WSUP
Water & Sanitation for the Urban Poor

Reducing vandalism of water and sanitation infrastructure: experience from Zambia's Copperbelt

This Topic Brief highlights the relevance of vandalism as a key issue that impacts on the financial viability of water and sanitation utilities, and aims to provide practical insights on strategies for vandalism reduction. This is achieved through a case study documenting experience in the Copperbelt region of Zambia, where Nkana Water and Sewerage Company (NWSC) are implementing a three-pronged, integrated approach to vandalism reduction consisting of improving customer and utility relations, increasing the community's sense of ownership, and strengthening law enforcement. The Topic Brief emphasises the importance to utilities of identifying the motives behind local acts of vandalism, and of establishing a robust monitoring and reporting framework to capture incidents of vandalism and to inform the focus of planned and on-going interventions.

1. Introduction

Water and sanitation utilities commonly experience vandalism and theft of their property. These acts of vandalism are widespread in both urban and rural settings and take a number of forms: they include water theft leading directly to a loss of revenue for the utility, and the vandalism and theft of valuable metal pipes, fittings and manhole covers leading to an increase in the utility's maintenance costs. The extent of vandalism and theft experienced in a project or defined area can have a direct and significant impact on the performance of a utility, and where the service is negatively affected, this will ultimately impact on the well-being of customers. Despite anecdotal evidence of the prevalence of this problem research into the subject remains very limited, with a lack of documentation on interventions to reduce vandalism or the extent to which a reduction in vandalism can lead to improved water and sanitation services.

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Box 1: How is vandalism defined?

The term 'vandalism' is popularly used to refer to "the deliberate damaging of things, especially public property" (Collins, 2014). This includes both intentional destruction of public property for its own sake, and acts of theft carried out to gain financial advantage and resulting in damage to public property.

This Topic Brief focuses on experience from the Copperbelt region of Zambia, where staff of Nkana Water and Sewerage Company (NWSC) are working to address the problem of widespread vandalism of their water and sanitation infrastructure. Their investigations and analysis of the problem have evolved into a three-pronged, integrated approach (see Box 2) now being deployed to reduce the frequency of vandalism incidents. The Topic Brief begins by providing contextual information on the effect of vandalism on water and sanitation utilities and on the operations of other service providers worldwide. It introduces the importance of identifying the motives leading to vandalism in any given context, before describing the important steps taken by NWSC to reduce the local scale of the problem. Finally a draft monitoring framework is outlined, now being developed by NWSC and with the potential to be used by other utilities to develop appropriate management strategies for vandalism reduction.

Box 2: Nkana Water and Sewerage Company's integrated approach to reducing vandalism in low-income communities.

The approach comprises:

- Improving *customer* and *utility relations* by developing an association with the Ministry of Health through a shared sanitation programme; organising visits for community leaders to sewerage and water treatment works to help them understand the utility's work and the challenges that it faces; and investing in community engagement.

- Increasing the *community's sense of ownership* by introducing the requirement for each household to make a financial contribution to construction costs. Of course, any contribution must be realistic and fair with respect to the household's ability to pay.

- Strengthening *law enforcement* to ensure perpetrators are held to account. This includes working with police to help them to understand the law in this area, and the training of prosecutors within the utility.

A vandalised tap

> The adverse effects of vandalism on utilities include increased O&M costs, increased NRW and reduced customer satisfaction

2. Vandalism and service providers

2.1. How serious is the problem worldwide?

The theft of construction materials and installed equipment from service providers is a worldwide, multi-sector issue: companies and local authorities providing power, telecommunications, transport, water and sanitation services are all adversely affected. The problem is particularly acute where valuable metals are involved: in the UK for example, Edemariam (2008) reports that metal theft is one of the fastest growing crimes with an estimated cost to industry of £360 million per year. This type of theft often occurs in the public components of the supply chain - for a water and sanitation utility, this might be from their water or sewage treatment works or the theft of cast-iron manhole covers - and the costs can be considerable. Newham Council in London reportedly spends £60,000 per year replacing manhole covers alone (Edemariam, 2008), while Yorkshire Water in the United Kingdom reports an average of £20,000 per month in metal thefts from its network (BBC, 2012). In less-developed countries theft at the community and household level is a serious problem, notably the theft of parts from shared, communal or public facilities. A press release by the Nairobi City Water and Sewerage Company cites theft at water installations as one of the major challenges the utility faces in achieving proper service delivery to its customers (Muthoni, 2011).

