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State and Drivers of Change of Kigali's Sanitation - a Demand Perspective

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Introduction

This article provides a view of the current state of the sanitary system in urban Kigali and focuses on the practices and perceptions on the demand side. The study was carried out to obtain my MSc degree at the Wageningen University with technical support of the Kigali Institute of Science and Technology (KIST). Seven research assistants from the final year civil engineering and third year environmental technology closely supported the data collection and research design. Since 2003, I have been working in the student run NGO Rwanda-VCP, which is attached to the National University of Rwanda.

The study is based on 30 qualitative interviews in households and a school staff discussion. We worked in three neighborhoods of which one is mixed standing, dense, central, the second rather peri-urban and the third is in the central commercial district. This information was supplemented with 34 citywide interviews, for example at the Ministry of Infrastructure, Kigali City Council, local governments, local health centers, Plan International, and UNICEF amongst others. Observations in the field gave an insight on the physical state of sanitation.

Sanitation system in Kigali

Rwanda is the country of 1000 hills. Also, the capital Kigali, with about 1mio inhabitants, was built on hills. Often higher income population lives rather on top of the slope, while economically less strong people live close to or in the valley wetlands. Very different life-styles are found within urban Kigali.

Currently, there is no sewerage system in the city. A storm water drainage system, partly underground, is in place though. Every house owner is responsible for providing sanitation facilities for their property, which allows a range of approaches. The government monitors those requirements, but at this time there is no direct support program in place. Following I will shortly describe common sanitation approaches in Kigali.

unpiped individual: pit latrines

According to the Kigali Waste Water Masterplan (SGI-Projema 2008) more than 95 % of the population uses on-site individual sanitation. About 80 % use pit latrines, of which the vast majority



are traditional designs. There is a government campaign carried out through local leaders to have clean, non-smelly, covered latrines with concrete slabs. Local authorities monitor the hygiene situation in the 100-350 households for which they are responsible. There are few statistics on sanitation issues, but figures show that on average four households in Kigali share one pit latrine (OzArchitecture 2007). In my interviews, I came across a few people, who shared toilets. They were mostly tenants renting from the same owner. One toilet was located in a valley wetland and used by all surrounding households, who did not own facilities. The families could not estimate how many people would use it. The responsibility for the sanitary facilities lies, according to the law, with the house owner. However, often tenants themselves take care to have the sanitation they require and possibly pass on costs to the owner. Most interviewees (owners and tenants) said that they dig a new hole when the old one is full. They can find workers in certain areas, who will do that or some people exchange telephone numbers of good workers. It was claimed, that those workers never come from their own neighborhood. If young people belong to the household, they might decide to dig the hole or at least to construct the superstructure themselves to reduce costs. Usually the contractor of the latrine will make a pit that is as deep as possible for a long time use. The considerations for the depth are firstly, how many meters the latrine owner can afford to be dug and secondly at which point groundwater is found. The old pit is often covered with the remains of the superstructure or with concrete, on which a room can be constructed.



pic.1 Neighborhood on slope in Kigali with valley wetland in background



pic. 2 public pit latrine

piped individual sanitation

About 20 – 30 % of the inhabitants of Kigali have flush toilets connected to a septic tank. Some few people also have soakage pits/ leach pits to store feces. Water-based sanitation is usually found in households with higher income, as it requires high investments and stable water availability. This system is more common in the city center and other areas with multi-story buildings. Only few are found in the low standing areas. Tanks and pits have to be emptied when sludge has accumulated. Sludge removal poses less of a problem if the pits are lined and thus more stable, if the owners generally have a higher income to pay workers and if their houses are located in well accessible roads.

piped common sanitation

Institutions and high rising buildings are required by law to have their own treatment facilities, which are generally septic tanks. There are more than 10 treatment plants in Kigali; most of them work conventionally (Umuhiza 2007). Besides two biodisks, most commonly they are activated sludge systems. They are found in hotels, hospitals, banks, prisons and estates. The Social Security



Fund of Rwanda (Caisse Social) has invested in at least three estates with common treatment. Some institutions, like the 'Green Hills Boarding School' and the Kimironko prison, as well as the estate Batsinda, implemented biogas producing sanitation facilities.

open defecation

Open defecation is estimated very low at about 1 % and has been reported in low population density areas in peri-urban Kigali (OZarchitecture 2007).

Challenges of the current sanitary system in Kigali

The following challenges are partly based on literature and partly concluded from my interviews. Many are rooted in the number of people living on a limited space. The quantity of waste can easily exceed the carrying capacity of the location, causing health, environmental and aesthetic problems. Furthermore, challenges of financing, erosion and water supply put pressure on the status of sanitation provision.

