WaterLinks
WATERNOTES
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FIELD NOTES FROM WATER OPERATOR PARTNERSHIPS IN ASIA 2010

MANILA PARTNERS WITH DANANG TO IMPROVE WATER QUALITY MANAGEMENT

In 2008, with assistance from the United States Agency for International Development (USAID) Environmental Cooperation-Asia (ECO-Asia) project, Da Nang Water Supply Company (DAWACO) and Manila Water Company, Inc. (Manila Water) engaged in a water operator partnership (WOP) to help DAWACO meet World Health Organization (WHO) standards for water quality in their pipe network. Manila Water helped strengthen DAWACO's capacity in water quality management through hands-on training, technology demonstration and peer-to-peer consultation. Over the 10-month partnership, Manila Water guided DAWACO in developing and instituting a rigorous pipeline cleaning program and a management plan that adopted standard operating procedures for proper water sampling and water quality monitoring. Through the partnership, 20,000 residents received improved access to water, and DAWACO increased staff capacity to scale up similar improvements in the remainder of DAWACO's service area.

"Working with Manila Water as a true peer in finding practical solutions to raise our low pipeline chlorine residual levels has really benefited us…DAWACO is scaling up these techniques to all branches of the company to supply better quality water for the population of Danang."

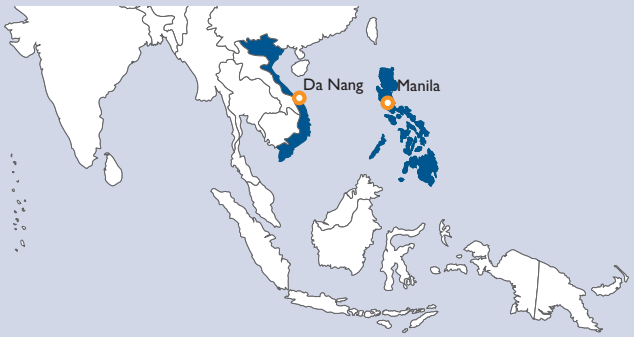
~ Mr. Nguyen Truong Anh, Director of DAWACO

I. CHALLENGE

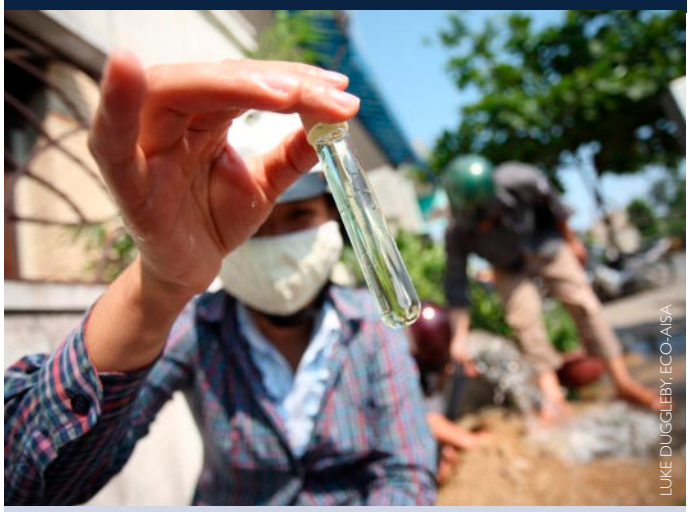
As in many Asian countries, Vietnam's economic growth has led to rapid urbanization. The country expects the number of people living in cities to grow by one million annually, reaching 46 million by 2020. Urban water operators face the daunting task of meeting increasing demand. In 2007, the Vietnamese government passed Ministerial Decree 117, requiring urban and rural water supply providers to improve the quantity and quality of their services throughout the country. A key element to achieving this goal is ensuring safe water supply provision through better water quality management.

PARTNERSHIP AT A GLANCE

- Facilitator: USAID ECO-Asia
- Mentor Partner: Manila Water Company, Inc. (Metro Manila, the Philippines)
- Recipient Partner: Da Nang Water Company (Da Nang, Vietnam)
- Duration: November 2008 to September 2009
- Impact: 20,000 residents with safe water



PARTNERSHIP SITE



Staff from the Da Nang Water Supply Company takes a sample of water to test for chlorine residuals in the pipe network.

Proper pipe flushing and disinfection program could reduce the risk of contamination by removing unwanted materials to stabilize chlorine residual levels

WHAT IS FREE CHLORINE?

Free chlorine, or chlorine residual, is the amount of chlorine available to disinfect contaminants in water, thereby eliminating the bacteria and viruses that cause diarrheal diseases. WHO recommends the presence of at least 0.2 mg/L of free chlorine throughout water supply distribution and at the farthest end of the pipe network to effectively destroy unwanted contaminants and pathogens that may affect human health.

