, and consumers' rights such as the maximum tariff. Scaling up does not need to occur only by expanding to new territories. There are existing pockets of urban poor along existing water networks. Large populations can be covered at low costs by identifying these pockets and giving them the opportunity to connect to the system.
- Conflict resolution regarding land usage, illegal connections, and payments between the consumers, the consumers and the provider or a CBO, or between CBOs
- Hearing service complaints (an "ombudsman") about water quality, hours of service, providers' or CBOs' requirements, etc. MOAs cannot be designed and signed for every detail in the naturally scaled-up systems as was done in the pilot. Conflicts can be resolved by a responsible local authority (for example a "barangay committee" in the Philippines). Output standards are preferable to input standards which may be prohibitive for most small organizations and thus prevent scaling up. Local authorities should also carry out independent regular monitoring, especially of water quality based only on complaints.

244. Central utilities, possibly with assistance from ADB, should provide supportive environments for the mid-level organizations that operate or could operate as SSWPs to achieve financial and environmental sustainability.

- Technical training on metering, NRW and water treatment
- Access to official loans

245. ADB can also channel through the developed central and mid-level organizations, such as local and international NGOs<sup>26</sup> and local banks as well as financially and organizationally support the consumers' communities and individuals.

- Financial assistance for saving schemes, support for opening of individual bank accounts (which increase chance for access and have other positive externalities)
- Community-organizing by NGOs to increase self-sufficiency (e.g. PHILSSA, IPD in the Philippines).

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<sup>26</sup> For example, WaterPartners International <http://water.org/> has been recommended.

246. In the Philippines, some existing efforts show a promising step in this direction. An NGO (Streams of Knowledge) has been creating a network of SSWPs across the country. In the future, ideally, the NGO could use the knowledge of the situation at the grassroots level. Trust for the SSWP could start cooperation with a public central level authority responsible for the national water resources (NWRB). Through this partnership, suitable SSWPs in the network can be registered, regulated, and if the standards meet, accredited as eligible for soft loans.

## 2. Areas not suitable for replication

247. Most remote areas, especially rural, tend to be most expensive to reach by piped water networks. At the same time, the inhabitants of these areas tend to have the lowest incomes.

248. As observed in Tien Giang, the people in the more remote parts have enough space for efficient storage of rain water, and use local sources. Even if they do get a piped water connection, they use the paid water (although cheap) only for drinking as a supplement to their traditional sources. In the rural areas, SPWN may be feasible only within clusters of households, provided that the abovementioned support from the central organizations is in place. For the more remote residents, it would be efficient to have the mid-level organizations, such as NGOs, to promote safe usage of the local sources. Education on water safety should be provided and individual water treatment technologies dissemination promoted (Figure 41).

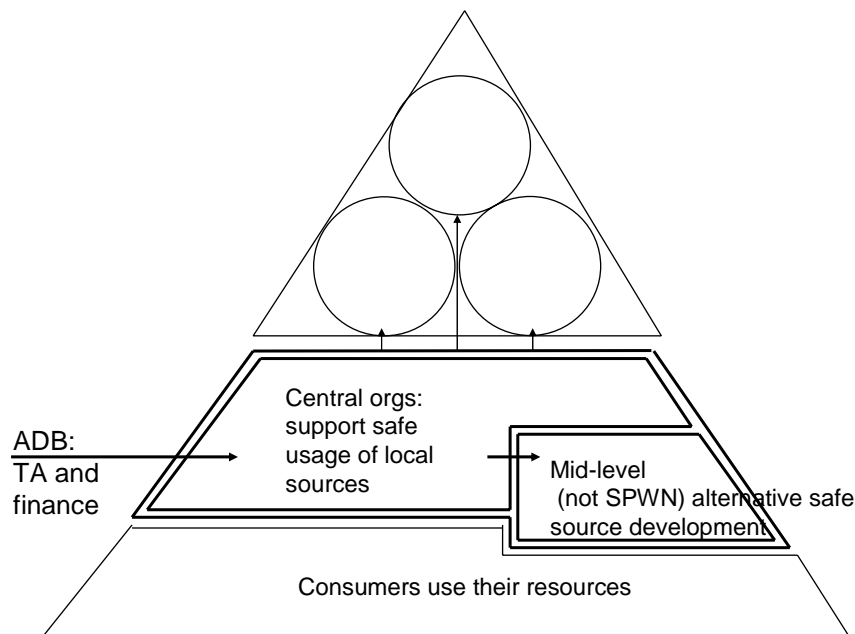


Figure 41 – Function distribution in a rural remote area

## 3. The relevance of worldviews

249. Although the ultimate goal of this study has been to propose actual policies to ADB, the researchers are not in the position to make the necessary ethical judgments about which

policies are “right” or “wrong” for different populations around the world. The final decision about which policies to pursue can not be based solely on the results of the researchers’ analysis. Further adjustment to the proposed policies depends on the worldviews of the decision makers who are accountable to their citizens. In this section, some implicit worldviews or values that are behind some of the most discussed and conflicting issues in water supply to the poor will be introduced. Their implications on the actual policies are briefly mentioned.

250. Firstly, communitarianism is an idea that the interest of a “community” should be prioritized over the individual. Empowering community-based organizations is considered intrinsically positive and leads to development of civil society. Elements of this thinking can be found in Putnam’s influential *Bowling Alone* (Putnam 1995). NGOs that work with the communities of the poor tend to promote water supply provision by CBOs or HOAs as a way for the organizations to mobilize payments from the individuals and generate revenues which can be spent for collective goods and further community development. That is even if the overall financial burden on the individual consumer is higher than classical individual water provision. Nevertheless, the likely possibility of the community elites using the profits only for their private interest should not be forgotten.

