Academia contribution to managing drinking water, basic sanitation and Hygiene (WASH): tools and lessons

Session report, 16 January 2015

Session Structure

The session was convened by Jose Gesti Canuto, WASH specialist at UNICEF. It begun with an overview presentation taught by Ricard Giné from the Technical University of Catalunya outlining the challenges and contributions the academia can make to support the realization of the post-2015 development goals around WASH. The session continued with the presentation of several cases studies that have succeeded in the implementation of WASH goals on-the-ground, including: Ricard Giné (Technical University of Catalunya), Jonh Chilton (International Association of Hydrogeologist, UK), Mohamed Ahmed Mohamed (United Nations Support Base), Fabio Fussi (University of Milano-Bicocca) and Sharon Velasquez (University of New Castle). A panel discussion followed the presentation of the case studies in which the panellists made reference to the innovative/valuable aspects as well as the existing barriers to overcome when implementing scientific tools related to governance, capacity development and technology surrounding WASH goals.

1. Implementation challenges for managing WASH

Poor capacities to operate rural water supplies and expensive technologies typically result in low functionality / sustainability of supplies

While there have been substantial progress in developing technological solutions to support the implementation of WASH goals, greater efforts are required to adapt these tools to different local conditions, particularly in rural contexts of developing countries. This adaptation involves providing adequate training to local practitioners, to guarantee the achievement of water and sanitation goals in the long run, as well as making technologies more affordable. In many rural communities monitoring the state drinking water sources (eg. groundwater) is extremely expensive and technically challenging, often leading to a failure supply.

Monitoring schemes for WASH implementation and progress need to be tailored the different contexts

Implementing WASH monitoring program is complex because of the lack of data and limited technical skills in many regions. Overcoming these problems required developing data collection methods that are valid at the local scale as well as designing simple decision-making tools to track status and progress. The Academia can provide guidance on this area and support the development of methods and approaches which are feasible in context with limited data and resources.

A pre-test of tools could increase the effectiveness of national WASH plans

National WASH plans are frequently implemented without evaluating the effectiveness of the tools on-the-ground. Pre-assessment or ex-ante evaluation of tools and strategies will largely benefit the overall success of plans and will contribute to allocate financial resources more effectively.

Hygiene and sanitation are still being poorly addressed

Little consideration has been given so far on how to promote hygiene practices to improve public health. Moreover, when dealing with improving sanitation there seems to be an asymmetry between northern and southern discourses. While sanitation targets in developed countries are far more ambitious and closely linked to the degree of connection to sewer systems, in developing countries the discourse is less ambitious and spins around on how to improve basic sanitation facilities (eg. pit latrines). Economic development explains to a large extend this asymmetry but other factors also need to be considered. Today nearly 1 billion people still practice open defecation and a large proportion belongs to middle-income countries, evidencing the need to promote greater social development.

More funding is required to develop the research WASH agenda

Academia can play a significant contribution in the implementation of the WASH goals but it requires greater public support. WASH research is not a major priority in most public funding agendas, limiting a more active participation of the Academia. National funding opportunities need to be promoted to enhance the role of researchers in achieving WASH goals.

2. Addressing the challenges: Developing and using tools

There are different tools, guidelines and other resources developed and used by the academia that may be useful to address implementation challenges and help ensure the provision of basic services

Cases discussed

Governance: 'Action plan for delivery of WASH services in Suba and Homa Bay districts, Kenya' by Ricard Giné, Technical University of Catalunya

Access to safe water and improved sanitation remains elusive in Homa Bay and Suba, and strongly correlates with the outbreak of frequent water borne diseases such as diarrhoea, typhoid and cholera. Investments in water and sanitation are therefore key to improve local health. A strategic plan was developed for monitoring the delivery of water, sanitation and hygiene (WASH) services. This plan aimed at promoting sustainable and equitable growth, but most importantly become a comprehensive road map for local authorities on how to increase the sustained access to safe water and adequate sanitation as well as to improve hygiene behaviour. It included: 1) a comprehensive diagnosis of the current situation; 2) a monitoring system based in the development of simple indicators easy to interpret and for which data is locally available; 3) the design of simple planning tools for local prioritization and targeting support; and 4) the development of a WASH action / investment plan. This plan was developed in collaboration with local technicians and has proven to provide useful information to local practitioners on where the problems are and track progress in the implementation of WASH goals.