ABOUT DAWACO

- Serves about 109,000 customers
- Operates three water treatment plants
- Maintains about 3,500 km of pipes
- Aims to serve potable water by 2015
- State-owned operator with 460 staff

ABOUT MANILA WATER

- Serves nearly six million residents in the eastern portion of Metro Manila
- Manages one water treatment plant
- Maintains chlorine residual levels that meet WHO standards at all times
- Has an ISO-accredited central water quality testing laboratory
- Private operator with 1,550 staff

The Da Nang Water Supply Company (DAWACO) serves 60 percent of the population of Da Nang, Vietnam's third largest city. To meet the government decree, DAWACO is currently improving and expanding its operations. Its vision is to supply potable water to all of its residents by 2015. However, in evaluating its systems and processes, DAWACO recognized the urgent need to enhance water quality management in the distribution network. DAWACO had inadequate chlorine residual levels in portions of the network, increasing the risk for contamination and exposure to waterborne diseases.

2. APPROACH TO MITIGATING WATER QUALITY RISK

In Vietnam, the WHO works with policymakers and water companies to support improved water quality management. WHO advocates the development and application of the Water Safety Plan (WSP), a framework for ensuring water quality using risk management methods. This provides a structure for water companies to assess their current operations and identify any public health hazards that may occur along the supply chain, from raw water extraction all the way through distribution.

USAID, through its ECO-Asia project, cooperated with WHO to facilitate WSP development and capacity building activities for selected water operators in Vietnam, including DAWACO. After completing its WSP in 2007, DAWACO identified constraints in maintaining adequate amounts of residual chlorine in its distribution network. Water sampling results from selected service areas indicated either extremely low or zero chlorine levels, thus increasing the risks for DAWACO's customers to contract waterborne diseases.

Recognizing its inadequate equipment and human resource capacity to manage its water quality, DAWACO reached out to WaterLinks about opportunities for linking with other water operators to address these challenges. With assistance from ECO-Asia under WaterLinks, entered into a WOP with Manila Water Company, Inc. (Manila Water), a regional leader in water quality management. The WOP operated from November 2008 to October 2009.

3. WATER SAFETY IMPROVED THROUGH WATER OPERATOR PARTNERSHIP

IDENTIFYING WATER QUALITY RISK

In November 2008, as a first step in the WOP, Manila Water conducted a 3-day rapid assessment of DAWACO operations. Through field investigation, interviews and desk studies, the Manila Water team reviewed raw water sources, treatment facilities and operations, distribution networks, and water sampling and analysis procedures. The analysis of DAWACO operations confirmed substandard chlorine residual levels in parts of the distribution network (particularly in areas farthest from the treatment plant) as well as inadequate water sampling and monitoring practices.

TABLE: RESULTS OF THE COMPREHENSIVE AUDIT OF DAWACO OPERATIONS

Water Supply System	Findings and Constraints	Potential Solutions
Raw Water Source	Lack of daily raw water sampling and monitoring procedures	Proper monitoring to determine in advance the amount and type of chemicals needed for water treatment
Treatment Plant	Prolonged downtime during power outages may cause contamination both at the treatment plant and the distribution lines, especially if pipes are leaking	Standby generator to power operations in case of outages
	Lack of established sampling and analysis plan for microbiological, biological, physical, chemical and radiological parameters	Procedures to record, analyze and report critical parameters to enable early detection of contamination
Distribution Network	Aging and deteriorating pipes contribute to lower residual chlorine based on records of samplings and tests	A phased pipe replacement program and/or cleaning program to remove sediments and reduce leakages
	Inadequate number of flushing points in the distribution network	Installation of blow-off or fire hydrants in accessible and strategic locations to support pipe flushing efforts
Laboratory	Insufficient laboratory equipment, instrumentation and procedures for testing and analyzing standard water quality parameters	New equipment with proper procedures and information channeled to main office and relevant branches
Compliance	Lack of established criteria for selection and frequency of sampling and testing (e.g. the number of sampling points versus the number of households is insufficient)	Sampling and testing system that include size and complexity of network lines, the rate of records yielding unsatisfactory results, disinfection processes
	No procedures to respond to customer complaints regarding water quality	Incident management plan to monitor/manage customer grievances and isolate areas with water quality issues

The team also worked with DAWACO to further pinpoint the most probable cause of the low chlorine levels, as summarized in the table above.

Based on the assessment findings, DAWACO decided to focus efforts on distribution network through proper cleaning and re-chlorination and on water quality sampling and monitoring improvements. The partners developed a WOP activity plan to help elevate and stabilize chlorine residual levels and to improve overall water quality management in the distribution network. They agreed that the key to a successful water quality management plan would include not only physical infrastructure improvements, but capacity building for DAWACO staff.

