2016 CLA CASE COMPETITION

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Case Story

This Case Story was submitted to the 2016 CLA Case Competition. The competition was open to individuals and organizations affiliated with USAID and gave participants an opportunity to promote their work and contribute to good practice that advances our understanding of collaborating, learning, and adapting in action.

Liberia Municipal Water Project's Sustainability Monitoring

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Sustainability Monitoring Meeting. *Credit: Tetra Tech.*

What is the general context in which the story takes place?

The USAID Liberia Municipal Water Project (LMWP) was developed to address a lack of clean drinking water in three secondary cities — Robertsport, Sanniquellie, and Voinjama — where piped water has not been available for decades, since the start of the Liberian civil conflict. The goal is to provide 90 percent of the population of the three cities with improved access to the water supply. The project aims not only to reestablish the water infrastructure, but also to improve local capacity for financial and technical sustainability when the project is handed over to locally based management when LMWP ends.

Local and national authorities needed support to improve the water supply. Local capacity is very limited, notably in engineering and construction and particularly in the three target cities, which are geographically remote from Liberia's capital, Monrovia.

In the seaside county capital of Robertsport, the first location for LMWP's interventions, the project's Liberian staff needed to provide three critical services:

- Oversight and quality assurance during the construction of project-designed water infrastructure by a local contractor

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- Upon completion of the facilities, supporting the Liberia Water and Sewer Company (LWSC) to operate and manage the systems, monitor key performance indicators, and track progress toward technical and financial sustainability goals

- Monitoring the project's overall impact for beneficiaries, notably increased and improved access to drinking water as residents transition away from unimproved water sources

What was the main challenge or opportunity you were addressing with this CLA approach or activity?

The project began its work in Robertsport. To ensure timely progress toward project goals, inexperienced engineers and construction workers needed regular oversight and support from experienced engineers and managers for water system construction, operation, and management. Additionally, the project needed detailed tracking of progress on indicators related to water access and use practices at the household level.

A range of day-to-day and longer-term challenges — from malfunctioning meters and vandalism to staffing, cost recovery, and other financial issues — all required collaborative review and support from experienced staff. However, LMWP and LWSC had limited numbers of staff with the requisite experience and expertise. Staff were also responsible for overseeing projects in multiple locations, and therefore are based in Monrovia or the United States. Given their myriad duties in multiple locations, the physical distances between project sites, and poor road conditions, frequent site visits by experts from Monrovia or the United States to remote locations were not possible. The project needed a way for its centrally located experts to remotely oversee construction and operations, collect and analyze data, and collaborate with field staff on solutions to problems — all in near real time.

Describe the CLA approach or activity, explaining how the activity integrated collaborating, learning, adapting culture, processes, and/or resources as applicable.

LMWP leveraged Tetra Tech's electronic Program Observation, Reporting, and Tracking (ePORT) suite of mobile-based solutions and geospatial analysis tools to provide detailed and up-to-date information and analysis simultaneously viewable by team members and government counterparts in Monrovia and the United States. ePORT enables data-driven and timely decision making, as well as enhanced infrastructure construction, operation, monitoring, and collaboration in a remote and low-capacity context.

LMWP staff used this mobile data collection platform to create forms for data collection on mobile devices equipped with GPS and cameras and trained field-based staff to use them for daily construction monitoring, operational monitoring reports, household surveys, and other monitoring and evaluation functions. Data are uploaded to a cloud-based network through the local cellular network, distributed via email, and viewable on a web-based interface, which also can track metrics such as average meters of pipe installed per day.

For construction monitoring, the project team developed an electronic construction monitoring form for local staff. The form captures important data, such as daily site conditions, on-site contractor staffing and equipment, georeferenced photos of construction activities and inventories of facilities installed, and safety and environmental compliance. The daily construction summaries are emailed to LMWP's Monrovia- and U.S.-based engineering staff, who review progress.

