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Intergration of resource oriented sanitation in informal settlements: The case of Arusha

J. Paulo, M. Senzia, J. Mohamed, T. Kimaro & O. Tendwa, Tanzania

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More than 75% of Arusha population lives in unplanned settlements which are characterized by poor sanitation. This paper aimed at exploring opportunities and challenges of implementing resource oriented sanitation in informal settlements of Arusha. The study aims at developing mechanism for integrating resource oriented sanitation in informal settlements. The study revealed that, housing or land ownership is among of the challenges in implementing resource oriented sanitation in these settlements. It was also observed that 35% of households do not own land; as such do not see the need of improving sanitation system. Also limited space to extent that becomes difficult to construct another toilet or empty when one is full, lack of awareness and the adoption of supply driven approach which do not consider peoples demand. The paper assessed ability and willingness to pay for resource oriented sanitation selected case studies.

Introduction

Despite the huge investment in sanitation in various Cities, sanitation investment in informal settlements is still a challenge. Informality of these settlements makes them lack enough municipal services such as connection to sewerage systems. According to UN Habitat (2001), an estimated 77% of people in developing countries are expected to live in urban areas by the year 2025, and half of them in informal settlements.

More than 70% of population in Arusha Municipality live in informal settlements (AMC, 2005).About 91.2% of population in Arusha Municipal are not connected and serviced by the sewerage system. Spatially, peri-urban areas are growing much more rapidly than formal urban districts .Densely populated areas like Sokon I and Daraja II, demand of house is high such that, land lords tends to use every space available to add rooms desired for more income (Mashauri et al, 2007).Limited space made difficult to empty the existing toilets and build a new pit latrine toilet when the old one gets full. About 61% of house holds share toilets.

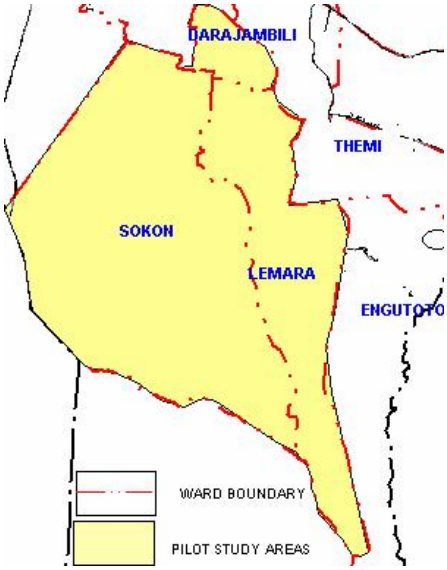
There have been many initiatives undertaken by various local actors towards sanitation improvement in unplanned settlements in developing countries. However opportunities and challenges of improving sanitation in informal settlements is inadequately reported. Also assessing affordability and willingness to pay for resource oriented sanitation in informal settlements is inadequately reported. The obvious disadvantages, like soil and groundwater contamination with pathogens, bad odour, fly/mosquito breading, pit collapse or the distance from the house make clear that this cannot be a viable alternative. However, in densely populated areas, the limits such as digging a new pit when the old one is full often leads to the question where to build the new one. Further problems greatly concern the agricultural sector. The produced nutrients on farms (in terms of food) are transported on a one-way flow to municipalities and discharged as waste. At present, this steady loss of nutrients on farms is compensated for by chemical fertilizers.

- The current sanitation paradigm is failing the world with the poor suffering most. The problems with conventional sanitations are fundamental, and radically different approach is needed. ROSA promotes resources oriented sanitation concepts as a route to sustainable and ecological sound sanitation in order

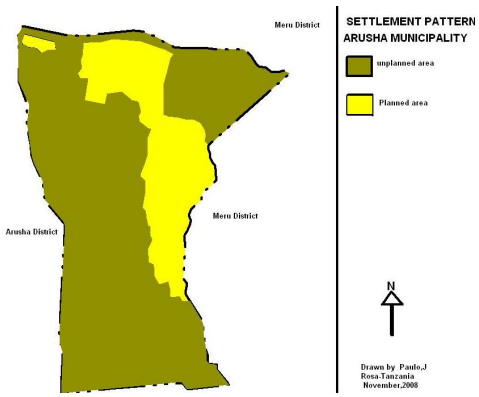
to meet the MDGs. Resource-oriented sanitation systems are based on collecting and treating the different wastewater flow separate to optimize the potential for reuse.