251. Secondly, utilitarianism is a group of philosophies arguing that the worth of an action is determined by its contribution to overall utility summed among all persons (see Mills 2001 for its application in ethics). If it is simplistically assumed that connecting any person to a piped system increased their utility by the same amount, according to this line of thinking it would be most fair to use the limited funds to connect the highest possible number of people by connecting those who are the cheapest to connect. Inhabitants of more remote or elevated areas who are more expensive to include in the systems should pay the extra cost by themselves. Current coverage targets in agreements of the providers promote this approach to expansion of their service. Also, the tariff structure motivates against including more remote residents. For example, in Vietnam the regulated tariff ceiling is based solely on the cost of raw water treatment, but the total operational cost also includes the expenditures for maintaining the pipe network and collection of the payments. These two elements increase with the distance of the consumers. Therefore, it is more profitable for the SSWP to connect the nearby clusters of households even if the remote ones pay for the construction cost of the network expansion. The problem with previously introduced simplistic assumptions about utility increase is that people who have no sufficient alternative source of water surely benefit more (their utility increases more) when included in the piped water system.

252. The last introduced view of justice is represented by the egalitarianism doctrine. It is based on the idea that the welfare of a society depends on the welfare of its worst-off individuals. Thus, improving the lives of the least fortunate improves the state of the society. Therefore, those who have the least should benefit most from the changes in policy (Rawls 1999). This view is apparently consistent with the major international players’ agenda in the water supply provision to the poor. WHO demands that focus should be placed on the least served; provision of a certain minimum necessary for health is required in MDGs and indeed poverty alleviation is the mission of ADB. This worldview apparently justifies cross-subsidies from the rich to the poor, for example, by charging everyone the same tariff even if the provision in the more blighted areas requires a higher cost for free-riding reduction tasks. Extending this line of thought, the poorest people who tend to live on geographical (as well as social) peripheries of water supply areas, should not be connected at a higher fee. The case of Ahmedabad is strongly egalitarian. It is not independently financially sustainable but if the state is willing and able to subsidize the programs in the future, financial sustainability is not an issue.

253. In conclusion, there is one policy that is desirable from these three points of views: including still the unconnected ones to the existing systems. Following the recommendations in the previous sections to provide conditions for the excluded inhabitants of the water supply areas to join the existing SPWNs would have three important implications: (1) service could be extended to a significant number of people with minimum expenditures, which would (2) improve situations of the poorest among the poor and (3) decrease socio-economic gaps in the structures of the communities.

## **VIII. CONCLUSIONS AND RECOMMENDATIONS**

254. The extent to which the findings from studying only four cases can provide for generalization is limited. On the other hand, the depth of available information (which enables viewing each pilot project as a separate case study) and the variation among the conditions of projects do provide insight into the relations of local context, project characteristics (especially function distribution), and its potential for sustainability. Supporting the selected SPWN projects have been a useful experiment, which provided valuable data on the mechanism of SSWP operations. Thanks to this effort by ADB, lessons about the sustainability and scalability of SSWP could be learnt. All projects have obviously improved the lives of the local people but the evaluation of improvement in quality of life was not the focus of this study. This chapter starts with a brief summary of the findings from the actual cases and follows with their implications, recommendations and policy proposals.

### **A. Local contexts, distribution of functions and the potential for sustainability of the studied projects**

255. In Ahmedabad, since there is practically free water supply in all urban poor areas via standpipes at least, there is no niche for classical SSWPs. The government only hires some NGOs as mid-level organizations, who further contribute to the creation and registration of CBOs as another intermediary representing the consumers. NGOs are considered more efficient and effective in pursuing the communication with the CBOs. One of the NGOs (SAATH) has been selected by ADB as the SSWP of the pilot project. Cost-recovery is not a goal in this government-funded program – AMC requires contributions of only 2,100 INR while the project cost is estimated at 15,000 INR per household. Thus, the NGOs' works do not include much of free-riding minimizations tasks. SAATH was financed for its work by ADB based on the number of households involved. Consumption is not metered, leakages not monitored, incentives or education against wasting are not provided, which has negative implications for financial and ecological sustainability. Consumers (except for slum dwellers) pay for water in form of a "water tax" which is 30% of the property tax and is not related to the actual consumption. "Free" water and low water connection fees, on the other hand, contribute to the social sustainability in the lowest income areas. Since the ADB-supported project was not yet operational during the data gathering process for this study, the outcomes could not be fully evaluated.

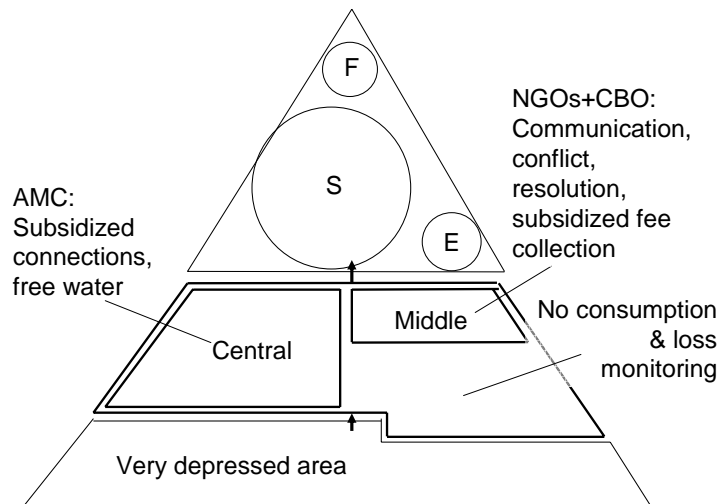


Figure 42 – Function distribution and sustainability potential of the pilot in Ahmedabad

