WaSHUp: Innovating Water, Sanitation, and Hygiene Upgrades in Langrug

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science.

ABSTRACT

The current top-down, subsidized, government approach to water, sanitation, and hygiene (WaSH) provision in South Africa has not been successful. The goal of this project was to establish a framework for the development of innovative, multi-stakeholder, multipurpose, and community-driven WaSH alternatives in Langrug, an informal settlement in the Stellenbosch Municipality. In collaboration with local co-researchers, government and NGO partners, we developed a process for incremental upgrading, constructed an innovative tap, implemented paintings to foster early childhood development in an ablution block, and proposed designs for a future multi-purpose hall. The work created a starting point for Langrug to become a centre for global learning and research in WaSH provision.

This project report is part of an ongoing research program by students and faculty of the WPI Cape Town Project Centre to explore and develop options for sustainable community development in the informal settlements of South Africa. For more information please go to http://wp.wpi.edu/capetown/wash

The following executive summary has been implemented as a website available at: http://wp.wpi.edu/capetown/homepage/projects/2011-2/wash/

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PROBLEM STATEMENT

Urbanization has led to the widespread development of informal settlements across the globe. People migrate to urban areas in search of economic opportunity, and find that they cannot afford formal homes. Therefore, they settle on unoccupied, low-quality land. These illegal squatter camps are often densely populated and contain little infrastructure. Because of this, governments struggle to provide basic services to the residents of these settlements. Water, sanitation, and hygiene (WaSH) provision is particularly challenging, and 2.6 billion people are currently unserviced (Wertz et al. 2011). In Sub-Saharan Africa, this lack of services leads to 1.2 billion cases of diarrhoea annually, and 770,000 fatalities to children under age five (Bahri, 2008). Langrug, the informal settlement in Franschhoek where this project is located, also faces water and sanitation challenges as the ratio of toilets to people is 1:49 (Informal Settlement Network et al, 2011).

Government is currently the primary organization responsible for WaSH provision in South Africa. However, too often its top-down, subsidized, non-inclusive approach has not been successful. The facilities are typically unclean, smelly, and undignified. In addition, they regularly break. In Cape Town, for example, two thirds of the Cape Town Water Services Department's annual $125 million budget is spent on new equipment and repairs (Jiusto, 2010). A. Mels and colleagues (2008) report that providing conventional sewage solutions to Cape Town's informal settlements would far exceed the budget of the WSD. The magnitude of this challenge is too great for the government alone to solve. It does not have the required personnel, innovative capacity, or capital. New community-engaged, multi-stakeholder approaches are needed, but few successful examples exist.

Figure 1: Ablution Block in Langrug

BACKGROUND

Before our work in South Africa, we researched the aforementioned challenges to global WaSH provision, as well as potential solutions. From this research, we identified three principles that should be included in WaSH upgrading in order to improve service delivery. Further research is required to confirm that these three principles work, and our project was intended to develop the framework for this research to begin.

"Multi-stakeholder involvement is essential to effective WaSH upgrading"

The first principle is that multi-stakeholder involvement is essential to effective WaSH upgrading. Successful, alternative systems, such as Ecotact in Kenya (Murray, 2010), BioCentres in Uganda (Aubrey and Shaw, 2009), and MobiSan in South Africa (Narnajo, 2009) demonstrate the involvement of stakeholders other than government. These stakeholders include private businesses, non-governmental organizations (NGOs), and communities, all of which contribute different resources that positively influence the system with which they are involved. These examples illustrate the success of multi-stakeholder models at providing adequate WaSH services.

"WaSH spaces need to be multi-purpose"

The second principle is that WaSH spaces need to be multipurpose. In informal settlements, WaSH spaces are not valued. As a result, they are commonly misused and vandalized. If these spaces were to simultaneously address needs such as unemployment, education, and communal space, residents would be more likely to care for them (Bell et al., 2010). From this, we developed the idea of WaSHUp spaces, or WaSH upgraded spaces. WaSHUp spaces "upgrade" WaSH spaces so that they meet water and sanitation needs in a holistic, high quality manner. They would incorporate many non-toilet features that would encourage residents to gather around the space such as laundry stations, clotheslines, and picnic tables for adults as well as educational games, toys, and other activities for children. The amenities and programs included in the WaSHUp facilities would depend on the needs of the community where they are located.

"WaSH must be community-driven."

The third and final principle we identified is that efforts to improve WaSH must be community-driven. Even if the government had the resources to supply WaSH services to all, they would not be successful if they continued to provide subsidized, barebones toilets without adequate community consultation. Manikutty (1998) supports this in his analysis of two sanitation projects in India: One that involved the community and had 80% of residents use the toilets, and another that did not initially involve the community and only had 50% of residents use the toilets. Similar to this, when the Stellenbosch Municipality put chemical toilets in Langrug without consulting the community, residents rejected and tipped them over.

The goal of our project was to begin to test these three principles in the community of Langrug. Langrug is an ideal location for this project because it is already progressive

in its multi-stakeholder partnerships, our first principle. One of these partners, the Stellenbosch Municipality has developed a Department of Integrated Human Settlements which focuses directly on providing innovative solutions to improve informal settlements. Their approach has led to a unique partnership with two NGOs: Shack Dwellers International (SDI) and its affiliate Community Organisation Resource Centre (CORC). These organisations work in a partnership outlined in a formal agreement. Langrug is one of the first communities in South Africa where such an overarching agreement exists between a government and NGOs. Together, these partners have begun a process of sustainable, incremental upgrading.

Langrug is also an ideal community to begin our work in WaSH provision because one of their key upgrading strategies is community engagement, our third principle. In this settlement, the Stellenbosch Municipality no longer simply builds a tap or toilet but instead works closely with the community to find a sustainable solution. A "nothing for us, without us," mentality has been adopted where no upgrading is done unless the community is directly involved in the process.

WPI brings this partnership four years of experience working with WaSH issues in Monwabisi Park, an informal settlement located outside of Cape Town. In addition, it brings a grant from the General Electric Foundation for innovations in WaSH provision. It is in this multi-partner, community driven context that this project began.

Figure 2: Langrug

MISSION STATEMENT AND OBJECTIVES

The goal of this project was to establish the framework for a community-based, multi-stakeholder WaSHUp program to meet community needs and create a learning environment to test our three principles. To achieve this goal, we identified five key objectives.

1. Develop a partnership with the Langrug community, Stellenbosch Municipality and other stakeholders
2. Understand and assess the current WaSH situation in Langrug
3. Develop an approach to incrementally transform existing sanitation facilities into valued WaSHUp spaces
4. Capacitate our co-researchers to incrementally upgrade sanitation facilities
5. Design a WaSHUp facility for inclusion in a new multipurpose community centre

METHODOLOGY

To accomplish these objectives, we applied action research. Unlike a traditional scientific inquiry where we would make a hypothesis, carry out an experiment, and analyse results *individually*, action research required that we complete these steps *collectively,* alongside our co-researchers and other community members (Ladkin, 2004). Sharing and listening to ideas identified key concepts that outlined the best way to address community WaSH problems. This method helped to break down the barriers that keep communities disempowered and researchers empowered – in our project, we did not hold all the knowledge, community members held it as well. Action research is ideal for our project because it coincides with our third principle, that upgrading must be community driven. By working alongside community members, as we did with our co-researchers, they gain the same knowledge and insights that we do, and therefore communities are more able to initiate change on their own.

Figure 3: Informal Community Meeting at an Ablution Block

Although action research is great in that it empowers the community, it does not lend itself to traditional reporting (Ladkin, 2004). Results and methods mix, and to separate them would fail to express the continuous nature of our work. Consequently, the results section will contain the process of the objectives as well as the key outcomes.

