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Supporting simple and effective rural water supply monitoring by local government in Malawi

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Regular monitoring of rural water supply infrastructure in developing countries is an essential part of providing efficient and equitable rural water service delivery, and accountable sector governance. In Malawi, WaterAid has been supporting GPS mapping of rural water supply since 2002 – however, to date, technical complexity and high implementation costs have prevented these monitoring processes from becoming institutionalized at the local government level (Welle, pp 45-46). In 2009 WaterAid Malawi and EWB Canada began a project to support local government with a new kind of monitoring – one using simple software tools, a reduced set of indicators, and an increased reliance on existing government systems. The project began with a pilot in 3 districts, and has since expanded support to 11 of Malawi's 28 district councils. This paper describes in detail how the system works, shares initial implementation experience, and provides lessons for other practitioners.

Design criteria and process

The monitoring system described in this paper was designed using a participatory and user-centered process. Engineers Without Borders Canada (EWB) staff members have been embedded directly in district offices throughout the on-going project, working with local government staff to iteratively develop and improve the monitoring approach. Two main criteria have provided a foundation for the entire design process:

1. The monitoring system should be simple and stand-alone. The system should provide users with all information they require for routine decision making, without requiring complex data analysis or cross-comparison of different data sets. Users should be able to focus their efforts on using data for improved decision making, and on taking action on those decisions, not on data management and data manipulation. Many monitoring systems in developing countries fail to generate practical results because data use is too complicated.

2. Monitoring processes should be integrated into existing government systems. System sustainability can be maximized by using existing local government financial resources and, as much as possible, existing government systems for data collection, rather than creating completely new systems or processes.

This paper outlines the initial results from experiences in putting these design principals into practice, and provides best practices and lessons learned for other practitioners.

How data is collected

Under the new monitoring approach, rural water supply monitoring data is collected by Ministry of Health extension workers known as Health Surveillance Assistants (HSAs). the HSA network was selected because HSAs are field-based, widely distributed (there is roughly one HSA for every 1,500 people in rural areas), and are already responsible for collecting information on rural water supply under the Government of Malawi's Health Management Information System (HMIS). Therefore, by using the existing HMIS infrastructure, the cost for local government staff to collect a full district-wide survey of water coverage data

was limited to the price of photocopying a new set of forms – typically less than USD$100 per district survey. This presented significant savings when compared with the cost of WaterAid's original GPS mapping work, which typically cost USD $10,000-20,000 per district surveyed (Welle, pg 9).

In addition to cost savings, HMIS data collection is effective because other essential information, such as village population, is captured at the same unit of analysis as data on water supply infrastructure. This means that village-level water coverage statistics can be calculated without cross-comparing different data sets. In the past, data from GPS mapping had to be overlayed onto GIS population maps from the national census in order to calculate water coverage rates, adding greatly to the technical ability required to use data for decision making.

Data management and analysis

Early in the project, it was determined that most local government staff had more experience using Microsoft Excel than Microsoft Access or other data management software packages. Therefore, with the goal of creating a simple and sustainable data management system, Microsoft Excel was selected as the most appropriate program for storing the data received from HSAs (see Figure 1).

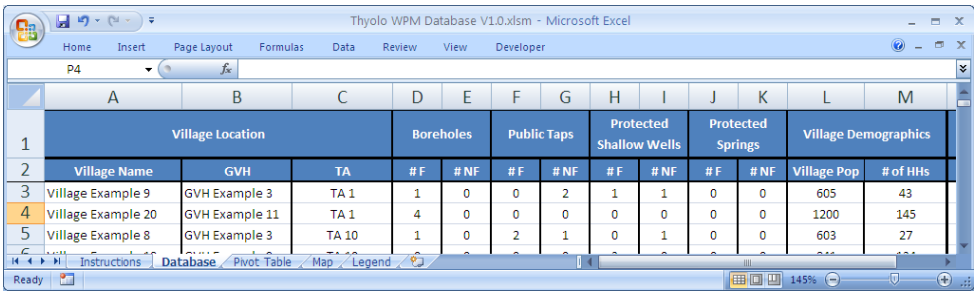

Figure 1. An example of a database of village level water access, housed in Excel

Source: Author[i]

In order to simplify data analysis for staff with limited computer skills and statistical experience, the Excel database was designed with an automatic link to a colour-coded pivot table, showing water coverage rates, aggregate water point functionality rates, population, and information on the type/functionality of waterpoints.

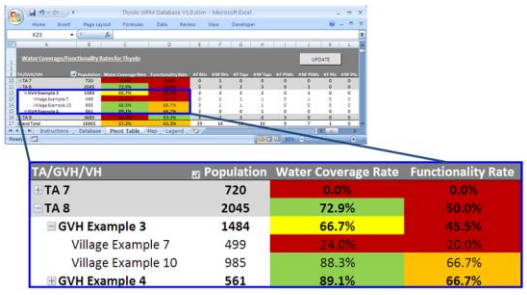

Figure 2. Pivot table with statistics calculated automatically from the database

Source: Author[ii]

The pivot table summarizes data for the entire district at various administrative levels, including individual villages (see Figure 2). Local government staff can quickly and easily find important pieces of information, such as the location of villages without any improved water points or the location of non-functional waterpoints, without complex data analysis. The pivot table also allows staff to quickly access aggregate statistics for the entire district. The pivot table is updated automatically by clicking a single button whenever the information in the database is changed.