256. In Metro Manila, West Zone case, the central utility bestowed upon the HOA excessive responsibilities for the tertiary water supply functions including financing, technical designing, cost of leakages. These appear to be beyond the HOA's capabilities, and the financial sustainability of the whole project is threatened. The hydraulic zone of 650HH is too large for an urban poor area, which makes collection efficiency low. The average NRW in this new system with pipes above the ground has already been over 15% the HOA has not been repaying 10% of their loan amortization. The HOA copes with the situation by charging excessive tariffs (13 PHP/CU.M. additional charge; instead of maximum 6 PHP/CU.M. stated in the MOA). Judging from the consumers' interviews, the high total tariff (26 PHP/CU.M.) provides incentives to save water but its social impacts are negative. The bulk tariff charged by MWSI to the HOA (and other "poor" communities) is 11 PHP/m<sup>3</sup>. (Their regular lowest block residential tariff is 13PHP/m<sup>3</sup>.)

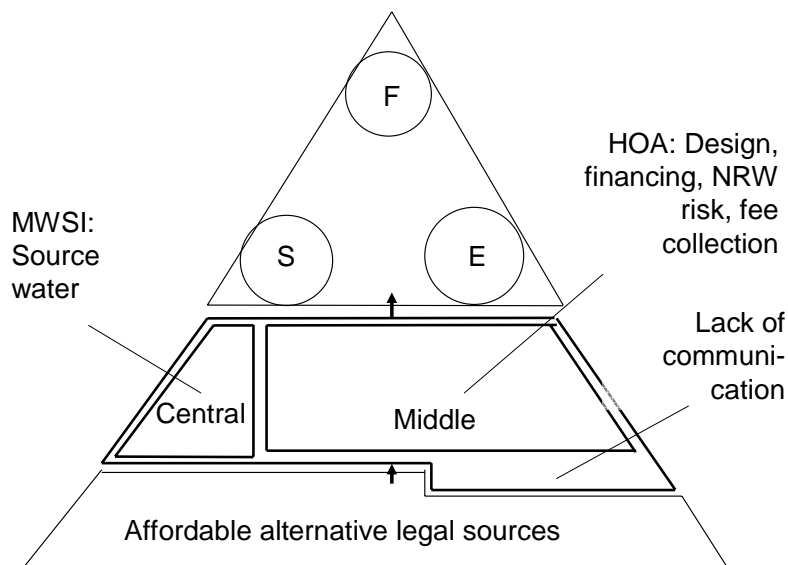


Figure 43 – Function distribution and sustainability potential of the pilot in Manila, West Zone

257. MWCI, on the other hand, hired local residents recommend by the local HOA to perform basic water supply tasks in their streets of approximately 20HH each for a small fee (averaging around 3 PHP/CU.M.). The outcomes have been significantly better in terms of the sustainability indicators. The collection efficiency is reported to be 100%, and average NRW is only 2%. This system has been found very effective for this context, although referring the local “street leaders” an SSWP may not be accurate.

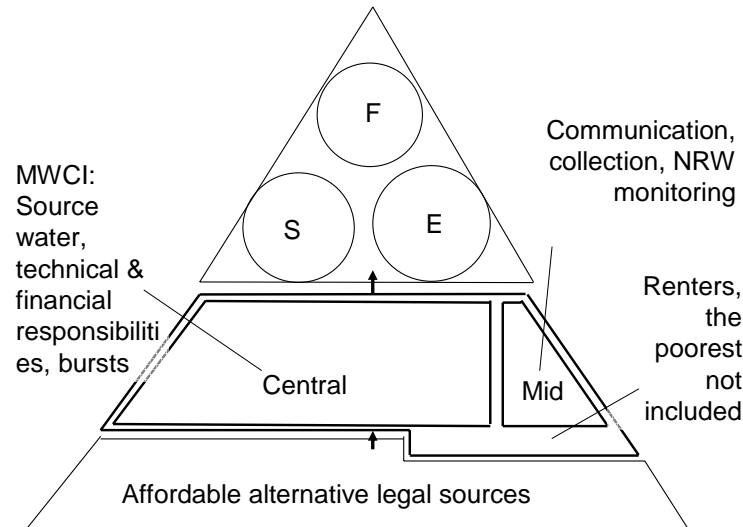


Figure 44 - Function distribution and sustainability potential of the pilot in Manila, East Zone

258. In Tien Giang province, since there is no central water supply utility, the SSWPs have to cope with numerous technical difficulties with various degree of success. The NRW is estimated at 30% but no clear base of the estimation has been provided because there are reportedly no reliable meters in place. Since regular checks are not practiced, concerns about the water quality have also been expressed. Using the ADB grant for connection fee decrease in the pilot project area, has decreased the willingness to pay the full connection cost in neighboring areas and complicated the expansion plans of the SSWP. On the other hand, their situation is made easier by the local government that facilitates information dissemination, easiness of payments collection and prevention of illegal connections in such a rural area. In Tien-Giang, the consumers pay 3000VND/m<sup>3</sup>. The provider estimates all of their operation expenditures (not only those related to obtaining the source) to a total of 2500VND/m<sup>3</sup>. Other customers of this company (and of other SSWPs with own ground water source) pay also 3000VND/m<sup>3</sup>.