Figure 4: Assessing Sanitation Facilities

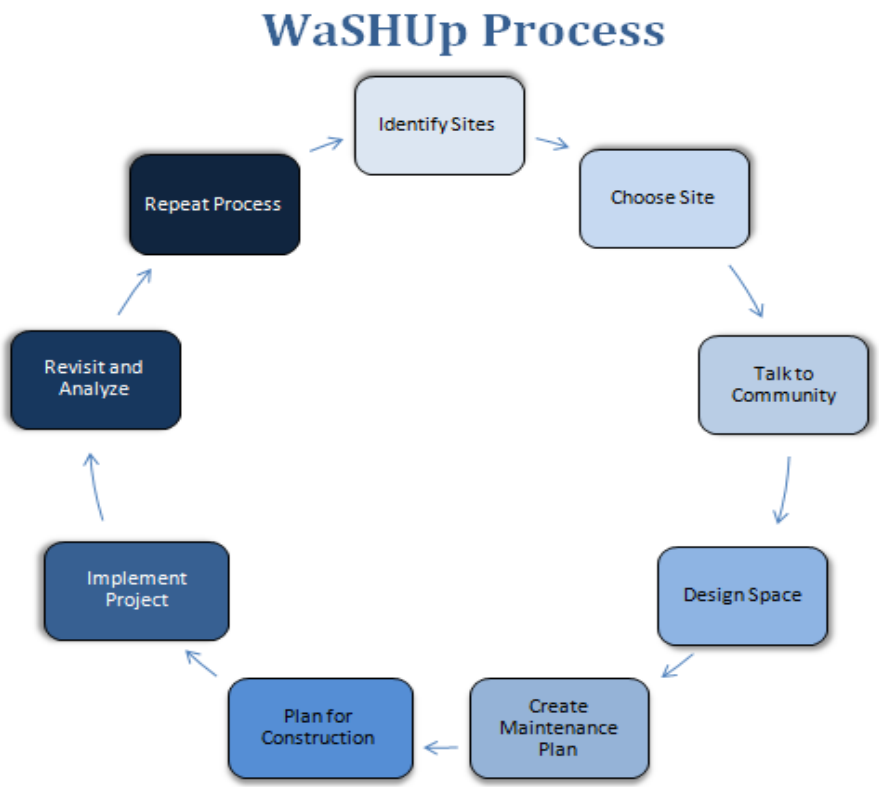

Figure 5: WaSHUp Process

RESULTS

Creation of a WaSHUp Partnership

In line with our first principle, the team formed partnerships with the Stellenbosch Municipality, CORC, and the Langrug community. Both the municipality and CORC will oversee and finance many of the initiatives being pioneered by our co-researchers over the next year. The municipality will also take on the managerial roles of bookkeeping and collecting regular progress reports, while CORC will collaborate with WPI to create a WaSHUp facility. The relationship with the Langrug community has paved the way for these initiatives, as well as provided a starting point for the projects of future WPI groups.

Assessment of WaSH in Langrug

To understand the WaSH situation in Langrug, we walked through the community, spoke to residents, analysed each toilet facility, and identified each on a map of the settlement. The co-researchers participated in this process by photo-documenting each facility, translating from Xhosa to English, and encouraging residents to speak about the ablution facilities. Every community member spoken to was briefed that the team was doing research on toilet facilities and that participation was optional. Common themes mentioned were toilet blockages, theft and vandalism of plumbing fixtures, unsafe and poorly lit facilities at night, and winter flooding. We synthesized all this information into a comprehensive database that can be found on our website.

Creation of the WaSHUp Process

After gaining an understanding of sanitation in Langrug, we collaborated with our co-researchers to determine how best to incrementally upgrade the existing WaSH facilities. Together we modified the 2011 WPI Greywater Team's informal settlement upgrading process to address WaSHUp ideas. This step by step approach, titled "The WaSHUp Process," guided our implementation work in D section, and will be used to direct future incremental upgrades to sanitation facilities. As seen in Figure 5 this process is cyclical, and is designed to be a model that can be repeated or modified by community members, governments, NGOs, and other interested organisations. The co-researchers will use this process on their own to upgrade existing facilities and evaluate their efforts, which helps promote our third principle.

Figure 6: Painting the D-Section Wash Basins

Implementation of WaSHUp designs

Using the database we developed of existing facilities and input from residents, we and our co-researchers implemented educational paintings and an innovative water tap in D-Section, an area near the top of Langrug. Both of these upgrades help promote our second principle, that WaSH spaces must be multipurpose.