- The concept relies on recognition of human excreta and water from households as a resource (not as a waste), which should be made available for re-use and it has the advantages of;
- reducing the health risks related to sanitation, contaminated water and waste,
- preventing the pollution of surface and groundwater,
- preventing the degradation of soil fertility.

The study conducted at Arusha municipality therefore aimed at exploring opportunities and challenges in integrating the resources oriented sanitation in informal settlements. Through this demand A study was conducted in informal settlements of Daraja II, Sokon I and Lemara Wards using structured questionnaires as well as observations techniques. Survey data was analyzed and compared using SPSS.



Map 1. – Pilot area



Map 2. – Settlement pattern

Results of the household survey

The study revealed that the urban poor use different sources of water for different purpose. In most cases tap water is used for domestic purpose while an effluent from waste stabilization ponds in Lemara is used for urban agriculture. The study revealed that more than 100 members have formed an association for managing the waste stabilization pond effluents.

Only about 30% the population in Daraja II have water from taps in their houses and the remaining percent normally buy water from those with the tap. In most cases those residents without tap water are buying from their neighbors at 0.20dollars per bucket.

On-site sanitation system

About 91.8% of the municipal population use on-site sanitation and 1% practice open defecation. However, based on the household survey, it was found out that a high proportion (more than 65%) of respondents use on-site sanitation as their means of disposing excreta. Only 5.2% of respondents in the three wards use flush toilets, which were connected to the sewerage system. It was observed that in the three wards 0.4% of respondents practices open defecation.

Table 1: water connections in selected wards		
Ward	**Number of connections**	**Population/connection**
Daraja II	501	71
Sokon I	1492	45
Lemara	778	24

From the interview it was observed that about 61.1% of interviewed households share their toilets with other households. At most 59.3% of interviewed households indicated not to empty their pit latrines when they get full, but they either dig another pit (66.8%) or close the toilet and use the residential room for the purpose of digging a new toilet (11.5%). The emptying is usually done by private companies and Municipality (73%). The survey established that the cost of empting a pit latrine/septic tank varies between 17 US dollars and 42 US dollars with the total construction cost of pit latrines varying between 90 US dollars and 1250 US dollars with an average of 210 Dollars depending on the sophistication of the pit latrine toilet.

Existing practices on waste reuse

The study revealed that 94% of the people use pit latrines. There are no people using excreta (feaces and urine) for agriculture. Waster water from waste stabilization pond is used for irrigation in Lemara ward. About 70% of all respondents in the survey who indicated that they use waste water for irrigation came from this ward. There seems to be no objection on re-use of wastewater for irrigation and it is practiced informally and for a small scale. Crops which are grown using waste water are (% of respondents who said they grow these crops in brackets), maize (66.5%), Beans (54%), Vegetables (50.5%), Banana (39.7%) and others like fruits, potatoes, etc (19.7%). However these vegetables are sold in markets in Arusha where customers who do not know the source of the vegetables buy and use them.

Re-use of solids waste

In addition to re-use of waste water there is re-use of other resources such as metals, organic waste and plastics. This facilitates cleanliness in the residential areas and helps to generate self employment and income. The most commonly recycled wastes are plastic and metals. These wastes are sold to the industries in Arusha. The business is carried by individuals especially young men who employ themselves in the business.Waste from kitchen is used for animal feeding and in the farms as fertilizer. About 10% of respondents in the house hold survey indicated that they use waste from kitchen for feeding animals and 2.2% said they use it for fertilizer.

Affordability and willingness to pay (costs of getting water)

About 70% of the people in Daraja II are not affording to connect water to their houses. This is due to high connection cost set by water supply authority (AUWSA). E.g. the cost of 100-metre connection was 185US dollars in year (2005).

Willingness to adapt resource oriented toilets (urine diverting toilets)

About 80% of interviewed population is willing to adopt resource oriented toilets (urine diverting toilets).Of which 12% are not willing to adapt urine diverting toilets. However 8% are undecided and have little knowledge on urine diverting toilets.