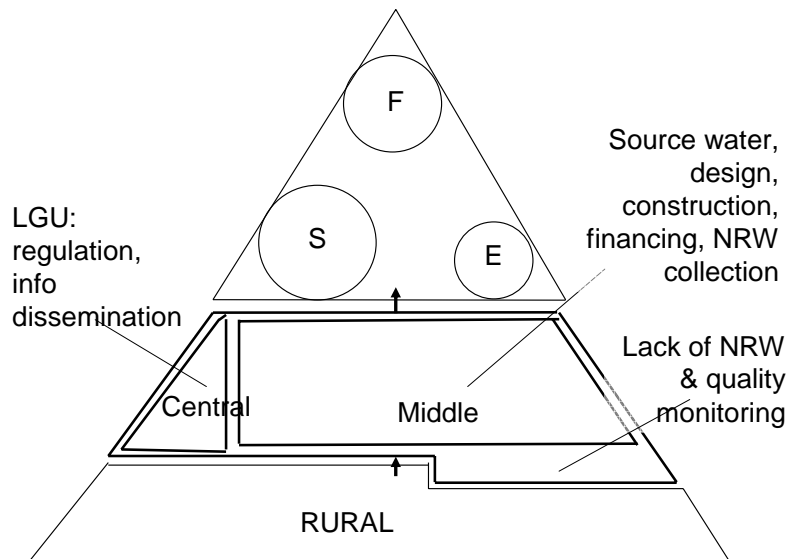


Figure 45 - Function distribution and sustainability potential of the pilot in the Tien Giang province

259. As a result of this general gap in responsibility for these functions, the renters do not have an opportunity to make decisions on their own about participating in the water systems. Some consumers are not informed about the opportunity and remain uninvolved. Also, the poorest ones may not be invited to join or may not even consider joining and pay higher unit costs for water from others. Those who are both very poor and have lack of social relations in the area to share a water connection and its cost find the expenditures too high and remain unconnected. The people living on the periphery of the water supply areas tend not to be included.

## B. SSWPs as mid-level stakeholders in water supply

260. Rigid definition of the SSWPs and SPWNs has been found to be problematic. The boundaries of the systems are not always clear, their sizes vary considerably, and it is not always possible to clearly determine which of the involved organizations “the SSWP” are. (The SPWN in the West Zone of Metro Manila is operated by an umbrella community organization which is composed of several HOAs. 650HH in this area are covered by two bulk meters. The Panghulo community of 290 HH in the East Zone of Metro Manila has bulk meters in each street of around 20HHs. In the case of Ahmedabad, the Municipal Corporation extended their network to around 200 households by individual connections without any bulk or individual meters. In Vietnam, the existing “SSWP” added to their existing network around 500 HH from two communes as part of the ADB project.) The identified stakeholders could be approximately categorised into three levels: central, middle and local. The central-level stakeholders are, for example, state governments, central water supply utilities, or public water supply-related organizations. The local stakeholders are mainly the actual individual consumers. The mid-level is filled with various organizations, taking up some water supply functions in between the central and local level. Small private organizations, NGO, or CBOs belong to this category. All of the officially designed SSWP providers in the pilot project carry out some functions on this middle level. Some of these pilot SSWPs, such as the HOA in the East Zone of Manila, or the NGO in Ahmedabad would not be considered as SSWPs according to the definitions identified in the

literature review. What they have in common is that they operate between the central and local levels (but they are not the only organizations in the projects that do so.)

## **1. Effectiveness, efficiency, and accountability of mid-level stakeholders**

261. As compared to the central-level organizations, the mid-level organizations, including SSWPs, tend to possess the following beneficial characteristics in the studied cases:

- Local (social, geographical) knowledge (+)
- Presence in the area (+)
- Lower opportunity cost of time (+)
- Reputation within the area (+,-)
- Less legal constraints (+,-)

262. The last two characteristics can function as strengths in some situations and weaknesses in others. Since the mid-level players tend to be known among the inhabitants of the water supply areas, they can generate more trust among them but bad relationships can endanger the sustainability of the project. Less legal constraints enable higher flexibility and creative approaches to legal and bureaucratic obstacles in supplying water to the poor. On the other hand, it also creates risk for abuse of the power coming from control over such a crucial resource.

263. The above listed characteristics make the mid-level organization especially suitable for water supply functions, which require the following:

- Communication with the residents
- Exertion of social pressure
- Labor or time-intensive, routine water tasks in the area
- Operations in unofficial settlements, strict dealing with delinquents

264. Overall the mid-level players are most efficient in functions related to limiting free-riding.

265. On the other hand, as compared to the central-level organizations, the mid-level studied organizations tend to possess the following negative characteristics:

- Lack of management, accounting and technical knowledge and skills (-)
- Lack of financial capital and access to credit (-)
- Reputation (+,-)
- Lack of legal constraints (+,-)

266. Therefore, when the mid-level organizations assume some water supply functions from the central organizations, the central organizations need to compensate for these weaknesses by carrying out the following functions:

- Training, accreditation, perform sophisticated technical tasks
- Financial investment, provision of access to financial credit, bear financial risks
- Conflict resolution
- Payments regulation and water quality guarantee

267. Overall, the central organizations are most suitable for functions related to creation of supportive environment for the mid-level organization and protection of the consumers' right, which need to be carried out for sustainability of SPWN.

## **2. Sustainable distribution**

268. The optimum distribution of functions among the central and middle level organizations should satisfy the following conditions:

1. All necessary functions and task in the given context should be covered
2. The tasks are performed by the stakeholders who are most efficient and effective and accountable
3. There is no unnecessary overlap between the tasks performed by the different stakeholders

## **3. Relevance of the local context**

269. The most relevant physical and social context characteristics which influence the relative importance of the water supply tasks are:

- Type of water source
- Availability of alternative water sources,
- History of water supply
- History of habitation, density of settlement
- Main employment
- Presence of community organizations

270. By these contextual characteristics, inclination for free-riding among the consumers is affected the most. Consequently, there are varying requirements on the providers to possess good local knowledge and social relationships to be able to carry out necessary tasks for free-riding prevention and reduction.

## **C. Replication, scaling up and the role of ADB**

271. The construction period of the studied systems was the same as in the already-existing schemes in the respective countries. The additional time for MOA preparation in each case took over one year. Well-organized cooperation with the mid-level players can have positive impacts on water supply sustainability, but naturally, this arrangement cannot be feasibly scaled up by ADB's direct support to each individual SSWP. In fact, direct financial support for selected cases can be counter-productive to further scaling up.

272. The general process of the replication and scaling up would consist of the following steps:

- 1) The local context determines which tasks could be optimally assumed by the mid-level organizations.
- 2) The central organizations provide a supporting and controlling environment for the mid-level organizations

- 3) ADB provided TA and financial assistance to the central organizations to be able to do so

## 1. Supporting legal and regulatory functions for sustainable scaling up

273. SPWNs have been proliferating mainly due to: (i) inability of the “central” formal supply systems (local government bodies or utilities/boards) to provide services to households that lack land tenure (read as urban poor); and (ii) inability of formal systems to reach all households in unserved pockets purely due to terrain issues. From a legal perspective, it is critical to determine the local governments’ long-term role in service provision to households that lack land tenure. The urban poor tend to constitute around one third of the city’s population and; a large proportion do not have legal land titles. Since water supply is a “mandatory” obligation of the local governments, it is important to determine how they will oversee water provision to the disadvantaged section of the population when the law does not currently allow for it. While there is an alternate form of providing these services through the SPWN, it is critical to determine how this relationship is formalized in the long-term, and the ability of the central organizations (LGUs, utilities) to regulate service delivery<sup>27</sup>. Moreover, these central organizations should be made aware about the optimal tasks’ distribution in different context, and what the appropriate level of responsibility that various mid-level organizations can assume is (especially in terms of financing and technical functions). Firstly, the central utilities should be accountable for the following functions, to assure consumers rights access in SSWP-operated schemes necessary for social sustainability.

- Regulation of tariffs, connection fees, payment schemes to protect against abuse, but enable reasonable profit for efficient providers.
- Design a business model for calculation of the appropriate charge.
- Maximum tariff should be based mainly on the cost of obtaining the source water (e.g. the bulk tariff of the central utility or the cost of extraction and treatment) with some consideration to which operational tasks are required in the given context. Another possibility in urban areas is to set the tariff ceiling uniform for all consumers, whether directly connected to central utility or supplied by SSWPs.
- The additional cost required by SSWPs to reach the residents of the blighted areas can be covered by the central utilities (similar to the MWCI case) or subsidized by the local governments to ensure equity<sup>28</sup>.
- Connection fees should be generally sufficient to cover the reticulation cost but should not be charged upfront lump sum.
- Authorization and registration of locally socially acceptable providers and organizations with sufficient capabilities to provide sustainable water supply. The registered SSWP should be provided access to official loans. However, public finances should not be spent to unconditionally subsidize operations of private-profit based operators, even for seemingly socially positive expenditures, such as one-time decrease of the connection fee.
- Provide information to the consumers about the opportunity to join, specifics about the costs and benefits, the procedure for applying, and consumers’ rights such as the maximum tariff. Scaling up does not need to occur only by expanding to new territories. There are existing pockets of urban poor along existing water networks. Large populations can be cheaply covered by identifying these pockets and giving them the opportunity to connect to the system.

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<sup>27</sup> Comment of V. Padmanabhan (ADB)

<sup>28</sup> Recommendation based on A. Chiplunkar’s (ADB) comment.

- Conflict resolution regarding land usage, illegal connections, and payments between the consumers, the consumers and the provider or a CBO, or between CBOs
- Hearing service complaints about water quality, hours of service, providers' or CBOs' requirements etc. MOAs cannot be designed and signed for every detail in the naturally scaled-up systems as was done in the pilot. Conflicts can be resolved by a responsible local authority. Output standards are preferable to input standards which may be prohibitive for most small organization and thus prevent scaling up. Local authorities should also carry out independent regular monitoring, especially of water quality based only on complaints.

274. Secondly, the central utilities, possibly with assistance from ADB, should provide a supportive environment for the mid-level organizations that operate or could operate as SSWPs to achieve financial and environmental sustainability. These include the following.

- Technical training on metering, NRW and water treatment
- Access to official loans

275. Thirdly, ADB can channel through the developed central and mid-level organizations, such as local and international NGOs and local banks, and provide financial and organizational support for the consumers' communities and individuals. As Technical Assistance, ADB can determine an appropriate level of financial support for the SSWPs' development in each region based on the estimated financial capacities of the local governmental units and public benefits from the improved infrastructure. Financial assistance to individuals can be provided for saving schemes, support for opening of individual bank accounts (which increases chance for access and have other positive externalities).

276. Special attention should be paid to include the not yet connected inhabitants of areas. Following the recommendations above to include them in the provided services would have important implications. Services could be extended to a significant number of people with minimum expenditures, which would improve situations of the poorest among the poor and lead to decreased socio-economic gaps in the structures of the communities.