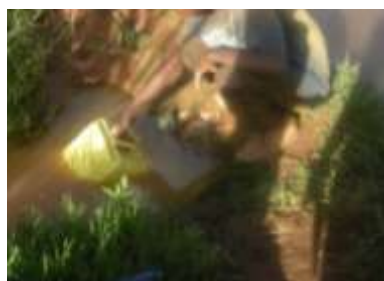
health

The open storm water drains are not only polluted with greywater, but also with other waste. Especially during rains, latrine pits, septic tanks or soakage pits sometimes overflow or are discharged. Particularly children playing in the area of flowing sludge can get infectious disease, like diarrhea, as pathogens are present in the environment. According to Urwibutso (2008) this problem has decreased since the Kigali City Council put a department of inspection of infrastructures in place.

The ways of transmission are various. The lack of fresh water and soap in the house can hinder people from handwashing and uncovered pits or stagnant black water can attract flies. Effluent from tanks and pits can pollute surface and ground water used for human consumption with pathogens and pollutants.



pic.3 pollution in wetland



pic. 4 getting water in the wetland



pic. 5 children playing with street water

aesthetics

Especially waste in the streets and open drains decrease the aesthetic looks for the inhabitants of the neighborhoods. Many interviewees have also complained about smell from neighboring toilets



or standing water and waste within the community. Often they wish to have better kept green spaces.

finances

Many interviewees stated that the quality of their facilities depends mostly on their financial situation. Some felt left alone by the government, as they did not offer soft loans for domestic improvements. One house owner claimed that the government is demanding and monitoring, but not providing support to improve the hygiene situation. During my research, I did not come across a support program for urban sanitation.

limited space

A full latrine is problematic. Emptying is rarely done, as the pits are generally not lined with bricks and can collapse after a period of use. For the soakage pits and septic tanks there are only few suction trucks available and often they are not able to access the narrow steep roads that lead to the toilets. In those areas, pits are emptied manually, mostly during the night. Neither in the literature nor in my field interviews did I find any facility offering 'vacutrucks' or other small pumps that can access the inside areas of of Kigali's neighborhoods to empty pits. One house owner stated her latrine pit was about to be full, but there was no more space, where she could dig a hole.

water provision

During the dry seasons, Kigali lacks water. The owner of a local industry in one of the neighborhoods reported that the water is cut off on purpose in certain areas to assure the delivery of water to other areas. It is estimated that Kigali households with flush toilets use 20-30 liters per person a day for the toilet (Umuhoza 2007) and thus pose a risk to the stable water provision.

erosion and its risks

As drains are often canals in the soil without concrete lining, they become eroded and cause further erosion during heavy rains. Three interviewees had to leave their houses due to destruction through rain. Recently, the government started promoting the use of soakage pits for grey water. According to Sano (2007) more than 50 % of the people are using them, but in my study they were rare.

environment

The soil can filter a certain amount of pollution from the effluents of tanks and pits. If the density of these pits is too high, however, the absorption capacity of the soil is restricted, depending on soil type and layers. If the current demographical development continues without a system change, Umuhoza (2007) predicts an eutrophication of water bodies in Kigali due to the bad effluent qualities. A major challenge is waste dumped in the drains and flushed down into the downhill areas. Together with industrial discharge, this is the reason why Nkuranga (2007) found heavy metal pollution in the Nyabugogo wetland.

If there is a possibility to empty pits, the sludge is not always disposed in a proper manner. Visiting the dumpsite 'Nyanza', I saw an open sludge lake, where the suctioning trucks officially discharge sludge. An interviewee claimed some neighbors would leave sludge on an empty space within the area at night.



Initiatives to change the existing sanitary system in Kigali (selection)

The above mentioned challenges show, that there is a high pressure on the current system and the city needs infrastructural change. Initiatives from different backgrounds have started to implement projects.

- The government is planning a conventional sewerage system for the central areas and is promoting septic tanks, VIP and EcoSan for others as a precondition to fulfill the vision2020.
- The social security fund implemented the innovative estate 'Batsinda', where four households share one biogas plant. A field trip has shown some technical and social challenges, which might already be tackled through an improved customer support.



pic. 6 Kigali according to the Vision2020;
source: Masterplan Video KCC

Two remarkable initiatives take place in the neighborhood of study 'Urugero'.

- Firstly, a resident scientist from KIST is now creating a showcase for the applicability of an inter-domestic network to produce biogas. He wants to connect about 150 surrounding households to three digesters with a total volume of 172m³.
- The second initiative is a UDDT, set up by Meg Foundation, a UK based charity, in their primary school. In need of a new toilet, the head had heard of "EcoSan" through a friend and then found technical support through KIST. A local ornamental nursery is using the feces for compost.

