

# Facilitating the improved management of waste in South Africa through a national waste information system

Linda Godfrey \*

*CSIR, Natural Resources and the Environment, P.O. Box 395, Pretoria 0001, South Africa*

Accepted 8 June 2007

Available online 27 July 2007

---

## Abstract

Developing a waste information system (WIS) for a country is more than just about collecting routine data on waste; it is about facilitating the improved management of waste by providing timely, reliable information to the relevant role-players. It is a means of supporting the waste governance challenges facing South Africa – challenges ranging from strategic waste management issues at national government to basic operational challenges at local government.

The paper addresses two hypotheses. The first is that the identified needs of government can provide a platform from which to design a national WIS framework for a developing country such as South Africa, and the second is that the needs for waste information reflect greater, currently unfulfilled challenges in the sustainable management of waste.

Through a participatory needs analysis process, it is shown that waste information is needed by the three spheres of government, to support amongst others, informed planning and decision-making, compliance monitoring and enforcement, community participation through public access to information, human, infrastructure and financial resource management and policy development. These needs for waste information correspond closely with key waste management challenges currently facing the country. A shift in governments approach to waste, in line with national and international policy, is evident from identified current and future waste information needs. However, the need for information on landfilling remains entrenched within government, possibly due to the poor compliance of landfill sites in South Africa and the problems around the illegal disposal of both general and hazardous waste.

© 2007 Elsevier Ltd. All rights reserved.

---

## 1. Introduction

The South African Government identified in the late 1990s the need to develop pollution and waste information systems (WIS) to support the implementation of pollution and waste reduction measures, and effective integrated waste management (Republic of South Africa, 2000a). However, research has shown that for information systems to be sustainable, one must understand the underlying motivations or needs of key stakeholders (Heeks, 2002; Lafontaine, 2000; Moussa and Schwere, 1992). This poses two questions – ‘how can the needs of government direct or

shape the development of a sustainable WIS?’ and ‘how can an information system support effective integrated waste management?’

This paper aims to evaluate two hypotheses within the context of the young South African democracy. The first hypothesis is that the identified needs of government will provide a platform from which to design a national WIS. The second hypothesis is that where a need for waste information is highlighted, it reflects a greater, unfulfilled need in the sustainable management of waste – a need, which if fulfilled through the WIS, has the potential to lead to the improved management of waste in the country.

Since the WIS is seen as a tool of government, this paper focuses specifically on the needs of government – local, provincial and national – and does not consider the needs

---

\* Corresponding author. Tel.: +27 12 841 3675; fax: +27 12 842 7687.  
E-mail address: [lgodfrey@csir.co.za](mailto:lgodfrey@csir.co.za)

of non-governmental organisations (NGOs), community-based organisations (CBOs) or industry. It is felt that introducing the needs of non-government role-players may divert the focus of the system to one which is either more onerous in terms of NGOs needs or too lenient in terms of industry's needs.

## 2. Materials and methods

Two methods were used to assess the waste information needs of the South African Government – participative workshops and postal questionnaires. Workshops were held with key individuals responsible for waste management within the national and selected provincial government departments, while a postal questionnaire was sent to all nine provinces and 284 local government departments.

### 2.1. Sampling and information collection

The target population for the workshops was government officials responsible for waste management in the national and provincial departments of environment. Due to the geographical distribution of provincial departments and the associated cost of holding workshops with all nine provinces, purposeful non-probability sampling (Maxwell, 2005; Leedy and Ormrod, 2005) was applied. The criterion (Neuman, 2000) used for sampling provinces was whether they had developed, or were in the process of developing, a WIS. The reason for non-probability sampling was to ensure a focused input that best reflected the waste information needs of provincial government. Of the nine provinces in South Africa five were, at the time of the workshops (October 2004–January 2005), to some degree involved with WIS development or implementation. The five provinces selected for workshops had an understanding of the role that a WIS could play in the integrated management of waste. The remaining four provinces had not actively engaged with the concept of a WIS. A review of the selected provinces (Free State, Gauteng, KwaZulu-Natal, Mpumalanga and the Western Cape) showed that both urban and rural provinces were selected, in other words, provinces facing different waste management challenges.

Although it is recognised that postal questionnaires typically provide a low response (Rea and Parker, 1992), often less than 20% or 30% (pers comm., Koen, 2006), it was considered the only feasible option for assessing the needs of local government, due to the large geographical distribution of respondents (Brynard and Hanekom, 1997). The entire population of local government departments responsible for the management of waste was included in the postal survey, providing a census (Henry, 1990) of waste information needs across local government. Postal, self-administered questionnaires (Neuman, 2000) were sent to the waste management departments in all 284 municipalities, comprising 231 local municipalities (Category B), 47

district municipalities (Category C) and 6 metropolitan municipalities (Category A). The questionnaire was distributed to all municipalities and provinces on 1 December 2004, with two follow-up requests made to municipalities in July 2005 and October 2005.

### 2.2. Method

A participative approach was adopted for the workshops to promote input from all delegates (Godfrey, 2005). Each waste management official, representing middle and senior management, was requested to provide two responses (on cards) as to why they needed a WIS. All cards were collected and, through a participatory approach, clustered into themes. Unless clarity was required, all responses were treated anonymously to allow participants the freedom to express their needs and concerns. The findings of each workshop were written up and made available to stakeholders for review and comment, to ensure that the needs had been accurately captured. All identified needs, grouped by theme, were placed in a spreadsheet for further analysis.

It was recognised, upon analysis, that two types of 'needs' were provided – *why* we need a system, and *what* data we need in that system. As such the needs were further clustered into *why's* and *what's*, the *why's* providing key themes as to the needs of national and provincial government and the *what's* providing insight into the specific areas of waste management which are priority concerns to government, i.e. generation, minimisation/reuse/recycling, transportation and final disposal (treatment or landfilling).

The intention of the postal questionnaire was to gather information on the current waste data and information practices in municipalities, the use of currently collected waste data and the perceived value of waste data, as a basis towards understanding the waste information needs of local government. The questionnaire posed a total of 31 (16 open and 15 closed) questions (Neuman, 2000) on the current collection of waste data; the types, frequency and reliability of data collected; the purpose for which data are collected; the means of storage of collected data; the availability of integrated waste management plans (IWMPs) and supporting data; the approach to current planning and decision-making; the presence of existing environmental and/or WIS; the need for access to waste information; the role-players in the provision, collection and maintenance of such waste data; and any plans to develop or implement a WIS. So as not to lead the respondents, specifically with regard to government waste information needs and to allow for maximum variability regarding possible needs, these specific questions were posed as open questions.

In an attempt to make the questionnaire 'user friendly' and easy to complete, thereby potentially maximising the return rate, a number of factors were considered in the questionnaire design. These included, amongst others,

questionnaire length, use of language, avoidance of leading questions, clarity of instructions, layout and aesthetics (Leedy and Ormrod, 2005).

### 3. Results and discussion

#### 3.1. Waste information needs

##### 3.1.1. National and provincial government

The White Paper on Integrated Pollution and Waste Management (IP&WM) (Republic of South Africa, 2000a) identifies the role of national government as being one of providing leadership and guidance to provincial environmental departments and municipalities through the development of policy, strategy and legislation; through coordination; enforcement; dissemination of information; participation and appeals; monitoring, auditing and review; and capacity building. As such the role of national government is one of a strategic nature, providing guidance and leadership in the management of waste in South Africa. Provinces, on the other hand, play an important role in implementing national strategies and are responsible for the monitoring and enforcement of pollution and waste management issues within their province (Republic of South Africa, 2000a).

The priority needs for waste information by national and provincial government, as identified from the participative workshops are outlined in Table 1. These needs largely reflect this strategic role of national and provincial government.

With regard to the specific areas of waste management (the *whats*), the emphasis of the needs for waste information were found to be on waste disposal (40.0%), followed by minimisation, reuse and recycling (23.5%), waste generation (23.5%) and waste transportation (13.0%). Although there has been a shift in focus locally (DEAT, 1999) and internationally away from end-of-pipe disposal and treatment solutions towards waste minimisation, reuse and

recycling, the emphasis for waste information is shown here to remain predominantly on waste disposal. This is relevant at local government, with disposal being a basic service delivery issue. However, it is surprising at national and provincial government where one would expect a more strategic approach to waste management, in line with national and international policy. This focus on waste disposal by national and provincial government, may be due to the current problems concerning the illegal dumping of waste, the mismanagement of waste disposal sites and the lack of compliance of disposal sites within South Africa.