2.2. What are the impacts on water and sanitation utilities?

When water utilities experience theft of their property, the act will typically conform to one of two distinct types of theft: theft of pipes and fittings (e.g. meters, taps, valves, fire hydrants, stopcocks and manhole covers); and water theft through bypassing of meters, meter tampering, and/or tampering with pipes and fittings to make illegal connections. This is a major problem for utilities, undermining their financial viability. Whilst the degree or extent of damage may vary, typical outcomes of thefts and other forms of vandalism might include:

- Increased operation and maintenance costs – from the need for repair or replacement of vandalised pipes, fixtures and fittings.

- Increased non-revenue water (NRW) – from water losses due to either water theft or leakage from the damaged network.

- Reduced customer satisfaction – from more frequent service interruptions and/or rise in tariffs to cover increased costs, which may in turn lead to further dissatisfaction and lost revenue from customers' refusal to pay.

The issue of theft and other forms of vandalism extends beyond facilities related to water supply: sanitation facilities can also be targeted, with equipment, materials, fittings and even signage being stolen from wastewater treatment plants as well as from public and communal toilet blocks. A significant problem, particularly where solid waste disposal services are inadequate, occurs when thieves remove (and sell) cast iron sewer manhole covers. This action leaves the sewer open and easily accessible for the dumping of solid waste by local residents. Such behaviour can result in expensive, hard-to-clear blockages, which in turn may lead to flooding and further problems for both local residents and for the utility.

> " It is vital for the utility to understand why vandalism is happening before behaviour can be changed "

2.3. What are the impacts on customers?

Any disruption to services is ultimately of greatest concern for the impact this can have on the well-being of customers. Severe disruption to services resulting from acts of vandalism can increase risks to public health and lead to other negative socio-economic impacts, including any or all of the following:

- Reduced access to a suitable quantity and quality of water, which may lead to customers using reduced volumes or alternative non-potable sources.

- Reduced time available for income generation, due to an increase in the amount of time spent queuing for services or making complaints to the service provider. This may cause customers to use reduced volumes or alternative non-potable sources of water.

- Reduced access to safe sanitation services, with associated impacts to public health and personal dignity.

3. Vandalism motives – what is behind the behaviour?

Many of the issues described in Section 2 relate predominantly to what has been termed *acquisitive vandalism*: acts of vandalism involving theft and motivated by the need to acquire a resource at the least possible cost. This financial motivation is a leading cause of vandalism, but it is important to recognise that other motives may also be involved. Cohen's (1973) taxonomy of vandalism includes acquisitive vandalism but identifies four further types of behaviour, all of which are relevant within the context of vandalism of water and sanitation infrastructure:

- **Acquisitive vandalism** - damage is inflicted to public property in order to acquire a resource, often to be sold on for a profit. This includes looting of public facilities – e.g. parking meters, ticket machines or public pay phones.

- **Tactical and ideological vandalism** - the damage done is a conscious tactic used to draw attention to an issue or to gain publicity for a political cause. Typical examples include property defacement by slogan writing.

- **Vindictive vandalism** - property is damaged as revenge, often the result of the perpetrator feeling that they have been unfairly treated.

- **Malicious vandalism** - a violent outpouring of diffuse frustration and rage that often occurs in public settings. The act is enjoyed for its own sake: it may be viewed as amusing by the perpetrator, and/or express malice and anger.

- **Play vandalism** - damage resulting from children's or youth's games where the property destruction is secondary to the players' skill or display of strength. Using windows as target practice or writing graffiti on hard to access public or private property are common examples.