277. Pipe networks are not feasible in very remote areas. In such context, the mid-level players can help to implement safe technologies for usage of indigenous water resources such as rainwater.

## REFERENCES

- Asian Development Bank. 2004. Small Piped Water Networks: Helping Local Entrepreneurs to Invest. ADB "Water for All" Series. Asian Development Bank.
- Bernard Collignon and Marc Vezina. 2000. Independent Water and Sanitation Providers in African Cities: Full Report of a Ten-Country Study. Water and Sanitation Program.
- Bourdieu, P., Ed. (1986). Forms of capital Handbook of Theory and Research for the Sociology of Education. New York, Greenwood Press.
- Lin, N. (2001). Social capital: A theory of social structure and action. Cambridge, Cambridge University Press.
- Matous, P. and K. Ozawa (2007). "Relations between Community-Based Infrastructure Development and Squatters' Social Capital: A Case Study of a Bulk Water System in Metro Manila, the Philippines." The International Journal of Environmental, Cultural, Economic and Social Sustainability 3 (5), 179-192
- McIntosh, A. C. 2003. Asian Water Supplies: Reaching the Urban Poor. ADB and International Water Association.
- Mill, J. S. (2001) Utilitarianism. Indianapolis, Hacklett Publishing Company
- Morgan, M. G., B. Fischhoff, et al. (2001). Risk communication: A mental models approach. Cambridge, Cambridge University Press
- Putnam, R. D. (1995) Bowling Alone: Americans' Declining Social Capital. Journal of Democracy 6(1): 65-78
- Rawls, J. (1999) A theory of Justice (revised edition), Oxford, Oxford University Press
- Tova Maria Solo. 2003. Independent Water Entrepreneurs in Latin America *The other private sector in water services*. World Bank.
- UNDP and World Bank. 1999. Improving Water Services through Small Scale Private Providers: Water Vending in Chennai (Madras). Field Note.
- UNDP and World Bank. 2002. Water Services in Small Towns in Africa: the Role of Small and Medium-Sized Organizations. Field Note.
- Water and Sanitation Program. 2004. The Experience of Small-Scale Providers in Serving the Poor in Metro Manila: Increasing Access. Field Note.
- Water and Sanitation Program. 2005. The Small Town Pilot Project in Peru: a Private-public and Social Partnership to Change Water and Sanitation Management Models.

## APPENDIX: SEMI-STRUCTURED INTERVIEW WORKSHEET FOR SSWP AND EXPERTS

### INTRODUCTION

Good morning/afternoon. My name is \_\_\_\_\_. I'm (e.g. a student of the University of the Philippines) and we are doing a survey for the Asian Development Bank. We are doing a study about the water supply in this area. We promise that information that you will tell us will be kept confidential. We will appreciate if you will cooperate with us. The interview can be finished in approximately XX minutes but you can stop anytime.

### A. SOCIAL CONTEXT

#### Perceived cohesion

##### History

*When did the first people come here? Where did they come from?*

*What was here before?*

*Are most of the people here from the beginning?*

##### Area dynamics

*Were most of the people born here?*

*How long does take for newcomers to get accepted by the people here? (Howlong did it take you not to feel like a newcomer?)*

*Do many people come and leave the community each year?*

##### Diversity

*What are the major occupations of the people here?*

*Which religions do you have here? Which churches do you have here?*

##### Control

*Have customers reported illegal connections or something on their neighbors?*

##### Safety

*Have you had cases of deliberate leakage?*

*Have some meters been stolen? Do you think the delinquents come from this place?*

*Have you encountered any danger during money collection?*

*Would you say this place is safe?*

##### Trust

*Would you say most people can be trusted here or you can't be to careful dealing with people?*

*Do most neighbours know each other here?*

##### Events

*Do you have some formal meetings where all neighbors meet?*

*Are there many social events here? Do many people participate?*

*Are there any community projects?*

## **B. SSWN & SSWP CHARACTERISTICS**

**Technical system** – ask only questions which are not covered by the competition report for the SSWN

System parameters

*What type of pipes/fittings do you use?*

Way of implementation

*When did you start implementing the system?*

*What kind of technology did you use to construct the network?*

*Was the implementation gradual all did you connect most of the people from the very start?*

### **Leadership and Enforcement of rules**

Franchise

*How did you obtain the franchise?*

*What was your position in the community before the bulk water supply started?*

*What is your position now?*

*Who are the most important people here?*

Leader

*Do you have many friends here? What is your relation to other leaders of this organization? Do you have friends among leaders of other organizations?*

*Do you know most of people living here? Did you know them when you started?*

*Do you have some enemies here?*

Written and unwritten rules

*What are the most important rules for the consumers?*

Violations

*What kind of violations of rules have you encountered?*

*Have you got some unsettled conflicts?*

Resolution

*How do you deal with violators?*

*What if it doesn't help? Has it happened? What are the next steps?*

*Do you use threats? Does it work?*

*Do you approach different kind of mischief differently?*

*Did you have to disconnect some people?*

Authority

*Who do you approach if you cannot resolve the conflict by your self?*

*Are these people generally respected? Does it always work?*

*How have they gained their authority?*

*Do you have you have to do something in return for the help of the authorities? Do you treat them for meals? Do you give them some presents?*

*Do you sometimes have to give money to some authorities?*

### **Management capacity and Baseline skills**

Previous experience

*What's your job experience?*

*Volunteering activities or livelihood projects?*

*Which schools have you attended?*

*Have you taken any courses?*

*Have you participated in any training directly related to water supply?*

Operation and training

*How long did it take to master all the tasks?*



*Could you do meter-reading and basic accounting before? Where have you learnt it?  
Who has taught you most?  
Who fixes leaks when they occur? Where has she learnt it?  
Do you sometimes encounter some problems, which you don't know how to fix? What do you do then?  
Did you find it difficult in the beginning to deal with people you supply water to? Do you find it difficult now?  
Have you taught your skills to someone else?  
Are you running or planning to run bulk water supply also in some other area?*