Capacity Development: 'The UPGro program: increasing groundwater access for the poor' by John Chilton, International Association of Hydrogeologists

The 'Unlocking the Potential of Groundwater for the Poor' (UPGro) programme, is a seven-year international research programme jointly funded by the UK's Department for International Development (DFID), Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC). It focuses on improving the evidence base around groundwater availability and management in Sub-Saharan Africa (SSA) to enable developing countries and partners in SSA to use groundwater in a sustainable way in order to benefit the poor. UPGro

projects are interdisciplinary, linking the social and natural sciences to address this challenge. There is increasing, but often anecdotal, evidence that substantial numbers of rural water supplies in SSA based on boreholes with handpumps are failing within a short time of their installation. This project aimed at developing a methodology for unravelling the complex and often interlinked technical, institutional and social reasons for this high level of failure. Working in two districts in eastern Uganda, the project team has undertaken fieldwork comprising community surveys and detailed technical examinations of pumps and boreholes. The results of this pilot study have shown that, in this area, symptoms in the field resulting from poor siting and construction can be traced back to underlying conditions and root causes at programme level.

Technology: 'A Microbial Fuel Cell (MFC) biosensor for water quality monitoring in Dar es Salaam, Tanzania' by Sharon Velasquez, University of Newcastle

Urbanisation is rapidly occurring across Africa. Since the majority of the population are using on-site sanitation systems (ie., latrines and septic tanks), a rise in anthropogenic groundwater pollution through chemicals like nitrate and pathogens has led to a spreading of water pollution related diseases with significant associated costs. In Dar es Salaam about four million people live in densely populated and unplanned settlements where waterborne disease outbreak are usually triggered by the rains. The lack of water quality routine testing results is a major challenge for the management of public health, due to the high costs. This case study aims to tackle this problem with the development of a Microbial Fuel Cell (MFC) biosensor, for the continuous monitoring of microbial and nutrient contamination in groundwater used for drinking water. The in situ MFC bio-sensor has been built at a cost of approximately £10 (USD 15) and does not require energy or high maintenance and it is consider a suitable device to monitor groundwater pollution continuously.

Technology: 'Application of manual drilling in Africa' by Fabio Fussi, University of Milano-Bicocca

Within the framework of implementing the WASH goals and particularly those related to access to safe water, UNICEF is promoting manual drilling throughout Africa with different activities: advocacy, mapping of suitable zones, technical training and institutional support. Manual drilling refers to those techniques of drilling boreholes for groundwater exploitation using human or animal power (not mechanized equipment). These techniques are well known in countries with large alluvial deposits like India, Nepal or Bangladesh. They are cheaper than mechanized boreholes, easy to implement as the equipment is locally done, able to provide clean water if correctly applied. But manual drilling is feasible only in areas with suitable hydrogeological conditions ie. shallow groundwater with non-hard drilling surfaces. This research pursued a double goal: 1) contributing to define an improved methodology for the characterization of shallow geological conditions integrating other sources of indirect data; and 2), producing more detailed suitability maps in the selected area, with the goal of supporting the implementation of manual drilling construction program. So far, the project has delivered positive outcomes by providing maps on suitable areas for manual drilling.

