

Improving Global Wash Sustainability

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Abstract

This paper provides a review of the health and economic effects of water, health, and sanitation (WASH) infrastructure. Global strategies to increase WASH infrastructure and the current coverage levels are discussed revealing mixed progress and disparities particularly in rural areas. Many rural WASH infrastructure interventions have failed or operate significantly below intended capacity demonstrating the need for a greater focus on sustainability. This paper defines sustainability in the context of WASH infrastructure and describes the tools used to assess sustainability of water projects. Finally, this paper concludes with specific recommendations for governments, non-governmental organizations, and donors to improve the sustainability of water projects and ultimately the development of communities.

Keywords: sustainable development goals, water, sanitation, hygiene, global health, development.

Introduction

Depending on one's point of view and situation, water, sanitation, and hygiene (WASH) services contain the ability to sustain healthy life and positive development (NAUGES; STRAND, 2013; WHO, 2012) or, on the other hand, developmental

determent and cause of one's suffering and untimely death (FERDOUS *et al.*, 2013; GUERRANT; DEBOER; MOORE; SCHARF; LIMA, 2013; HASANAIN; JAMSIAH; ZALEHA; AZMI; MOHAMMED, 2012; PRÜSS-USTÜN *et al.*, 2014). Sustainable WASH services is crucial to ensure its effectiveness and long-term benefits (BOULENOUAR; SCHWEITZER;

LOCKWOOD, 2013; KWANGWARE; MAYO; HOKO, 2014; MCCONVILLE; MIHELICIC, 2007; RONDİ; SORLINI; COLLIVIGNARELLI, 2015; SCHWEITZER; MIHELICIC, 2012).

Health and Economic Consequences

The lack of adequate WASH services poses the paramount threat to the health and development of the global community. Improper WASH causes a variety of diseases including diarrheal diseases, dracunculiasis, and lymphatic filariasis through the ingestion of pathogenic organisms in drinking water and unsanitary soil with pathogens such as *Entamoeba histolytica*, *Giardia duodenalis*, and *Ascaris lumbricoides* (GEERS CHILDERS; PALMIERI; SAMPSON; BRUNET, 2014). In terms of effect on health, inadequate WASH was estimated to be the cause of 842,000 diarrhea deaths globally representing 58% of diarrheal diseases in 2012 (PRÜSS-USTÜN *et al.*, 2014), which is approximately 2,300 deaths per day. An estimated 361,000 deaths among children under five years of age, representing 5.5% of deaths in that age group, could have been prevented with proper WASH. Persistent diarrhea among children is associated with malnutrition, cognitive impairment (FERDOUS *et al.*, 2013; HASANAIN *et al.*, 2012), and an increased risk of developing obesity later in life (GUERRANT *et al.*, 2013). Proper WASH is crucial to a healthy life and development.

Concerning effect on development, the water crisis ranks number one in terms of global societal impact and number eight in terms of likelihood to occur within the next ten years (WEF, 2015). Lack of a clean drinking water source poses such a great economic threat due to the resulting mortality, morbidity, and disability by rendering a person unable to work and due to the enormous quantity of time demanded to haul water. Women and children bear the majority of the water hauling responsibilities with the largest group spending more than 30 minutes on a single trip totaling an estimated 140 million hours every day hauling water (UNICEF; WHO, 2015). This daily time demand causes obvious conflict with development by reducing time invested in an income-generating job, caring for family members, or attending school. However, through improved water sources and, thus, reduced hauling times, children's school attendance has significantly increased in multiple developing countries (NAUGES; STRAND, 2013). Investing in WASH infrastructure also has a high rate of return with an estimated US\$ 4 economic return on every US\$ 1 spent by keeping people healthy and productive (WHO, 2012). Investing in adequate WASH infrastructure would greatly reduce this burden of disease and provide enormous economic benefits.

Global Framework for Solutions

Clean water and sanitation is a building block to global public health

and development as evidenced by its inclusion in the Millennium Development Goals (MDGs) and now the Sustainable Development Goals (SDGs). On September 25, 2015, the member states of the United Nations celebrated the beginning of a new era of cooperation in development with the adoption of the SDGs for 2030 (UNITED NATIONS, 2015). The SDGs are the post-2015 goals that follow the MDGs, which was the framework of development between 2000 to 2015 (UNITED NATIONS, 2000). The MDGs contained eight broad goals of which MDG 7c was to halve the proportion of people without sustainable access to safe drinking water and basic sanitation between 1990 and 2015. Well ahead of the 2015 deadline, the goal for improved drinking water was announced as being met and surpassed in 2010 (UNICEF; WHO, 2012). However, this announcement was criticized as being overly optimistic when the microbial water quality was considered revealing improved water supplies with unsafe levels of coliforms in several countries raising serious concerns about the safety of the improved water sources (BAUM; KAYSER; STAUBER; SOBSEY, 2014; SHAHEED; ORGILL; MONTGOMERY; JEULAND; BROWN, 2014). This suggests new efforts are needed to ensure both quantity and quality of improved water sources.

When the final MDGs assessment report was published in 2015, it boasted numerous significant improvements but also revealed areas of needed improvement (UNICEF; WHO, 2015). Concerning drinking water, key positive highlights were that 91% of the

global population was measured as using an improved water source and 2.6 billion people gained access to an improved water source since 1990. On the other hand, an unachieved goal was that the Caucasus and Central Asia, Northern Africa, Oceania, and Sub-Saharan Africa regions did not achieve their regional coverage goals. Specific disparities were noticed as 96% of the global urban population uses improved drinking water sources compared to only 84% of the global rural population. Stated another way, 8 out of 10 people without an improved drinking water source live in rural areas. As of the report's publishing, 663 million people still lack an improved drinking water source. Despite the global increase of improved rural water systems, evidence shows that 30-40% of these systems fail or operate significantly below intended capacity demonstrating the need for a greater focus on sustainability (LOCKWOOD; SMITS; SCHOUTEN; MORIARTY, 2010).

Concerning sanitation, the target of 77% improved sanitation coverage was missed by almost 700 million people (UNICEF; WHO, 2015). Geographic disparities also exist in improved sanitation coverage as 82% of urban population was reported to have access to an improved sanitation facility compared to only 51% of rural population. Of those who lack access to an improved sanitation facility, 7 out of 10 live in rural areas, and 9 out of 10 people who practice open defecation live in rural areas. Although this target was not achieved, a highlight is that 2.1 billion people gained access to improved

sanitation since 1990. However, 2.4 billion people still lack access to an improved sanitation facility. Based on this report, the SDGs were created to continue this progress.

There are 17 SDGs set to be achieved by 2030. SDG six is “Clean Water and Sanitation.” Addressing drinking water and sanitation, target 6.1 is to “achieve universal and equitable access to safe and affordable drinking water for all” and target 6.2 is to “achieve access to adequate and equitable sanitation and hygiene for all and end open defecation...” (UNITED NATIONS, 2015). There are several other targets under this goal but these targets are relevant for the scope of this paper.

Interventions: Focus on Sustainability

The goal in providing WASH services is to ensure the entire array of benefits while minimizing its costs over time. Sustainable development has been defined as “development that meets the needs of current generations without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43). Thus, sustainable WASH infrastructure is the continued delivery of clean drinking water and sanitation without resource depletion. How to best ensure sustainability is highly debated but one recurring theme is demand-driven approach (DAYAL; VAN WIJK; MUKHERJEE, 2000; KWANGWARE *et al.*,

2014; MADRIGAL; ALPÍZAR; SCHLÜTER, 2011; MONTGOMERY; BARTRAM; ELIMELECH, 2009).

Demand-driven approach

Demand-driven approach is the principle that local communities are active in the decisions that affect their communities and the consideration that different user groups may desire different interventions (DAYAL *et al.*, 2000; MADRIGAL *et al.*, 2011). Evidence has revealed that community participation in the design, financing, and administration significantly increases project sustainability (BARNES; ASHBOLT; ROSER; BROWN, 2014; MADRIGAL *et al.*, 2011; MARKS; KOMIVES; DAVIS, 2014). Depth, not breadth, of resident's involvement in the planning process is associated with water point sustainability. Project outcomes are better when the community participates more in management decisions and less favorably with technical decisions (MARKS *et al.*, 2014). The opposite of demand-driven approach is the supply-driven approach in which communities are not included in the decision-making process but are simply observers. Supply-driven approach, a paternalistic behavior, perpetuates cyclical poverty and ineffective interventions (CORBETT; FIKKERT, 2014). To improve sustainability outcomes, sustainability frameworks and assessment tools have been developed to guide and measure sustainable development.

Sustainability assessment tools

Dozens of sustainability assessment tools have been made to improve the sustainability of development projects addressing all stages of the planning and life cycle utilizing various sustainability models. The sustainability assessment tools contain a litany of questions based on its specific model of sustainability framework rating the likelihood of success and sustainability. Schweitzer, Grayson, and Lockwood (2014) performed a review of 191 sustainability assessment tools evaluating the context of their use and their strengths and weaknesses. Their review should be used as a resource in choosing the proper tool for the anticipated project. Besides these sustainability assessment tools, other specific recommendations exist for various groups that provide WASH infrastructure.

Recommendations for governments

According to Boulenouar and Schweitzer (2015), governments should develop an infrastructure asset management (IAM) strategy particularly for rural water supply where parastatal corporations and community management organizations manage the majority of WASH infrastructure. IAM in the WASH sector refers to the physical components of water systems as well as the decisions and processes to assure services. The government should also provide template contracts

between service authorities and service providers and ensure the financing of WASH infrastructure. Lastly, government should provide the technical support and training to both service authorities and service providers. Evidence suggests that access to post-construction support services greatly affects sustainability outcomes (FERDOUS *et al.*, 2013; MARKS *et al.*, 2014). Although government financing is suggested, strong government subsidies have many drawbacks and may not be appropriate for every project (GOMES; HELLER; CAIRNCROSS; DOMENÈCH; PENA, 2014). A more effective financing method to the financial recovery and functionality of installed water systems is the collection of a user fee (FOSTER, 2013; MONTGOMERY *et al.*, 2009).

Recommendations for non-governmental organizations and donors

Boulenouar and Schweitzer (2015) suggest that non-governmental organizations (NGOs) can improve the sustainability of WASH infrastructure by supporting local governments to inventory the water assets in their jurisdiction and to implement the national IAM guidelines. Donors should also support the government by providing technical and financial support, ensuring all the water assets are registered, and sharing pertinent information. Many studies have demonstrated that the use

of financial tools are beneficial to project sustainability (BOULENOUAR *et al.*, 2013; JONES, 2013; KWANGWARE *et al.*, 2014; MADRIGAL *et al.*, 2011; RONDI *et al.*, 2015; SCHWEITZER; MIHELICIC, 2012). These three levels of organizations working together can provide greater accountability and local support, which increases project sustainability (JONES, 2013; SMITS; ROJAS; TAMAYO, 2013; WINTERS, 2010).

Conclusion

In order to achieve SGD six and to reduce the rates of death and disease as well as its associated economic

consequences, WASH services and infrastructure must be built especially in the areas where it is lacked most and disease is most prevalent, namely rural areas. Simply providing WASH infrastructure (i.e. supply-driven demand) to communities in need has resulted in inoperable systems and the perpetuation of poverty foiling development efforts (Lockwood *et al.*, 2010). Therefore, through the recommendations of demand-driven approach and usage of sustainability assessment tools, new WASH infrastructure can provide lasting health benefits and support the economic development of the recipient communities in both rural and urban areas.

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