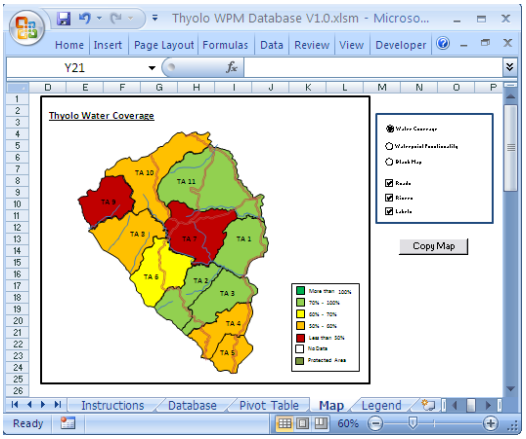

Figure 3. A map of water coverage produced automatically from information in the database

Source: Author[iii]

In addition to the data summary provided by the pivot table, map production was determined to be useful for data visualization, report writing, communicating with political stakeholders (e.g. Members of Parliament), and for communicating with traditional leaders and local constituents who often have limited data-literacy. In order to simplify map production, EWB created a custom Visual Basic macro, embedded in the Excel workbook. The macro links data from the database directly to a map of the district, allowing summary maps to be produced by clicking a button (Figure 3). This process requires no new software, and can be done completely offline, allowing local government staff with limited resources and computer skills the ability to quickly and easily produce summary maps for their districts.

Project results to date

The project is currently working with 11 of the 28 districts in Malawi, of which 8 have already completed an initial round of data collection and 3 are organizing for data collection in December 2010. Several of the districts who have completed initial data collection are currently in the process of organizing biannual updates. The project also has more demand from new districts than it has capacity to support, which is a strong indicator that the technical support the project provides is valued by local government staff.

The majority of rural water supply activity in Malawi takes place during the dry season from May to October. For this reason, the majority of the data was collected relatively recently and therefore was not available in time for significant use during this year's dry season. However in Chikhwawa district, one of the project's initial pilot districts, the monitoring system has been routinely used by local government for siting new boreholes, planning rehabilitation of non-functional waterpoints, communicating and discussing water coverage information with local constituents and stakeholders, and reporting coverage and functionality rates to the national ministry. A large part of this data use has taken place since the project phased out direct support – a positive sign for system sustainability. Similar data use is also commencing in most other partner districts.

Data collected with technical support from the project has also been used as part of the baseline survey processes for a major African Development Bank (AfDB) funded project in three districts in Malawi. The AfDB funded project is currently the largest planned investment in rural water infrastructure in the country, with the projected installation of over 2,100 new boreholes in these three districts.

Advice for other practitioners supporting local government rural water supply monitoring in developing countries

1. **Any external funding and direct implementation support is likely to jeopardize the sustainability of the intervention.** As much as possible, local government partners should be required to provide all necessary funding for the system, and handle all implementation tasks. The project team should restrict their activities to the provision of advice, training, and technical support. This ensures from the outset that the implemented system is within the financial and technical means of the local government to sustain, and that the local government staff have a genuine interest in collecting the data, rather than simply responding to distorted financial incentives.

2. **Simple, stand-alone systems work**. In the words of one of the project's local government partners, *'data in the system should speak for itself"*. The monitoring system accomplishes this by collecting data on water infrastructure and population from the same source, and at the same unit of analysis. This allows for the automatic computation of water coverage statistics, and the simple production of maps

without the use of additional mapping software or online systems. Simplifying data analysis results in an increased likelihood that the system will be used for improved decision making.

3. **System design needs to be iterative, participatory, and user-centered**. The majority of the design ideas for this system have come from local government officers, with the process facilitated by embedded EWB staff. Externally designed elements, such as the mapping macro, have been repeatedly tested at the field level, and have been changed significantly based on user feedback. This process has led to the creation of a system that works effectively at the intersection of the technical abilities and decision-making requirements of local government staff.

Conclusion

The project is currently working with more than one third of the district councils in Malawi, with strong results in data collection, data usage, and local government ownership. The project is continuing to expand support to more district council partners on a demand-driven basis.

Initial results in Malawi provide good evidence that simple monitoring systems can work where more complicated systems, such as GPS mapping, have had little success. Stand-alone, simple, inexpensive data collection systems have a crucial role to play in the future landscape of water supply monitoring. These systems can be easily sustained by local government, both financially and technically, and can be used effectively without significant training. The result is that local government staff can focus less effort on sustaining the monitoring system, and more effort on using the data for improved decision making, such as explicitly targeting the construction of new waterpoints towards villages with no safe water access.

Acknowledgements

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References

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Note/s

i. Please note that because this paper is not an official publication of the Government of Malawi, all screenshots from the monitoring database use invented data.
ii. See note (i)
iii. See note (i)

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