Both projects are driven by their initiators' ideas and efforts. (Hohne, 2011)

Perceptions on sanitation of Kigali inhabitants

In the following section, I will explain perceptions about sanitation of the inhabitants in three neighborhoods. The focus is on what people think is 'good sanitation', what are 'appropriate technologies' and in how far they believe to have 'access' to different sanitary options.

good sanitation

Good sanitation can encompass a variety of aspects. I selected opinions that present how inhabitants would like hygiene and sanitation to be in their surroundings.



People were asked to rank criteria of good sanitation between: low investments, returns, cleanliness/outlook, health, environmental pollution and workload. Cleanliness and health are seen as most important criteria for good sanitation amongst the three neighborhoods. Indicators for bad hygiene that people mentioned most are bad smells and flies. They know from awareness training that flies can be vectors for diarrhea; and amongst others one nurse claimed that smell could cause respiratory infections and even lung cancer. Even though health was a priority, none of the respondents stated, that their children had more than three times per year diarrhea. Workers at three local health centers stated that severe diarrhea is not common.

The inhabitants also ranked environmental pollution high. Asking for more details, I found out, that my concept of natural environment is rather understood as living environment. In Kinyarwanda language there is no such word, so people usually think of aesthetics.

Some people were surprised about the criteria 'returns', as they were not or were only vaguely familiar with the possibility of using treated human feces as fertilizer or of producing biogas for cooking. 'Returns' as such was then also ranked high.

When I asked people how they would like to improve their neighborhood many people mentioned aesthetic improvements as painted houses or better green areas. They also desire better infrastructure like drains and roads. In fact, interviewees found aesthetics and those infrastructures usually more urgent to change than the quality of latrines. Better toilets are also on the wish list, but are not a priority.

appropriate technologies

Many people do not feel that they actually have the choice between different technologies. With respect to technology and design, one interviewee claimed, that people are too satisfied with their current toilets to invest into a new system. Often people do not give much attention to the design of their toilet and what impact this would have on them and their environment. For most interviewees, the 'user interface' was in the center of attention when talking about sanitary technologies. This is the place where he or she is in contact with the toilet. The toilet system as a whole receives attention when it needs maintenance or replacement. There are also some exceptions though where people really thought of their sanitary system.

When asked to describe good technologies people usually focus on details of technologies they use. Pit latrines are most common. Concrete slabs can be cleaned with water and are considered appropriate, as promoted by the authorities. In addition, a good superstructure is important for the inhabitants. If water can enter through missing or leaking roofs or doors, pits can overflow and cause smells and dirty stagnant water in the streets.

People in the three neighborhoods do not desire a shared toilet, as 'others' do not maintain them well. It is difficult to share the responsibility of cleaning and particularly when children are using



facilities they are often dirty. One interviewee claimed that some people prefer to defecate in front of the toilet, if the inside was inappropriate.

People often think of flush toilets as modern. They usually know them from hospitals and offices and claim that they are more hygienic and therefore healthier. Two interviewees however claimed that the transmission of pathogens is not depending on the technology, but rather on practices, like washing hands with soap or covering the pit. For house owners an important advantage of septic tanks and soakage pits is that they do not have to dig new holes regularly. Tank owners rarely mentioned poor road access as limiting for the emptying. Maybe this is because there are workers available, who can manually empty stable pits.

The use of feces is generally seen controversially. Some people remember 'arbooos', where villagers traditionally plant bananas on filled shallow pits. Some do not mind using this fertilizer also for other crops. The value of the fertilizer is economically perceived to be very low however. Others claim that the use of feces is new in Rwanda and would often refuse it.

Technologies like EcoSan and biogas that involve the use of feces as fertilizer or for the production of biogas are vaguely known. Usually people have heard of biogas from TV and radio. They know, that farmers get a biogas plant for cow dung and that they are implemented in prisons and schools in urban Kigali. People who have passed by those prisons often noted the disturbing smell in the pilot phases or at least heard about it. An interviewee involved in biogas construction claimed that bad smells due to technical problems at one of the prisons' biogas plants destroyed the technology's reputation. Technically, a prison is a suitable location for biogas, as many inmates provide manure and the biogas can be used in the central kitchen. Socially people might associate it as a punishment requiring inmates to cook by using their own feces. EcoSan is less known within the communities. Some people have heard of the public EcoSan Urine Diversion Dehydration Toilet (UDDT) in town and in Nyabugogo station, but generally, they know that they are implemented in rural areas. None of the interviewees had ever used such a toilet.