Where vandalism is being experienced by a utility or other service provider, it is vital first of all to understand why this is happening before the behaviour can be changed. An understanding of motives is critical in any given context: this knowledge can then be used to design interventions that bring about a reduction in the incidence of vandalism.

4. Case Study: Vandalism in the Copperbelt, Zambia

Although there is little in the public domain on strategies to help water and sanitation utilities reduce vandalism, some utilities are grasping the relevance of this issue and implementing their own strategies to good effect. This Topic Brief will now detail an important example of this work, executed under the Copperbelt Water Operator Partnership funded by the European Commission. One of the aims of the project has been to identify examples of good practice by the three utilities in the Copperbelt region (see map, Figure 1) with regards to servicing low-income communities (LICs) and reducing non-revenue water, and to support the adoption of these practices elsewhere in Zambia. The work conducted by NWSC in the area of reducing vandalism has been an innovative aspect of this effort. The project has been conducted under a partnership formed between Kafubu Water (KWSC), Mulonga Water (MWSC), Nkana Water (NWSC), Vitens Evides International and WSUP.

Figure 1. Location of Copperbelt in Zambia

> **" In a 2010 baseline study, 80% of households reported that vandalism was widespread "**

4.1. The local scale of the problem

Vandalism of water and sanitation facilities has been a prominent issue for utilities in the Copperbelt region of Zambia for a number of years. Here are some examples of the local scale of the problem: in the 2001 Kitwe Water Supply Rehabilitation project, 70% of the 2,480 brass yard-taps installed were vandalised within one year of project completion; in 2010, a baseline study for the Nkana Water Supply and Sanitation Project (NWSSP) found that over 80% of households interviewed confirmed that vandalism and theft was rampant (Hayward et al., 2013). The NWSSP Project Coordinator, Engineer Kenneth Chense of NWSC, reports that sanitation facilities have also been targeted: in the 2001 Kitwe Water Supply Rehabilitation project, 70% of the 2,480 brass yard-taps installed were vandalised within one year of project completion; in a 2010 baseline study for the Nkana Water Supply and Sanitation Project, 80% of households reported that vandalism and theft was widespread; and in Kitwe's Wusakili neighbourhood, the removal of communal toilet fixtures, fittings, doors and roofing materials made it necessary to demolish some toilet blocks. Vandalism is viewed by the NWSC staff as having played a significant part in the relatively poor NRW performance of the utility over the past decade (see Box 3). Though NRW figures are always the result of a combination of factors, it is notable that neighbouring Copperbelt utilities also report high levels of both vandalism and NRW: 42% NRW for Mulonga Water and Sewerage Company, and 45% for Kafubu Water and Sewerage Company (EC, 2011).

Box 3: Key data for Nkana Water and Sewerage Company

Year formed:	2000	No. of staff:	347
No. of connections:	43,805	Water coverage:	88%
Total population in service area:	685,420	Sanitation coverage:	52%
No. of townships served:	3	Non-revenue water:	42%

Recognising the financial cost to the utility and the negative impact on customer service resulting from vandalism, NWSC appreciated the need to develop focused interventions to address the problem. Through a number of internal discussions the utility staff first sought to understand why vandalism was occurring. Engineer Chense (2013) identifies a combination of recurring problems and individual flashpoints that had contributed to the behaviour observed by the utility:

- **Poor service**: At times of inadequate or intermittent water supply users commonly removed taps, meters and even riser pipes to "try and find water". This resulted either in water theft (if the attempt was successful) or in considerable water wastage resulting from damaged infrastructure.

- **Lack of ownership**: In Wusakili neighbourhood the imposition of a different household toilet design to the one initially chosen by the community resulted in vandalism. The facilities required a higher volume of water than was regularly available which led to frustration, anger and then vandalism of the installed toilets.

- **False expectations**: The project in Wusakili was launched prematurely with a toilet being built to meet the requirements of a national election campaign. This led to false expectations amongst the community, who then vandalised utility property when they realised that the project was not advanced and that the situation had been manipulated for political gain.