Technology 'Application of geospatial and geophysical technologies to identify potential aquifer drilling points' by By Mohamed Ahmed Mohamed, United Nations Support Base, United Nations

This case study was undertaken in Mali in support of the peacekeeping mission (MINUSMA) operations. The study used geospatial technologies and geophysical surveys to identify exact drilling points to secure potable water in support of deployment of UN troops and civilian personnel. Both, radar and multispectral satellite imagery was processed, analyzed, and interpreted to map

geological features and coupled with spatial/terrain analyses (surface modeling) to identify potential sites for groundwater. Field geophysical surveys were conducted and the collected data was analyzed to model the subsurface. Three-Dimensional models of the aquifers were produced through the integration of the surface and subsurface models. Then drilling points were located in the deepest parts of the aquifers. A very high rate of success was achieved in this drilling campaign (over 90%) and in some areas (eg. Kidal) historical highest yields were secured.

3. Lessons learnt from implementing the tools

During the panel discussion, participants from the Academia community shared their experience in utilizing available tools and guidelines that can help ensure the provision of basic services. Most of the discussion revolved around the barriers that have to be overcome for the Academia to have a more active role.

Investments in data collection is a cost-effective strategy to support WASH targets

Ricard Giné highlighted that WASH-specific and updated data has been essential to support evidence-based planning. Cost of data collection is low in comparison with sector-related investments (new infrastructure) and the returns are high. Having reliable data is key to develop simple planning indices that can inform planners/decision-makers and guide policy-making. Reliable data will also help identifying better the problem at hand, and decide on what are the most appropriate options to adopt (construction of new water points; Rehabilitation of non-functional existing systems; Water quality improvement; Sanitation Marketing; Hand-washing promotion, etc.). Moreover, the continued use of developed instruments/tools requires effective appropriation by decision-makers, which in turn depends on i) engagement of end-users throughout the process, ii) design of user-friendly instruments, and iii) continued support to local authorities. Lastly, monitoring framework needs to be rethought to allow data updating and foster replicability.

Failures in supplying access to improved water are often casual

John Chilton remarked that to a large extend the causes underlying the failure to secure access to water in groundwater dependent communities in Africa are in many cases motivated by casual factors rather than just structural factors (lack of funding, lack of water availability, etc). Casual factors might include: inadequate planning which leads to drilling in unsuitable water conditions for drinking purposes, poor sitting because of low groundwater potential, inappropriate borehole design, and underestimated demand which impedes meeting all community demands. This failure in service delivery is largely explained by the fact that most efforts are placed on expanding coverage and little efforts are placed in planning, construction evaluation and local training to maintain existing systems.

Earth Information Systems is a cost-effective tool to address water access

As outlined by Mohamed Ahmed Mohamed, geo-information tools are probing to be a cost effective-tool for groundwater exploration and define appropriate management strategies for its exploitation. The SGITT/MINUSMA campaign conducted by UNGSC in Mali has shown a rate of success in securing access to groundwater close to 90%, evidencing the potential of such tools have to meet some WASH goals, particularly in regions where groundwater is a major source of freshwater. Similarly, Fabio Fussi also emphasized that remote sensing techniques have a large potential to be used to identify suitable areas for manual drilling. The big advantage of using these tools is that they rely on available and free of cost data and field data collection has a very limited cost. This circumstance highly facilitates the transfer of these tools to other regions.

Biosensors: a cheap strategy to monitor water quality

Biosensors are cheap and easy to maintain tools to control water quality. As Sharon Velasquez highlighted these technologies are robust, can be adapted to different conditions and with specific training they can easily be maintained by local water managers without requiring high expert profiles. These biosensors have great potential to be used in areas where anthropogenic pollution is likely ie. urban areas.

5. Conclusions

Concluding remarks regarding WASH implementation, challenges and the role Academia can play can be summarized in two main points:

1) The Academia has develop a large number of tools that can help addressing the main challenges related to water-related SDGs in a cost effective way. Successful implementation of these tools requires, however, investing in local capacity development and knowledge sharing to ensure its adaptability to the local conditions as well as the maintenance and well functioning in the long term.

2) WASH research requires greater public funding support. Governments from developed countries barely support research activities in this field. Likewise, donor agencies should realize that Academia can play an important role in the implementation of national WASH plans, particularly in the planning and monitoring phases.

Session Photos: