Research Paper

Analysis of institutional arrangement for greywater management in unplanned settlements of Kinondoni municipality Tanzania

Teresia W. Ndunguru and Deogratias M. M. Mulungu

ABSTRACT

Greywater (GW) may contain pathogens and organics thereby calling for its management. Institutional arrangement (IA) is the heart of planning, coordination and management of initiatives. Analysis of IA is key for determination of what could be rectified within organisations based on the existing structure, resources, strategies, data and information, stakeholder participation and involvement, policy and by-laws. Kinondoni municipality has the largest population of the three municipalities in Dar es Salaam city. In this study, the IA for GW management in Kinondoni municipality was analysed using weighted strengths, weaknesses, opportunities and threats (SWOT). The weights for the SWOT criteria were obtained from field interviews with households and key informants, and then integrated using expert judgement. Overall, from the analysis matrix, the SWOT was towards weaknesses (73%) and opportunities (60%). Weaknesses were largely due to internal factors, others were lack of horizontal and vertical coordination, accountability, and stakeholder participation. With respect to GW management, these results revealed that there is inadequacy in the existing institutional structure, which accelerates poor performance in GW management practices in Kinondoni municipality. Accordingly, this study proposed an IA that induces stakeholder involvement and participation, accountability mechanisms and collaboration between departments in GW management.

Key words | greywater, greywater management, institutional arrangement, Kinondoni municipality, unplanned settlements

INTRODUCTION

Greywater (GW) is the domestic wastewater generated by processes such as washing dishes, laundry and bathing, excluding wastewater from the toilet and washing nappies (Ecosan Services Foundation 2007), but still containing some pathogens and organics. It accounts for about 50–80% of the total domestic wastewater generated (Allen et al. 2010). GW management refers to practices that ensure a clean and safe habitual environment through measures taken at the point of origin and using appropriate techniques for purification with the endeavour to reuse or return to nature in a responsible way (Ridderstolpe 2004; Morel & Diener 2006). But this is a challenge facing developing countries mostly in urban areas, as GW is discharged into the environment, leading to environmental and public health concerns (Morel & Diener 2006).

In Tanzania, there are conflicting responsibilities not only for GW management, but also for sanitation issues in general between various government ministries and departments. This has resulted in sanitation issues being left hanging. With this situation, GW is ignored and sometimes is combined with black water (URT 2009). Poor GW management is a risk to the environment and health (Carden et al. 2007;
Armitage et al. 2009) and a loss of a potential water resource (Jeppesen 1996; Jamrah et al. 2006). The local government in Tanzania has municipal councils with autonomy in their geographical areas, which thus have mandates to manage all waste to achieve environmental and health objectives (URT 1982). However, Ndunguru (2015) found that in the unplanned settlements of the municipality, open discharge of GW is common where the majority (83%) of households have no collection facilities for GW from the kitchen and laundry. The only consideration for collection of GW (about 61%) was observed for GW from the bathroom. Also, it was found that GW is disposed of untreated while only a few (about 18%) sometimes reuse untreated GW from laundry due to water scarcity. Moreover, the following average values of $3.1 \times 10^4$, $4.0 \times 10^4$ and $2.2 \times 10^3$ of coliform count per 100 mL (CFU/100 mL) were obtained for GW from the bath, laundry and kitchen, respectively. These counts are above WHO (2006a) standards of ≤200–1,000 CFU/100 mL. Consequently, this indicated the need for concerted efforts for GW management in the municipality.

An inadequate institutional framework is a limitation in attaining the United Nations Millennium Development Goal (MDG) sanitation target, causing sanitation to suffer from weak planning, coordination and management of initiatives at different levels of government (Sandec-UNITAR-WBI 2008). IA is about having an anchor body that champions for and acts as a home for planning and management, and can be held accountable. It refers to a formal organizational structure, with a set of rules and norms for service provision. It involves clear allocation of roles, responsibilities and accountability mechanisms for service provision among different actors (NETSSAF 2008). IA is a key for sustainability, not only for GW management, but also for better sanitation practices. It is required to provide guidance and technical support for communally-managed solutions, enforce regulations (Holden 2008) and develop an incentive structure that induces the participation of key actors.

Therefore, in order to achieve proper GW management practices, a study was undertaken to analyse the GW management aspect in terms of IA, with Kinondoni municipality as a case study. Kinondoni municipality is one of the three municipalities of Dar es Salaam city, with the largest population, and where about 70% of the city’s population live in unplanned settlements (World Bank 2002; UN-Habitat 2009). This high level of unplanned settlements characterised by poor GW management practices is a challenge for sanitation management in the city. During rainy seasons stormwater may cause urban flooding, and with contamination from unsafe disposal of GW this results in, nuisance from stagnant water and a disease risk to public health. Moreover, with an increasing urban population due to urban migration, there is an increase in water supply services rather than sanitation facilities, which focus on faecal disposal in pits rather than looking at all wastewater. Thus, this study can present a showcase to other municipalities in Tanzania and be a benchmark for further studies in relation to GW management. In Kinondoni municipality, no studies had been done to analyse the IA for GW management. Accordingly, there was a need to understand the existing IA for management of GW and come up with suggestions for improvement of the same. A SWOT analysis was therefore applied.

**METHODS**

**Study area**

Dar es Salaam city has three municipalities: Kinondoni, Temeke and Ilala. The study area was Kinondoni municipality (Figure 1), which has about 41% of the city’s population. The municipality covers a total area of 531 km$^2$, with a population of about 1.8 million and an average household size of 4.0 people (URT 2013). Administratively, Kinondoni municipality has four divisions, with a total of 34 wards and 171 sub-wards.

**Data collection and analysis**

Information on the IA for GW management was collected by using semi-structured in-depth interviews, which involved 10 staff from the municipality (four from sub-sections of the environmental health and sanitation section), ward (two ward environmental health officers from two wards and two ward executive officers from two wards) and sub-ward level (two sub-ward executive officers from two wards). The two wards involved in the study were Kimara and Tandale (Figure 1), which represented socio-economic
conditions of middle and low income classes, respectively. About 110 households were interviewed among others on GW management considerations in their architectural plans.

In order to analyse the IA for GW management, the existing institutional structure needed to be clearly articulated. Collected information on the IA requirements was analysed using the Strength, Weaknesses, Opportunity and Threats (SWOT) method. The SWOT analysis is increasingly of interest among researchers particularly for general management of companies and environmental studies (e.g. wastewater) (Ghazinoory et al. 2014). In this study, SWOT analysis was used to determine whether the IA for GW management is able to effectively manage its internal and external environments, thus providing a measure of the municipality’s performance. The study came up with a SWOT for the municipal arrangement based on the existing situation (practice), where the analysis determined what needed to be rectified or changed for better GW management. The SWOT analysis involved identifying criteria (requirements) for the institutional setup and assigning weights (proportions) to the criteria as in Tables 1 and 2. These requirements were obtained from a field survey and literature review. For example, for development of policies, procedures and regulatory frameworks at national and local levels, WHO (2006b) gives the following guidelines: involvement of stakeholders and all interested parties; presence of inter-sectoral collaboration; planning, design and operations of GW use activities; delegation of decision making to the lower administrative levels; initiation by local communities with or without the help of local non-governmental organisations (NGOs) of small-scale GW use projects; links to academia, with the opportunity to bring valid research questions to the attention of universities and to translate research outcomes into relevant policy and regulatory framework.

Another example, for sanitation sector governance, De La Harpe (2007); Sandec-UNITAR-WBI (2008) presented guiding principles for designing the institutional framework and aspects for designing an efficient institutional
framework. These principles include finding a suitable political anchor in the government; structuring relationships between the main actors involved in the service delivery chain to promote performance, and responsiveness to demand as well as accountability mechanisms in improving access; deciding on service delivery needs at the lowest appropriate level, and involving each actor.

The efficiency aspects include defining an institutional anchor; insuring a clear and efficient allocation of roles and functions between government agencies, civil society organizations and the private sector; strengthening in parallel and in a complementary manner the role of local and community level service providers for the private component of the service and of agencies and utilities; allowing synergies with the water supply to close the water cycle, and also linking sanitation to other services (health, education) and sectors (agriculture, tourism, industry); and including sanitation and hygiene promotion within broader poverty alleviation strategies.

Assigning weights (proportions) to the criteria was based on a field survey and expert judgement, which indicated the desired target or goal for setting up the IA. The weights are subjective and have perception attributes, which reflect the decision-making preferences or importance in the IA. Incidentally wider stakeholder participation becomes very important in deriving more effective weights. Based on ranking in the range 0–3 as explained below, scores were assigned to each criterion based on the existing situation for GW management in the municipality, using the information obtained from interviews with the staff and on observation. Thus, the
scores represent the actual situation or achievements of the IA for the municipality in GW management.