- **Political interference**: Local politics in Wusakili neighbourhood again resulted in vandalism when a political party campaigned that "sanitation services" should continue to be provided free of charge. This perceived political interference caused unrest, anger and eventually led to vandalism of public property.

- **Poor communication**: The NWSC installed meters on yard-taps in LIC areas in order to improve control over water use and to reduce wastage. However, households were accustomed to paying (at most) a nominal fixed charge for water irrespective of the amount used: when they received bills based on their metered water usage many customers reacted angrily to the increased cost and broke or removed the recently installed meters. These were clear acts of vandalism caused by poor communication between the utility and its customers: the utility had failed to explain why meters were being installed, as well as their advantages and disadvantages.

Having formed a view on the possible causes of the high incidence of vandalism, NWSC and project partners combined this information with their understanding of the theory of motives for vandalism as outlined in Cohen's taxonomy (Cohen, 1973). Both NWSC's analysis of local factors and Cohen's supporting theoretical framework helped to steer the utility's evolving strategy as it developed a number of focused interventions, each aimed at reducing the frequency of vandalism within the area.

4.2. Nkana Water and Sewerage Company's integrated approach

As outlined in Box 2, the utility is now developing a three-pronged integrated approach to reduce vandalism consisting of a) improving customer and utility relations, b) improving customers' sense of ownership, and c) strengthening law enforcement. It is important to note that this approach developed organically over time as an iterative process: rather than devising a defined strategy at the outset and implementing this according to a project timeline, each of these three core aspects were introduced separately as NWSC's understanding of the issues grew and common patterns of behaviour were identified. These strategies have now been implemented in the district of Buchi Kamitondo where a project to improve household sanitation is nearing completion (see Box 4). Early indications are positive and suggest that the approach is bringing about the desired change in behaviour: below we explore the three aspects of NWSC's approach in turn.

*Source
Chiwala, 2014.*

Box 4: Buchi Kamitondo Sanitation Improvement Project.

- Number of LIC beneficiaries: 24,000.

- Total cost: USD 4.7 million.

- Funding: part-funded by NWSC, the Government of the Republic of Zambia and by the African Development Bank.

- Hardware components: installation of a sewer network and construction of 2,257 household toilets with combined shower.

- Software components: Social mobilization, which included sensitization, training, governance issues and health education.

On completion the sewer network was handed over to NWSC for operation, maintenance and revenue collection while the toilets were handed over to each individual household.

4.2.1. Improving customer and utility (NWSC) relations

In what is now viewed to have been an important step in improving the public image of the utility, NWSC agreed a Memorandum of Understanding and developed a close working relationship with the Ministry of Health (MoH), through which the two institutions developed a joint hygiene education programme. Working through a Neighbourhood Health Committee (NHC) comprised of staff from the local health clinic and voluntary members of the local community, the important link between health, hygiene, sanitation and water was communicated to the public.
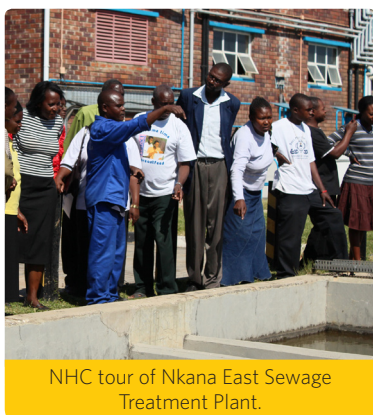
NHC tour of Nkana East Sewage Treatment Plant.

NWSC trained the NHC to carry out house-to-house visits to promote improved WASH behaviours as well as arranging theatre groups to perform themed plays and sketches at community events. Mwangala Chiwala, Community Mobilisation and Sensitisation Specialist for NWSC, notes that "these activities focus on the most important local cultural values, for instance, enhancing self esteem, maintaining dignity amongst your neighbours and how best to look after your extended family" rather than direct health education or the importance of paying utility bills (Chiwala, 2014).

The NHC also disseminated information on operation and maintenance of facilities and on the negative consequences of vandalism (see Figure 2). This close relationship between NWSC and the MoH had a positive impact on the image of NWSC and improved customer relations: instead of being viewed as a self-interested and profit-driven organisation, the utility was now understood by many to have a genuine concern for the health and well-being of the local population.