The project implemented a similar daily reporting system to support LWSC in monitoring operational performance. Forms are uploaded daily by local staff to track water production and sales at each point of sale, revenue collection (including photos of bank deposit slips), rainfall measurements, water quality testing, staffing levels and hours of operation, operator comments, and more. This kind of detailed and up-to-date information, which was not available to LWSC in the past, has resulted in key operational and business planning decisions. For example, long-term data collected through ePORT revealed a dramatic inverse correlation between seasonal rainfall and water sales, which is now incorporated into business planning and marketing efforts. Data from sales at individual kiosks has been used to optimize kiosks' hours of operation. Finally, operational and financial data collected through ePORT enable detailed tracking and reporting on progress toward LMWP's sustainability goals, including operational cost recovery.

To track the project's household-level impact on the intended beneficiaries, LMWP household surveys use ePORT to geo-locate and "link" each respondent household and its reported primary water source (typically, unprotected wells or surface waters) LMWP staff visit each reported water source and evaluate it, using another ePORT mobile form to assess its status. This data enabled the project to clearly track the transition away from mostly unimproved sources to the USAID-supported infrastructure, including quantification of reduced travel distance. The transition is presented graphically, comparing the connection between households and their primary water sources in 2014 and 2015:

- In the 2015 survey, 57 percent of Robertsport households reported using water kiosks as their primary year-round source of drinking water, up from only 15 percent in 2014, before system expansion.
- For households that access water from the same source year-round (the majority of households in Robertsport), the distance to water sources dropped from more than 500 meters in 2014 to about 200 meters in 2015.

Were there any special considerations during implementation (e.g., necessary resources, implementation challenges or obstacles, and enabling factors)?

The use of ePORT was successful in achieving the goals of improved data quality, remote access to near-real-time data, detailed tracking of indicators during construction and operation, and changes in household water-use practices. The proliferation of mobile phone networks in Liberia, along with residents' familiarity with mobile and tablet devices, enabled the technology to be successful with a minimum of required training.

Unavailability of the mobile network sometimes delayed transmission of daily reports, and some reports were received without all of the data. For the household survey, the project conducted pilot testing to catch programming errors, but some programming glitches and occasional issues with mobile devices resulted in some loss of data. However, these factors did not greatly detract from the overall success of implementation.

Costs for ePORT include short-term technical assistance for training, purchasing mobile devices, programming, and annual usage licensing for 27 users. The ePORT forms were designed and uploaded to mobile devices using a mobile data collection platform, with the incoming data displayed automatically on a data visualization platform. The overall cost represented well under 1 percent of the contract budget and proved to be a very worthy investment.

With your initial challenge/opportunity in mind, what have been the most significant outcomes, results, or impacts of the activity or approach to date?

The use of ePORT has enabled quantitative tracking of myriad indicators related to construction, operations, and household-level data. Post-processing has enabled the identification of clear trends, which have been used for operational modifications and business planning. The use of an electronic platform eliminated data transcription errors and enabled the capturing of photographic records and GIS-based data visualization. Troubleshooting can be supported quickly and remotely.

Seasonal trends were clearly evident and incorporated into business planning. Daily comments from reports enabled the technical team in Monrovia or the United States to identify potentially serious issues and initiate discussions with field staff. Daily data reviews were supplemented with monthly in-person reviews of data and trends by LMWP, LWSC, and local stakeholders to identify problems and collaboratively formulate solutions.

What were the most important lessons learned?

Mobile and cloud-based technology is a viable, low-cost solution to enable timely, data-driven decision making and enhanced infrastructure construction, operation, monitoring, and collaboration in remote and low-capacity contexts.

As a result of the success on this project, we have expanded the use of ePORT for additional programs. To facilitate sustainability, we are in the process of transferring from proprietary software to open-source solutions, which will reduce cost dramatically.

Secondly, although ePORT provides great data for a collaborative discussion, this intervention required extensive home-office support in programming, training, and troubleshooting. Moving forward, local staff should be trained to also conduct setup, programming, and enumerator training.