**Ranking and scoring of the criteria in SWOT analysis**

Based on the existing situation for GW management in the municipality, ranks were assigned (scoring) to each requirement/criterion based on the information obtained from the in-depth interview. The ranking 0 to 3 is explained below.

- **0 = Negligible (N)**
  - For strength and opportunity, this score was assigned if the criterion does not persist or is not met.
  - For weaknesses and threat, this score was assigned if the criterion is not a weakness or threat.

- **1 = Low (L)**
  - For strength and opportunity, this was assigned where efforts exist to meet the criterion or the opportunities but are very low.
  - For weakness and threat, this was assigned if the weaknesses and threat are very low.

- **2 = Medium (M)**
  - For strength and opportunity, this score was assigned if the criterion has been met but not to the fullest potential
  - For weakness and threat, this score was assigned if weaknesses and threat persist but there exists some little strength and opportunity.

- **3 = High (H)**
  - For strength and opportunity, this was assigned if the criterion is met to its fullest potential.
  - For weakness and threat, this was assigned if the criterion is entirely weakness and threats.

From the scores, weighted scores were computed to indicate the proportions achieved for a particular criterion. The achievements in each criterion and for each internal and external factor were added and the sum plotted in a SWOT chart consisting of four quadrants or a matrix, so as to determine the position of the municipality with respect to GW management.

**RESULTS AND DISCUSSIONS**

**The existing institutional structure**

The analysis involved reviewing the existing institutional structure for GW management from municipal to ward and sub-ward level as presented in Figure 2.

![Figure 2](https://iwaponline.com/washdev/article-pdf/5/4/594/385518/washdev0050594.pdf)
Given the institutional structure of Kinondoni municipality (Figure 2), the Health and Sanitation Department is concerned with the management of all health and sanitation issues. Hence GW management falls under this department. The structure of this department is composed of sections as described in Figure 3.

Requirements for institutional setup for GW management

In order for GW management to be considered and given attention in an institution, the issues presented in Tables 1 and 2 were considered as the requirements for the institutional set up. The tables present requirements/criteria associated with internal and external factors, respectively. Also, in order to determine the position where the institutional structure lay, weights in terms of proportions were assigned to the requirements. The weights (proportions) in the tables were assigned based on a number of issues considered or involved per criterion, and the proportions made a total of 100% for each strength-weakness and opportunity-threat matrix. The issues considered as internal factors included the presence of an anchor department, and horizontal and complementary relationships with other departments dealing with GW management; the presence of private sector participation; other stakeholders’ participation (donors, households and service providers); accountability mechanisms; availability of strategies for GW management and their implementation; a local sanitation policy or slogan applicable to GW
management; law and regulations; available human resources, and technical capacity building.

External factors included population increase and the emergence of new, unplanned settlements; the presence of academic institutions for technical backstopping on GW management; the presence of a national sanitation policy; the presence of technical options for GW management; and the existence of a demand driven management approach. This approach helps to ensure sustainability and accountability of services. For example, with the existing supply-driven approach, the construction of stormwater drainage channels by the municipality ends in inappropriate use by discharging GW into it simply because the community did not pay for it; and finally the availability of space for taking care of GW in peri-urban wards.

SWOT analysis—strengths and weaknesses

This is concerned with the issues which are within the control (internal functioning and mandate) of Kinondoni municipality as far as GW management is concerned.

Strengths

- Kinondoni municipality has established a Waste Management and Sanitation section which deals with both solid and liquid waste. The section is concerned with raising health education and awareness on sanitation issues, house-to-house inspection and follow up for law enforcement on sanitation and pollution control.
- The municipality has a local policy on sanitation which says ‘Kinondoni uchafu sasa basi’ meaning ‘now it is the end of dirtiness in Kinondoni’. The policy was formulated in 2010, by which open discharge and disposal of liquid waste including GW is discouraged.
- The Kinondoni municipal council bylaws of 2010 are applicable for discouraging open discharge of GW into the environment. Also, the Environmental Management Act 2004 and Public Health Act, No. 1, 2009 are applied. The municipality has prosecutors in the city court, where those who violate the bylaws can be prosecuted.
- Human resources (health officers) are available up to ward level. There are a total of 70 health officers, distributed as either one or two health officers in each ward.
- The presence of private service providers like ECO-Protection, ECO-Green and CANS offering septic emptying services. The municipality has designated the parking area at Kijitonyama, where all septic emptiers are found. Thus, anyone in need of the emptying service can request the service provider at a cost.