The local leaders were asked what system they wish for their neighborhood. In Urugero, where one inhabitant is implementing the biogas show case, he would like to have a piped biogas system for all. The leader in the rather peri-urban area stated he wanted VIP for the people on the upper hillside and EcoSan for the downhill parts with high groundwater level. The local leader of the commercial center who is also a multi-story houseowner knows that there is a new complicated system going to be implemented in her area.

perceived accessibility

Interviewees saw a major constraint for improved sanitation at home in their financial situation. In the peri-urban neighborhood, several people stated that if they had more means, they would prefer moving to another area.

Some interviewees reported having to save for a new toilet before the pit is full. Others without sufficient resources depend on social networks. They use the neighbors' toilet until they can afford to renew theirs, if they are in good contact or take loans from the family, if available. In very serious



cases, widows for example can ask the local leader to organize community work (Umuganda), where all neighbors come together to help constructing. In some areas church or musk community can take this role.

A worker at the Kigali City Council said about the planned city upgrade according to the vision2020, 'Kigali will be an exclusive city like Singapore or New York' [...] 'who wants to fly first class, has to pay first class'. Some inhabitants would not be able to pay a monthly fee for the obligatory sewerage connection in some areas, as they are already not always able to afford water.

Most interviewees would hesitate to invest in new technologies. According to the implementer of the biogas showcase in Urugero only a third of his neighbors were theoretically willing to connect. They often claimed the connection was too expensive. However a rough calculation of our research team has shown, that it can be more expensive to establish a new pit latrine, than to connect the household to the digester's main sewer. This reluctance might be explained by the willingness to take risks with a system they are not familiar with.

One woman was desperately looking for a solution to the lack of space for a new latrine. She did not consider connecting to the biogas system that was about to be established in her neighborhood. Even though she knew of the initiative going on in the neighborhood, she said: '*I don't pay attention to things that anyways will not come to me*'. The house owner had never heard of a domestic biogas system before. She did not consider this new technology as part of her life world and therefore did not take it as a serious possibility for her household. There seem to be typical designs -pit latrines and flush toilets with septic tanks- that are often copied. Usually people stick to technologies they have always used and that they consider appropriate for their socio-economic status.

Drivers of change from the user side

Based on my findings from interviews, observations and a literature review, following drivers of change are of major importance in the communities.

access to information

The interviews showed that people are mostly familiar with common technologies, like pit latrines and septic tanks. To make an informed choice for the most appropriate system, you have to know your possibilities. The case of biogas implementation has shown that there is a difference between theoretical information and understanding a technology as a real choice. To achieve this, people need the chance for physical contact with different kinds of technologies and receive information, for example, on total costs over time, required workload or risks. Innovative technologies are perceived as being too expensive, which might not always be the case. There are some few people amongst the interviewees, who were deeply interested in new technologies.

reputation of technologies

Through pilot projects as the biogas implementation in prisons, technologies tend to acquire a certain reputation. If the reputation is positive, like the view on flush toilets, the demand increases. We need very well executed, accessible and understandable examples to facilitate open minds for (new) technologies.



ownership

In the peri-urban area, some people claimed that they would move away as soon as they have more financial means. If inhabitants were more attached to their neighborhood, they might be more willing to invest. With respect to improvements, many interviewees prioritized painting their houses and maintaining green areas. In addition, improved infrastructure such as drains and roads were important to the people. Beauty, cleanliness and accessibility of an area can therefore create ownership.

financial support system

Many interviewees stated they were lacking financial means to improve their sanitary system. One way forward might be to raise the value of biogas and fertilizer, providing markets to create financial returns for the households. Another approach might be to provide soft loans, subsidies or in-kind support.

champions and shared visions

The initiatives have shown that one determined person could be a strong driver, especially in the initial phases when people are not convinced about intended changes. The direction of change should be determined in cooperation with the community though. If community members are not convinced, the project has to fail as soon as the champion stops pushing.

Conclusion

Traditional pit latrines and flush toilets connected to septic tanks predominate in the current sanitation provision. Many households are not very concerned about their sanitation, although particularly high population density areas are under pressure. Cleanliness and health are important to the inhabitants, but the sanitation situation is alarming in some areas.

People tend to focus on technologies they know and perceive as appropriate for their socio-economic status. The access to sanitation innovations is therefore rather difficult. There are some initiatives in Kigali to improve sanitation systems; however, they are not yet demand driven. Beside the physical context, also perceptions within the communities have to be taken seriously to develop an appropriate system, as they will use and maintain the system. Based on my findings social and technical drivers of change are of major importance in the communities.

Contact information

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