Figure 2. Anti-vandalism flyer distributed to customers by NWSC

> **" Influential community members saw for themselves the work involved in supplying potable water "**

A second initiative relating to customer relations aimed to address the view that the utility over-charged for a poor level of service. To correct this perception the NWSC invited influential, respected members of the community to visit the water and sewage treatment works. This innovative action enabled the visitors to see for themselves the work involved in supplying potable water to the neighbourhood and the steps involved in treating waste water; on their return home the visitors were encouraged to share their knowledge with other community members. To date over 50 residents have visited the site and further trips are planned. Reagan Mulumba, Peri-urban Department Manager for Mulonga Water and Sewerage Company, believes that these visits have "greatly helped the community to appreciate the challenges and resources required to treat the water" (Mulumba, 2014). NWSC are confident that many of their customers now have a better understanding of what a water utility actually does; with this enhanced understanding comes an appreciation of the importance of paying bills on time and of treating infrastructure with respect.

4.2.2. Increasing household ownership of infrastructure

In order to increase the sense of ownership of contractor-built household toilet facilities, NWSC introduced a requirement for each household using such a facility to contribute ZMW 5,000 (US$100) towards capital costs. The total cost of a household toilet structure under the Buchi Kamitondo Sanitation Project is US$995 - too much for a LIC household to fund on its own. Whilst the US$100 is only 10% of the actual cost, Engineer Chense believes that "this initiative has been a key factor in creating a sense of ownership among community members who will now carry out repairs when they are needed rather than waiting for the utility" (Chense, 2013). NWSC records indicate that households are willing and able to contribute: 1,540 household contributions have been received and 72% of the households who own the first built toilets have paid their contribution in full. Importantly for LIC households, NWSC has also agreed that the contribution can be made in staged payments over a period of ten months, easing the strain on a household's cash flow. Chiwala (2014) identifies this intervention as being "one of the main lessons learnt by NWSC from its earlier projects, when people vandalised infrastructure that had been given to them completely free of charge".

4.2.3. Strengthening law enforcement

Though vandalism of water and sanitation infrastructure had been a common occurrence for many years in Kitwe, no arrests, charges or prosecutions had ever been made against the perpetrators. NWSC's knowledge of each incident was limited and the police displayed indifference towards these cases, claiming that vandalism of NWSC infrastructure was outside their jurisdiction. Resulting from the utility's efforts there is now a much improved system in place in Kitwe, with three important elements:

- A *Neighbourhood Watch Committee* (NWC) with a mandate to look at issues of security in the local area. The Committee is a community-based policing mechanism comprised of local residents that reports to the NWSC Inspectorate Team of plumbers, security staff and an inspector.

- An *NWSC Inspector* trained in prosecution procedures at the National Institute of Public Administration (NIPA). The inspector has helped NWSC to interpret laws related to water supply, sanitation and public health and to prepare prosecutions that have led to successful convictions; the inspector has also built a close relationship with, and trained, the local police force. Equipping the police officers with these new skills and knowledge on vandalism has increased their capacity, enabling them to make arrests and to bring charges against perpetrators of vandalism.

- An *Inspectorate Team* within the utility, reporting to the Chief Security Officer under the Human Resources Directorate. The Inspectorate Team undertakes regular field inspections to detect vandalism and follows up reported cases of vandalism with the police. The team receives information from staff employed to read meters that observe suspected illegal activities; from other NWSC

NWSC Chief Security Officer after the arrest of vandals

> " A monitoring and reporting tool is viewed by NWSC as an essential aid in identifying vandalism trouble spots "

field-based staff that discover acts of vandalism; and from the NWC who report on suspicious behaviour. In addition, Chiwala (2014) notes that "NWSC also uses customer payment records and financial indicators to monitor water usage, water wastage and revenue". These measures inform decisions on which LIC customers to target with interventions and the most appropriate messages to use. The inspector and members of the NWC also provide useful inputs to these sessions with customers, highlighting the consequences of meter tampering, making illegal connections and damaging property.