Weaknesses

- The anchor department is not solely concerned with sanitation issues, thus it is not fully independent. Management is carried out by a subsection called Waste Management under the Environmental Health Section in the Health and Sanitation Department.
- There is a missing horizontal and complementary relationship between the anchor department and other departments. This is because there are no other departments dealing with GW management.
- In Kinondoni municipality, there is inadequate and unreliable data and information on GW management with respect to the generation rate, collection, treatment, reuse and disposal. Information is limited, merely obtained from staff explanations about how GW is collected and disposed of.
- There is limited financial resource allocation and budgeting for GW with respect to raising awareness, promoting GW treatment, reuse and safe disposal. For instance, in the financial year 2013/14, the amount allocated to Waste Management and Sanitation sub-section was only for fuel in the municipal wastewater trucks to provide emptying services in the municipal institutions.
- Inadequate planning and strategies for GW management. The available strategy includes discouraging open discharge and emphasising that households should have collection pits (septic tanks). When the pit is full it should be emptied and disposed of to the designated area.
- Lack of technical capacity building (on the job training) for GW management. The available strategy includes encouraging open discharge and emphasising that households should have collection pits (septic tanks). When the pit is full it should be emptied and disposed of to the designated area.
- Limited private sector participation in GW management. Thus, no NGO is dealing with GW within the municipality. The existing participation is limited to private septic emptiers (service providers).
Lack of clarity in terms of the role descriptions, responsibilities and accountability mechanisms of its various stakeholders.

Limited stakeholder involvement, such as donors supporting GW management programmes. Also, the involvement of service providers is limited, and as a result interactions only exist between the service provider and the households. Households may be involved through house-to-house inspection by health inspectors.

Limited investments in the sanitation sector including GW with respect to treatment and reuse.

Limited consideration of GW management in architectural plans for households.

Lack of specific bylaws on GW management.

SWOT analysis—opportunities and threats

This is concerned with the opportunities available and threats imposed by the external institutional environment for GW management.

Opportunities

- The presence of the Tanzania National Water Policy (URT 2002), the Tanzania National Health Policy (URT 1990), and the Tanzania National Environmental Policy (URT 1997), which are the crosscutting policies with in the Tanzania National Sanitation and Hygiene Policy draft of 2009. These policies are important, as they deal with issues of pollution prevention, health and environmental sanitation, water and wastewater management.

- Academic institutions like the University of Dar es Salaam and Ardhi University within the municipality can be consulted for technical advice. The academic institutions have professionals who are knowledgeable on GW management issues.

- The existence of technical options for GW management that are well known by experts and can be adopted by the municipality to solve environmental pollution and nuisance problems caused by the discharge of GW. The technical options include vertical gardens, rapid sand filters and constructed wetlands.

- The availability of space in unplanned settlements of some wards in peri-urban areas, like in Kimara ward, where GW can be reused for growing vegetables and fruits such as bananas. According to Dongus (2000), between 1992 and 1999 Kinondoni municipality had 261 ha of open space that was used for growing vegetables.

Threats

- The lack of a National Sanitation Policy that could act as a home for planning and decision making. The available policy is still a draft (URT 2009). However, in the context of wastewater management, GW management does not feature.

- Population increase accelerates the growth of new unplanned settlements, which are out of control, leading to an increase in GW management problems. For instance, the trend of population growth rate in the Dar es Salaam region has increased from 4.3% per year in the period from 1982–2002 to a growth rate of 5.6% per year in the period from 2002–2012 (URT 2013).

- The municipality is based on a centralized culture of supply-driven management. This results in uncoordinated development and management of sanitation issues including GW management.

The scores of the criteria, based on the results of the situation analysis of GW management in the municipality, are presented in Tables 3–6.

The scores of the SWOT analysis in Table 7 are presented graphically in Figure 4, showing the position of the municipality with respect to GW management.

Figure 4 shows that with respect to GW management the municipality largely tends towards weaknesses and opportunities, with proportions above 50%.

DISCUSSIONS

Strength and weaknesses of the IA

The SWOT results show that there is inadequacy (e.g. strengths below 50%) in the existing institutional structure specifically in the Health and Sanitation Department. The inadequacy is caused by the fact that much of the effort is
directed to the curative section, and low priority is
given to the preventative section basically on sanitation
issues including GW (e.g. budget allocations).
Consequently, these inadequacies result in inadequate
planning and strategies, a lack of adequate data and infor-
mation, limited stakeholder involvement and private
participation, and a lack of specific by-laws on GW
management.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Scores of the criteria for strength and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRENGTH (situation at present within the municipality)</strong></td>
<td><strong>WEAKNESSES (situation at present within the municipality)</strong></td>
</tr>
<tr>
<td><strong>Criteria</strong></td>
<td><strong>Scores</strong></td>
</tr>
<tr>
<td>S/N</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Presence of independent anchor department dealing with sanitation and GW</td>
</tr>
<tr>
<td>2</td>
<td>Presence of horizontal and complimentary relationship of the anchor department with other departments</td>
</tr>
<tr>
<td>3</td>
<td>Private sector participation and involvement (NGOs)</td>
</tr>
<tr>
<td>4</td>
<td>Other stakeholder participation and involvement (donors, service providers, households)</td>
</tr>
<tr>
<td>5</td>
<td>Accountability mechanisms (clear allocation of roles and responsibilities to stakeholders)</td>
</tr>
<tr>
<td>6</td>
<td>Availability of GW management plan and strategies</td>
</tr>
<tr>
<td>7</td>
<td>Availability of laws and by-laws on GW management</td>
</tr>
<tr>
<td>8</td>
<td>Availability of local sanitation policy/slogan applicable to GW management</td>
</tr>
<tr>
<td>9</td>
<td>Availability of human resources who can deal with GW management</td>
</tr>
<tr>
<td>10</td>
<td>Technical capacity building on GW to staff (on the job training)</td>
</tr>
<tr>
<td>11</td>
<td>Availability of data and information on GW management</td>
</tr>
<tr>
<td>12</td>
<td>Investment in GW treatment and reuse</td>
</tr>
<tr>
<td>13</td>
<td>Consideration of GW management in the architectural plan for households in unplanned areas</td>
</tr>
<tr>
<td>14</td>
<td>Attention and priority at political level (councillors)</td>
</tr>
</tbody>
</table>

Total score frequencies 7 6 0 1 2 0 6 7
### Table 4 | Scores of the criteria for opportunity and threats

<table>
<thead>
<tr>
<th>S/N</th>
<th>Criteria</th>
<th>Scores</th>
<th>OPPORTUNITY (external factors)</th>
<th>THREAT (external factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N – 0</td>
<td>L – 1</td>
<td>M – 2</td>
</tr>
<tr>
<td>1</td>
<td>Population increase and emergence of new unplanned settlements</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Presence of academic institutions that can be consulted for technical advice on GW management</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Presence of national sanitation policy</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Presence of technical options for GW management that are well known by experts</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Existence of demand driven management approach</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Availability of space for taking care of GW in peri-urban wards</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total score frequencies</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 5 | Analysis of strength and weaknesses based on the scores and weight per criterion

<table>
<thead>
<tr>
<th>S/N</th>
<th>Criteria</th>
<th>Scores</th>
<th>STRENGTH (situation at present within the municipality)</th>
<th>WEAKNESSES (situation at present within the municipality)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N – 0</td>
<td>L – 1</td>
<td>M – 2</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>15</td>
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<tr>
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<td></td>
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<td>0</td>
<td>15</td>
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<td>5</td>
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<td>0</td>
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<td>1</td>
<td>15</td>
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<td>3</td>
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<td>10</td>
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<td>10</td>
<td>0</td>
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<tr>
<td>11</td>
<td></td>
<td>11</td>
<td>1</td>
<td>5</td>
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<tr>
<td>12</td>
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<td>12</td>
<td>0</td>
<td>5</td>
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<td></td>
<td>13</td>
<td>0</td>
<td>5</td>
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<tr>
<td>14</td>
<td></td>
<td>14</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100%</td>
<td>26.67%</td>
<td></td>
</tr>
</tbody>
</table>

Note: The weighted scores were obtained from the proportions of scores out of 3 for the respective criteria multiplied by the criteria weights.
The results of the SWOT analysis as presented in Figure 4 show that with respect to GW management, the municipality is largely inclined towards weaknesses and opportunities; this situation calls for a remedy to the weaknesses and influence of the opportunities. This includes the need to prioritise GW management in plans and building on the existing opportunities. Therefore, efforts should be directed to the preventative section, with sanitation issues a priority.