#### Water supply organization structure

*How do you divide your responsibilities inside the organization?  
How do you make investment decision?  
How to you set tariff, connection charges and acceptable forms of payment?  
Have you accepted new people to the organization who were not with you from the beginning?  
Have some people left the organization?*

#### Central utility (where applicable)

*Can you count on help from the central utility if you encounter any problems?  
Have you had any conflicts with the central utility?*

### **Payments**

#### Connection fee

*How much do you charge for a connection? What is the payment scheme?  
How much do you charge for water in total?  
How often is the billing?  
How do you collect the money?  
Do you accept partial payments? Can you eventually collect the whole bill?  
Do you accept non-cash payments?  
How much is the average bill?  
How much do the poorest pay?*

#### Price

*Do people complain about the price of water? (Other covered by question about alternative and previous sources of water supply.)  
Is it more difficult to collect money when water supply is insufficient?  
Do you explain the components of the price?*

#### Motivation

*Do you explain the customers the importance of paying? How?  
Are they aware of other alternatives?*

### **Sense of ownership**

#### Communication

*How often do you meet the customers?  
Do you hold regular meetings?  
Do you inform them about details of your operations?  
Do you teach them some technical aspect of the water supply? How to read bill by themselves? How to fix leakages?*

#### Support

*Do people report leakages?  
Do people fix leakages by themselves?  
Have some reported illegal connections?*

#### Community building

*Do you invest some of the generated profit back into some other projects that benefit the community?*

## **C. OUTCOMES**

### **Water availability**

Coverage – ask only questions which are not covered by the competition report for the SSWN

*How many houses is connected to your network?*

*How many meters are in the network?*

*How many houses is in the area?*

*Why are not all houses connected?*

*Where do they get their water?*

Pressure

*Do you sometimes experience lack of water?*

*Is the water flow always sufficient?*

*Are there any area where people complain about the pressure?*

*Can the flow up to the second floor?*

*Are there typically some parts of the day when people can get no water in some areas?*

*Are there typically some parts of the year when people can get no water in some areas?*

Other sources

*What kind of water supply had been available here before you started this system?*

*What kind of other sources is here available now?*

*What happened to the operators that quit?*

### **Financial performance**

Balance sheet – ask for hard data

*How much money could you collect in the last month?*

*How much did you have to pay to Manila Water last month?*

Billing efficiency

*Is it difficult to collect the payments?*

*Do people usually pay on time?*

*Can you eventually collect the delayed payments?*

NRW (illegal losses)

*Have you discovered any illegal connections?*

*How much water do you loose because of illegal connections?*

*Do you know 'Patulo system', or 'Patak-patak'?*

*Is it common here?*

NRW (physical losses) – ask for hard data (main and household meter readings, billed volume)

*Have you experienced any leakages?*

*How often?*

*How much water does usually get lost because of leakages?*

## APPENDIX: SEMI-STRUCTURED INTERVIEW WORKSHEET FOR CONSUMERS

Name of Street:	Questionnaire no.:
Household code:	Date:
Interviewer:	

Name of Respondent:	Time Start:
Gender: M / F	Time End:
Relationship to Household Head (if applicable):	

### INTRODUCTION

Good morning/afternoon. My name is \_\_\_\_\_. I'm (e.g. a student of the University of the Philippines) and we are doing a survey for the University of Tokyo in Japan. We are doing a study about the water supply in this area. We promise that information that you will tell us will be kept confidential. We will appreciate if you will cooperate with us. The interview can be finished in approximately 15 minutes but you can stop anytime.

### RESPONDENT IDENTIFICATION

1. What is your name? \_\_\_\_\_
2. How old are you? \_\_\_\_\_
3. Do you have a husband / wife? (If yes, ask if married) \_\_\_\_\_
4. How many children do you have? \_\_\_\_\_
5. What town / province were you from? \_\_\_\_\_
6. When did you come to this area? \_\_\_\_\_
7. Do you own or rent this house? \_\_\_\_\_
8. Are you planning to stay here in the next years? \_\_\_\_\_
9. Would you say it takes a long time to be accepted here? \_\_\_\_\_
10. What is your main occupation? (take note of other current occupations) \_\_\_\_\_
11. What is your religion (if any)? \_\_\_\_\_

### ACCESS TO WATER

12. Where do you get your water from? How? What is your relationship to that person?
13. How much do you pay for it?

### PROFITS FROM THE WATER SUPPLY

14. Do you sell water to anyone? How? What is your relationship to that person?
15. How much do you charge?

### LOCAL SOCIAL CONNECTIONS

16. Would you say most of your friends/family come from this area?
17. Do you have any relation with the SSWP?



**For those with a connection:**

18. How did you get money for your water connection?

**ACCESS TO FINANCIAL CREDIT**

19. Did you borrow money from anyone? What is your relationship to that person?

**ACCESS TO INFORMATION**

20. How did you learn about the opportunity to get a water connection? From whom? What is your relation to that person?

**RELATIONS WITH NEIGHBORS**

21. Do you share you water connection with someone? What is your relation to that person?

22. Did someone help you to obtain the water connection in anyway? What is your relation to that person?

**For those without a water connection:**

23. Why didn't you get a water connection?

**ACCESS TO INFORMATION**

24. Did you know about the possibility?

**ACCESS TO FINANCIAL CREDIT**

25. Did you have enough money? Did you try to borrow from someone? (What is your relation to that person?) Did you try to ask for a later payment?