PREPARING AN ACTION PLAN

In January 2009, Manila Water performed an in-depth field and desk investigation of DAWACO's pipe network to design locally appropriate techniques for residual chlorine maintenance. Manila Water and DAWACO looked more closely into service areas with low chlorine, studied the piping system and its appurtenances (such as valves) and collected samples that confirmed low chlorine levels. Manila Water also shared information on its operational practices on water sampling and reporting.

The partners then agreed to target areas with extremely low levels of chlorine residuals and worked closely with key branch offices on monitoring. They also sought service areas with adequate pipe network information and that were relatively easy to isolate in terms of water flow. They identified several residential areas in Son Tra branch where about 4,000 customers had low or no chlorine residual levels.

Manila Water and DAWACO then prepared an action plan comprising of short-term (within three months) and medium-term (less than one year) strategies based on Manila Water's own experiences and on local conditions in Da Nang. In the short term, DAWACO would conduct pipe flushing and disinfection in affected lines and continuously monitor and analyze residual chlorine levels. Medium-term activities included installation of strategically located blow-offs within the target areas (including repair of defective valves) to check for color, pH and turbidity, and preparation for re-chlorination processes.

TAKING ACTION TO IMPROVE WATER QUALITY

From February to October 2009, Manila Water provided technical support to DAWACO in implementing the action plan through a series of on-site training and monitoring events and remote consultations. To begin with, Manila Water trained DAWACO in the use of Trimeter equipment to better measure on-site chlorine, color and turbidity levels. Manila Water also gave hands-on training and sample templates for proper water sampling procedures and better recording and analysis of results.

As a result, DAWACO completed new Standard Operating Procedures (SOP) on sample handling and testing and drafted internal guidelines on executing sanitary surveys, onsite review to identify problems that affect water quality based on a physical inspection of the water system and the system's operations and maintenance practices. Based on Manila Water training, DAWACO also drafted an Incident Management Plan (IMP) to immediately address field problems reported through the surveys or customer complaints through integration with the operations department.

Manila Water also demonstrated practical techniques to DAWACO to prepare for and implement a pipe flushing and disinfection program. It helped DAWACO develop an SOP on pipe network management that stresses pipe flushing and disinfection, including calculation of appropriate chlorine dosage, estimation of water losses, and installation of necessary flushing points. DAWACO then installed at least 10 new flushing points, such as blow-offs or fire hydrants, in Son Tra branch areas to allow for better pipe cleaning. It also converted several pipe-end caps to flushing points and introduced night flushing activities to improve the cleaning methodology and minimize disturbance to service delivery.

To help with medium-term solutions, Manila Water worked with DAWACO to identify potential locations for and types of rechlorination technologies. It gave DAWACO an interim portable chlorinator device to elevate chlorine levels at a pumping station serving the Son Tra area. DAWACO planned to install a permanent system as part of its water quality management improvement program. DAWACO also visited Manila Water twice to see first-hand how its partner operator manages and monitors water quality on a daily basis, conducts pipe cleaning activities, and rechlorinates in strategic locations.

4. PARTNERSHIP RESULTS

In the pilot areas, DAWACO implemented several pipe flushing and disinfection activities and was able to raise the residual chlorine levels by nearly 50 percent to at least 0.2 mg/L. Coupled with the interim rechlrination unit, the WOP resulted in stable residual levels that meet WHO standards and benefit nearly 20,000 residents. Key DAWACO technical experts also gained practical knowledge to monitor and manage water quality continuously.

Encouraged by the positive impacts, DAWACO plans to purchase and install a new rechlorination system and replace deteriorated pipes identified through the partnership. It also plans to apply similar programs in other service areas, including Lien Chieu and Ngu Hanh Son. DAWACO is working to become a practice leader in this sector and intends to meet its goal of having potable water supply by 2015.

PARTNERSHIP TIMELINE

Nov 08	Manila Water visits DAWACO for rapid assessment
Jan 09	Manila Water visits DAWACO to investigate distribution network and training on water quality management
Feb 09	Manila Water visits DAWACO to finalize WOP action plan, select pilot areas and train on pipe flushing program design
Mar 09	Manila Water visits DAWACO to train on sampling and pipe flushing
Apr 09	DAWACO visits Manila Water to observe water quality laboratory procedures and incident management
May-Jun 09	DAWACO completes SOPs and implements flushing program
Jul 09	Manila Water visits DAWACO to monitor and support rechlorination plans
Sept 09	Manila Water and DAWACO visit each other to implement rechlorination process, study network asset management, and conduct flushing and disinfection activities
Oct 09	DAWACO begins scaling-up water quality management initiatives

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