Moreover, stakeholder involvement, accountability mechanisms, appropriate planning and enforcement of by-laws should be enacted. As a result, this study proposes an institutional structure as presented in Figure 5 that induces stakeholder involvement and participation, accountability mechanisms and collaboration between departments in GW management as explained below.

### Municipal level

At the municipal level, the Health and Sanitation Department should be responsible for planning, coordination and management, performance monitoring, and enforcement of GW management bylaws. In addition, they should also provide technical guidance to service providers and households; ensure sustainable technical capacity building to staff members; raise awareness and promote GW management options and practices; and ensure the availability of adequate data and information.

Collaboration is vital between the Health and Sanitation Department and the following list of departments:

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**Table 6 | Analysis of opportunity and threats based on the scores and weight per criterion**

<table>
<thead>
<tr>
<th>OPPORTUNITY (external factors)</th>
<th>THREAT (external factors)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scores</strong></td>
<td><strong>Scores</strong></td>
</tr>
<tr>
<td>Criteria</td>
<td>N – 0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
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<tr>
<td>2</td>
<td>2</td>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
<td>6</td>
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</tbody>
</table>

Note: The weighted scores were obtained from the proportions of scores out of 3 for the respective criteria multiplied by the criteria weights.

**Table 7 | Scored proportions in SWOT analysis**

<table>
<thead>
<tr>
<th>SWOT</th>
<th>Strength (S)</th>
<th>Weaknesses (W)</th>
<th>Opportunity (O)</th>
<th>Threats (T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted score proportion</td>
<td>27%</td>
<td>73%</td>
<td>60%</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Figure 4 | SWOT scores and position of the municipality on GW management.**
Legal and Security – for formulation of GW management bylaws; Works & Fire Services, in order to provide technical support – to aid design of GW management technical options and advice on the options available; Education and Culture – to provide sanitation and GW management education to students and staff at schools; Agriculture, Livestock & Cooperatives – to promote GW reuse in the cultivation of vegetables and other crops; and Urban Development, Natural Resources and Environment – to ensure GW management considerations in architectural plans.

Ward and sub-ward level

These levels should be responsible for promoting the establishment of community-owned sanitation and GW organizations; enforcement of sanitation and GW management bylaws; resolving sanitation and GW management complaints; providing guidance to households on what is supposed to be done with regard to sanitation and GW management; carrying out inspection and follow up at households on sanitation and GW management issues; recognising service providers and community-owned sanitation and GW organizations at ward and sub-ward level.

Local level

Stakeholder involvement, participation and an accountability mechanism should be signed, like contracts for service provisions, and bylaws adhered to as explained: community-owned sanitation and GW management organizations should be responsible for service provision, collection of service provision charges from households and recognising the service providers at ward and sub-ward level.

In addition, service providers should provide sanitation and GW management services in accordance with their contracts and collect their service provision charges.

Finally, households should be accountable to the service provider and community-owned sanitation and GW organisation; they should pay the service provision charges adhere to GW management by-laws, and ensure GW management is considered in architectural plans.

Opportunities and threats of the IA

From the results of the SWOT analysis, the municipality can utilize available opportunities in order to grow, maximize opportunities through collaboration with stakeholders, have growth strategies such as strategic planning, and put
expert knowledge into practice. Efforts can be initiated to counteract the threats imposed on the institution by the external environment, like proper resource use, including strategic land planning and the waste to resource concept, whereby GW is considered as a valuable water resource.

CONCLUSIONS AND RECOMMENDATIONS

The SWOT analysis results indicate that, with respect to GW management, the municipality’s IA is positioned towards weaknesses and opportunities. This could be the cause of the existing poor GW management situation. The inadequate IA has resulted in inadequate planning and strategies, a lack of adequate data and information, limited stakeholder involvement and participation and a lack of specific bylaws on GW management. The available opportunities can be used to vitalize GW management and strategies for institutional growth. Following the inadequate institutional structure for GW management, therefore, this study has proposed an institutional structure for adoption by the municipality that will induce stakeholder involvement, participation and accountability.

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