Educational Children's Paintings

To encourage early childhood development, our team and co-researchers painted the alphabet and numbers on wash basins as well as letters, words and shapes inside toilet stalls. Since mothers go to ablution blocks to complete many of their chores, they will be able to work with and expose their children to letters, numbers, shapes, and colours. This exposure is especially beneficial for families who cannot afford to send their children to crèches.

Figure 7: Completed Toilet Stall

Foot Operated Tap

With the help of a local plumber, the team adapted the 2008 WPI Water and Sanitation Team's foot pedal tap design. This tap consists of a basin and a tall concrete column with an overhanging slab protecting the faucet. There are several advantages that this design offers over the standard twist or push models in Langrug. Firstly, a bucket can be rested within the basin on a platform so that it is no longer necessary to bend to pick the bucket up, a convenience the previous taps were unable to provide. Secondly, water release from the tap is controlled by a foot pedal which reduces hand-to-faucet contact and the spread of disease. Lastly, all of the piping of the tap is encased in concrete. This last feature was critical to the success of our design, because many taps are broken due to vandalism and misuse. Few alternatives address this issue, and so our innovative design can be used as a model for learning.

Figure 8: Co-Researcher Nyameka Using the Foot Operated Tap

Creation of a Guidebook and Design Book

In the final weeks of our project our team created two documents to be given to our sponsors and co-researchers. The first is a guidebook of our documentation of facilities, the WaSHUp process, the D section implementations, and suggestions that our team has for future work. The second is a WaSHUp design book for the proposed new multipurpose centre.

Co-researcher Capacitation

To advance work of the WaSHUp partnership formed between WPI, CORC, the Stellenbosch Municipality and the Langrug Community, the co-researchers will continue their work throughout the next calendar year with the support of "WPI Co-Researcher Scholarships" and the guidance of the municipality and CORC. As a result it became important for us to ensure that they gained the necessary skills that would allow them to continue upgrading after we leave. To build capacity we completed steps of the WaSHUp process alongside the co-researchers. They then utilized the skills they had learned and carried out steps of the WaSHUp Process by themselves, demonstrating the ability to think critically about WaSHUp facilities, identify issues, and propose solutions.

The co-researchers also learned very basic computer, typing and camera skills. WPI and partners supplied them with a computer, a camera, and internet access, and we set up a blog for them to document their progress and communicate their work.. Finally, we left them with our guidebook and sketchbook which contained the process we developed, space assessment forms, design forms, and implementation ideas.

Design of a WaSHUp Facility

The team created design ideas for a future WaSHUp facility in Langrug, shown in Figure 12, that will ultimately serve as a model for learning in water and sanitation. The foundations of this design are high quality WaSH services. Toilets would stay clean because a paid, onsite caretaker would manage them. Free soap and toilet paper, stocked by the caretaker, as well pay-per-use showers with hot water would be available (Granfone et al., 2008). Handicap accessible bathrooms and changing tables would also exist for those who needed them.

Adhering to our first and third principles, we involved community members, CORC, and other stakeholders before we drafted our designs. One method of involvement that was especially successful was our visit with Langrug residents and interested stakeholders to MobiSan, a successful urine-divergent, composting toilet system near Cape Town. Prior to the visit, residents were opposed to non-flush toi-

Figure 9: Foot Operated Tap

Figure 10: Co-researchers Designing WaSHUp Additions

lets. However, after seeing the facility, their opinions changed. Taking community residents to see possible alternatives is an effective way to involve them in the process of WaSH upgrading, but few exist. Ideally, the future WaSHUp facility in Langrug will become one of these model sites.

Our WaSHUp facility design includes

Figure 11: Salon Design for WaSHUp Facility

spaces that satisfy other community needs, in accordance with our second principle. The community expressed interest in laundry facilities, sinks, and showers, so all of these were incorporated. We addressed education with an interactive children's space, lack of community space with a women's salon, and unemployment with entrepreneurial opportunities for beauticians and caretakers. These ideas were presented directly to CORC, community members, municipal workers, and business leaders at a community poster fair in order to spark conversation about the possibilities for this future WaSHUp facility.