These improvements to law enforcement procedures have resulted in the NWSC issuing a number of penalties for vandalising water and sanitation services infrastructure. In addition, Chiwala (2014) reports that the Inspectorate Team's close relationship with the local police force has been a key factor: in November 2013, and as a direct consequence of this intervention, two youths were prosecuted and sentenced by the magistrates court to six months hard labour for stealing a cast iron manhole cover.

4.3. Next steps

4.3.1. Development of a vandalism monitoring and reporting tool

Data collected by NWSC to date supports the efficacy of the utility's approach: in a household survey conducted in Buchi Kamitondo using a project-designed 'toilet handover questionnaire', which includes questions on vandalism, only 43 vandalism events were reported. This represents less than 2% of the 2,257 toilets, a vast improvement on previous projects (Chiwala, 2014). NWSC intend to repeat the survey in March 2014 and every subsequent year to monitor household WASH behaviour, including vandalism. However, whilst the household survey is a useful indicator, NWSC recognise that the lack of nuanced data on vandalism incidents – data that captures their severity, location and possible motives - presents a barrier to further progress. Based on lessons learned from on-going interventions, and with support from WSUP, the utility is developing a monitoring and reporting tool to capture all vandalism events, not just those at household level. The purpose of the tool is to gain an understanding of each vandalism incident so that strategies can be put in place to reduce the likelihood of repeat events. The tool will classify vandalism events according to:

- key information about the location and date;

- if any immediate action is required;

- the suspected motive; and

- the estimated severity of the incident in terms of its impact on utility operations and/or risks to public health.

The on-going development of the monitoring and reporting tool reflects the importance attached to this activity by NWSC staff. Such a framework is viewed as an essential aid for the utility in identifying trouble spots, observing trends over time, understanding the effectiveness of intervention strategies and highlighting where improvements are needed.

5. Conclusion

Vandalism is a problem that affects service providers worldwide and which has the potential to undermine the financial viability of service providers working in water and sanitation in particular. This Topic Brief has aimed to highlight the relevance of this issue for service providers and to provide practical insights on how vandalism can be reduced based on recent experience. In the case of NWSC the identification of motivations behind local acts of vandalism has been a key step forward: it has enabled the utility to design targeted intervention strategies, to strengthen their relationship with the community (their customer base)

Improved sanitation facility

and to develop productive working relationships with key stakeholders including the Ministry of Health, the local police and staff of neighbouring utilities in the Copperbelt. The approach now being taken is popular with the staff of both NWSC and utilities elsewhere in the Copperbelt who have witnessed the change for themselves.

Based on WSUP's experience with NWSC, we recommend that utilities should seek to devise contextually specific approaches to reduce incidents of vandalism. The three core elements of the integrated approach now being piloted in the Copperbelt are proposed as a helpful starting point:

- **Improve customer-utility relations**: residents are less likely to commit acts of vandalism if the utility has demonstrated a genuine interest in the well-being of the community, and if residents have the opportunity to develop their understanding of what a utility actually does. These aims can be achieved by teaming up with an appropriate ministry and by offering the opportunity for community members to visit facilities and to see the work of the utility at first hand.

- **Increase customer ownership of household infrastructure** by requiring a household contribution to capital costs, with the option of staged payments over time to lessen the burden on household cash flow.

- **Strengthen law enforcement** and hold the perpetrators of vandalism to account. In the case of NWSC this was achieved with the help of a neighbourhood watch committee; a dedicated inspector trained in prosecution procedures and equipped to provide training to the local police force; and a dedicated inspectorate team within the utility.

Though the approach exhibited by NWSC is still evolving there is already clear evidence that the interventions are having a positive effect. WSUP encourages other utilities experiencing the damaging effects of vandalism to consider implementing some of the strategies described here and to give thought to further strategies relevant to their local context: in the long term such strategies have the potential to contribute directly to a utility's financial viability and to improve the quality and reliability of service to customers.

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