**Appendix: Lists of Informants  
The Philippines**

Org	Name	Position	Description	Purpose
IPD (Institute for Popular Democracy)	Jude H. Esguerra	Executive Director	Executive Director of IDP that in charge of: research for change, education for empowerment, analysis for action and democracy as advocacy	- Project issues: registration, financing, social exclusion - Scalability, Future options
Makawili Foundation	Epitacio Magbiro	Chairman		- General policies/structuring, Community dynamics, Illegal connections, Overcharging issues
MWCI	Emil C.Cabrera	Territory Manager, Pasig Business Area	Territory Manager of Manila Water. In charge of local area	- Connection fee, Individual connection, NRW, Punishment, Change of stakeholder, Local government, Working condition
MWCI	Rodney D.Cruz	Territory Manager, Pasig Business Area	Territory Manager of Manila Water. In charge of local area	
MWSI	Rex Ruidera	Zone head		- Background/Social connection, History and general information, Block leaders, Voluntary system, home owners association
MWSI	Job Cavares	BC Manager		- Project implementation, Future potential, Causes behind project delays, ADB vs. other projects, Labor contributions, billing and collection, deal with competition
MWSI	Mariric M.Delacruz	Program Management Coordinator		
MWSI	Aurora G.Canape	SAVP-Treasury		

NWRB	Ramon B.Alikpala	Executive Director	Main water regulator for water supply in Philippine	- Regulation ( charge & price, water quality, SSWPs), Concession, Registration, Replicability
Panghulo	Razel Bisig	President	President of Panghulo area, In charge of local area (management, fee collection, meeting organization, etc.)	- Details of the HOAs and street leaders operations"
Streams of Knowledge	Rory Villaluna			Networks of SSWPs, Scaling up, Exclusion and other ideas
	Tony De Vera	International Consultant		Pilots' characteristics, Implementation, Replicability, Scaling up, International (Indian and Vietnam cases)
	Cirio E.T.Cruz	Local consultant		Pilots' characteristics, Replicability (area characteristic, social/organizational characteristics), Scalability (speed of implementation, future possibilities, longer term)



**India**

Org	Name	Division	Position	Description
Ahmedabad Municipal Corporation	Anand Patel	Slum Networking Project	Deputy Engineer City	Officer of AMC who is in charge of SNP. Admits that SNP would not be feasible without the help of NGOs.
CEPT University	Madhu Bharti	Faculty of Planning & Public Policy	Head, Department of Housing	Professor at CEPT University, in charge of preliminary research on the situation of slum water supply in Ahmedabad for RETA6325
Chamundanagar CBO	Ramesh		CBO Leader	We interviewed Ramesh and 12 other CBO leaders (total of 13) at the site.
Mahila Housing SEWA Trust	Bijal Bhatt			Mahila Housing Trust (MHT) is in charge of many of the other Slum Networking Project sites, but is strongly opposed by the state government and ADB's decision to exclude MHT from some of the SNP projects "due to political reasons"
SAATH (Contracted)	Hasmukh Panchal		Civil Engineer	Engineer for the Chamundanagar (ADB Pilot) project. In charge of entire engineering phase (e.g. designing pipes, mobilizing contractors, etc)
SAATH (Contracted)	Rajendra Joshi		President	President of SAATH, the NGO in charge of the RETA6325 Project as well as a few other SNP projects
Samarpan Org.	Deepak Solunki		President	Leader of the Narsinghnagar CBO. About 6 other leaders of the CBO joined the meeting

## Vietnam

Organization	Name	Position	Description	Purpose
CERWASS	Le Minh Nham	Director	On behalf of DARD in the project	- Implementation, Funding, Price frame, Chosen of water provider for ADB, Water supply (urban and rural), Organization of DARD, Tasks in project
Saigon Corporation	Le Anh Dao	Vietnam Domestic Consultant	Vietnam Domestic Consultant	- Implementation, General Context, Terms of privatization in TG, Setting of tariffs, NRW, Funding, Price frame, Chosen of water provider for ADB, Checking quality, Relationship of stakeholders in project, Tasks in project
Tan Huong People's committee office	Duong Bao Toan	Leader		- Main Tasks of Commune, Main Tasks regarding ADB Project, General Context, ADB Project
Tan Huong People's committee office	Pham Van Trieu	Vice-Leader		
Tan Huong People's committee office	Le Van La	Staff		
Tan Huong People's committee office	Le Van Tao	Staff		
Tan Ly Tay People's committee office	Tran Van Tam	Leader		

Tan Ly Tay People's committee office	Ngo	Thanh Liem	Vice- Leader		General Context, ADB Project
Tan Ly Tay People's committee office	Vo	Van Hong	Staff		
TG People's committee office	Luu	Van Phi	Head of External Affair Department	- In charge of meeting organization for the survey	- 07/10:Structure of government offices in Vietnam, Survey schedule - 07/16: illegal connections (urban and rural), NRW, price frame, sorts of SSWPs, chosen of water provider for ADB
Thuan Phu Limited Company	Nguyen	Phuong Binh	Director		General information of Company, ADB project area, Project implementation, Regulation, Business, NRW, Connection with government and consumer
Thuan Phu Limited Company		Thao	Vice- Director	In charge of Water business in the company	- General information of Company, ADB project area, Project implementation, Regulation, Business, NRW, Connection with government and consumer, Tasks in project