Challenges in implementing the concept in informal settlements

Majority of inhabitants (65%) in densely populated areas are tenants who don't have authority and priority on construction issues. Lack of space for construction of new toilets. Less priority on improving sanitation due to limitation of financial resources has been a challenge for informal settlement dwellers. Majority of residents (61%) depend on informal sectors for their livelihood in which they face difficult in accessing loans and informal land ownership make difficult in use of their land as a collateral.

Affordability and willingness to pay (cost of sanitation)

The sanitation improvement has been in less priority as the survey revealed that people prefer most in improving water supply rather than sanitation. However house owners prefers additional of more rooms for renting in order to increase income rather than improving existing toilets as demand for houses is high. The survey revealed that house owners are willing to construct urine diverting toilets as it will save space and no need of digging holes.43% are able to construct the toilet which cost 600$. 70% are willing to construct the urine diverting toilets if they get loan. Also people in area with high water table are interested in having urine dry diverting toilets which they see as an alternative to reduce overflow of excreta during rain season. Also people in rocky areas sees urine dry diverting toilets are cheap compared to digging a hole which is expensive due hardness of the soil, it cost about 1000 US dollars to construct a toilet in these areas.

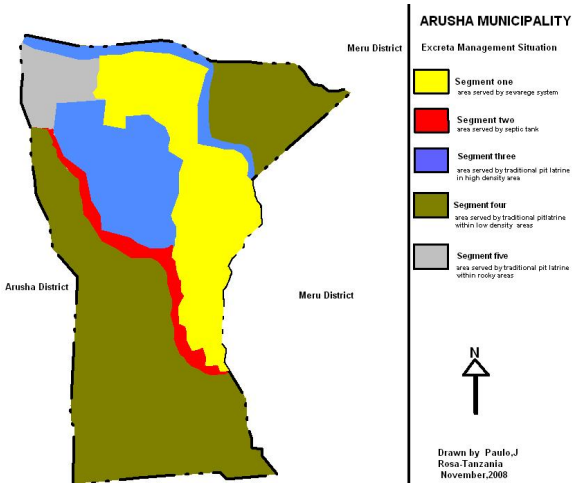
Opportunities for implementing resources oriented sanitation in informal settlements

Existing supporting government policies and political will of decision makers. Existing initiatives of Property formalization programme, under the famous Peruvian professor Hernando De Soto is an opportunity for implanting the concept in informal settlements. Existing initiative of informal settlement upgrading under Cities With out Slums (CWS) project under UN Habitat as an initiative for operational zing National human settlement development Policy (2000) is another opportunity in which people of informal settlements like Daraja II, Sokon I are upgrading their settlements in improving infrastructure and the urban environment through participatory approach.

Recommendation:

Implementing the concept in segments as indicated bellow and develop implementation options for each segment. Through segments, source and reuse areas of human excreta will be identified and sanitation options for each segment will be identified.

- Segment one-area served by sewerage system
- Segment two-area served by septic tanks
- Segment three – area served by traditional latrines within high density housing areas
  3. a within areas with high water table
  3. b within areas with low water table
- Segment four – area served by traditional pit latrines within low density housing areas
  4. a with areas with high water tables
  4. b within areas with low water tables
- Segment 5- rocky areas.
- In this fact, sanitation options for different segments will be developed.



Map 3 – Segment areas of Arusha

More over the concept should be incorporated in various government projects and programmes like that of upgrading informal settlements. Community should be involved at the earliest stages of projects in order to know their priorities. Also deploying market based approach in improving sanitation in informal settlements. This means treating poor people as potential customers rather than recipient of charity. People will decide what type of sanitation technology option to adopt. Thus a wide range of resource sanitation options should be developed to meet peoples demand and affordability. Through this people willingness to pay can be stimulated and private sector can enter the sanitation sector due to driven demand.

Keywords
Resource Oriented Sanitation, informal settlements.

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Contact details

Joseph Paulo Layson
3162 Arusha.
Tel: +255754509810
Email: chucujose@yahoo.co.uk
www .husea.org

Tumaini Kimaro
Box 35091 Dar es Salaam Tanzania
Email: ktumaini@hotmail.com
www.udsm.ac.tz