CONCLUSIONS

Traditionally, sanitation facilities are eyesores in informal settlements. They are smelly, vandalized, and unclean. If WaSH is to improve, this needs to change. We propose that one way to spark this change is to create WaSHUp spaces that are valued by the community. If people valued WaSH spaces, they would be less apt to vandalize and misuse them. To create value, we suggest making WaSHUp spaces high quality, clean, bright, safe, and welcoming - entirely opposite of how they are now. To do this, we advise adherence to three principles: that these spaces be multi-stakeholder, multipurpose, and community driven.

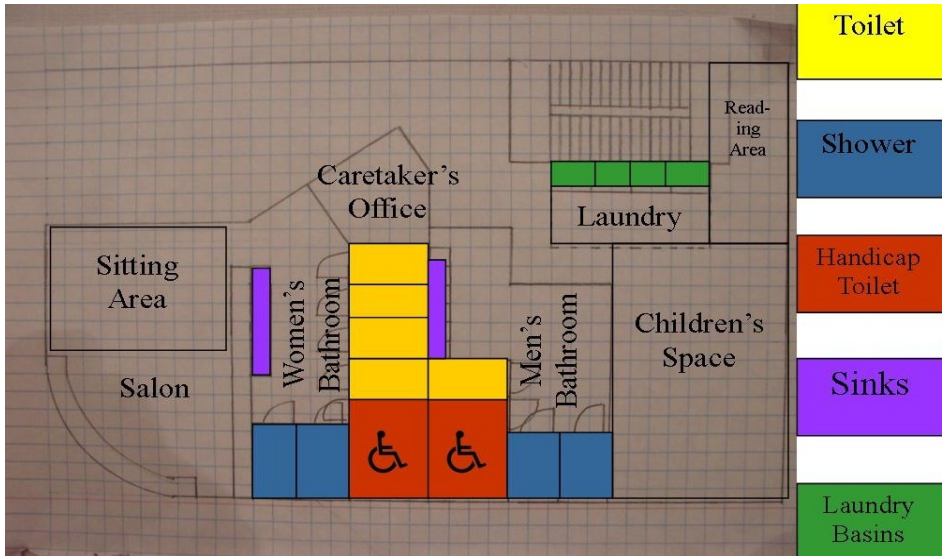

Figure 12: Floor plan Design f or WaSHUp Facility

We set the groundwork for these three principles in Langrug; now, we recommend that further research be done. Our small scale implementation could be analysed, and new WaSHUp spaces could be created. Langrug, with its strong community, multitude of partners, and plans to develop a multipurpose centre, is the ideal place for this research to continue. Because of this, we recommend that WPI continue a process of learning and experimentation in WaSHUp provision in Langrug. Below we offer a set of recommendations for this future work.

Future Implementations

We recommend that the co-researchers use the WaSHUp Process to implement the remainder of the design plan for D section, which includes signs, a place to dump food waste/trash, a soap dispenser, lights, a retaining wall, a laundry wringer, and door locks. Once they finish in D section, they should move on to other sections and do further research within the community.

Community Involvement

Future efforts should involve residents in all stages of implementation. Open communication, idea solicitation, and community review will be core components of a successful process. Also, any external party seeking to perform upgrades in the settlement should make use of the co-researcher partnership. Working with the co-researchers was pivotal in our interactions with community members and in our understanding of sanitation in Langrug. To maximize communication within this relationship our team recommends making use of visual and tactile approaches in addition to verbal communication.

Technical Research

We recommend that the Cape Town Project Centre build off past WPI water and sanitation projects and continue technical research on alternative sanitation systems. Specific areas to consider as alternatives to the current sanitation system would be waste composting, the recycling of greywater, and urine divergent toilets.

Entrepreneurial Analysis

The salon, children's area, and caretaker's office in our designs offer the possibility of employment. Further research is necessary to determine if these ideas are feasible and to identify community members who could fill these roles. Also, we suggest research to determine the marketability of waste's valuable by-products such as fertilizer and electricity.

Observation and Analysis

The above recommendations aid the implementation of WaSHUp spaces. However, once these spaces are implemented, they must also be observed and analysed to determine what was successful and what was not. This will help to facilitate a process of learning from which interested parties can benefit, ideally creating innovations that will help to provide WaSH to the billions of people globally who currently suffer from inadequate service.

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