#### 3.2. Local government

The Constitution of South Africa (Act 108 of 1996, Section 152(1)) (Republic of South Africa, 1996) and the White Paper on IP&WM (Republic of South Africa, 2000a) identifies the role of local government as ensuring the provision of waste management services, waste disposal facility management, and the promotion of a safe and healthy environment.

In terms of local government needs, 99 unique questionnaire responses were received from 34.9% of municipalities in South Africa (Table 2). This response rate was increased from an initial 23.2% to 29.6% to 34.9% by means of telephonic and postal reminders. For a postal questionnaire, such a response is considered above average however, it does raise questions as to the representativeness of the responses. One may argue that only those municipalities currently collecting waste data would respond to such a questionnaire, thereby skewing the results to a more favourable position regarding waste data collection (municipalities not collecting data may not respond due to a fear of possible ramifications). An analysis of early and late responses (Rogelberg and Luong, 1998), showed that 64.6% of municipalities who responded early (<16 weeks) to the questionnaire were collecting data, while 76.3% of municipalities who responded later (16–54 weeks), were collecting data. The results instead suggest a potential bias towards non-data collection, had the late (or potential non-responses) not been received. In addition 31.1% of respondents indicated that they were not collecting any waste data.

The highest percentage response was from the urban, industrial hub of South Africa, namely Gauteng Province with 73.3% of local, district and metropolitan municipalities responding to the questionnaire. The lowest response was from the rural North West Province with only a 12.0% response by municipalities. The distribution of responses from both urban and rural provinces, local, district and metropolitan municipalities, data collectors and non-collectors, suggests that although only a 34.9% response was obtained for the questionnaire, the results reflect limited bias and are largely representative of municipalities in South Africa.

Table 1  
Desired need for information by national and provincial government

Desired use	Response	
	<i>n</i>	%
1. Planning	53	37.6
2. Compliance and enforcement	22	15.6
3. Public access to information	15	10.6
4. Decision-making	11	7.8
5. Policy development	9	6.4
6. Monitoring	9	6.4
7. Budgeting, billing and financial management	8	5.7
8. Capacity building	3	2.1
9. Strategy development	3	2.1
10. Business development	3	2.1
11. Reporting	2	1.4
12. Job creation	2	1.4
13. Research	1	0.7

Table 2  
Response by municipalities to waste information needs analysis postal questionnaire (grouped by province)

Province	Local municipalities			District municipalities			Metropolitan municipalities			Total		
	Total	Number of responses	Response as % of total	Total	Number of responses	Response as % of total	Total	Number of responses	Response as % of total	Total	Number of responses	Response as % of total
Gauteng	9	8	88.9	3	1	33.3	3	2	66.7	15	11	73.3
Mpumalanga	17	8	47.1	3	1	33.3	0	–	–	20	9	45.0
Free State	20	10	50.0	5	1	20.0	0	–	–	25	11	44.0
Eastern Cape	38	12	31.6	6	4	66.7	1	1	100.0	45	17	37.8
KwaZulu Natal	50	16	32.0	10	6	60.0	1	1	100.0	61	23	37.7
Northern Cape	26	7	26.9	5	4	80.0	0	–	–	31	11	35.5
Western Cape	24	6	25.0	5	2	40.0	1	–	0.0	30	8	26.7
Limpopo	26	6	23.1	6	0	0.0	0	–	–	32	6	18.8
North West	21	3	14.3	4	0	0.0	0	–	–	25	3	12.0
Total	231	76	32.9	47	19	40.4	6	4	66.7	284	99	34.9

With the questionnaire being addressed to the waste management department of the local municipality, it is believed that ‘inaccessibility’ (Rogelberg and Luong, 1998) was one of the main reasons for non-response. Follow-ups showed that in many instances the questionnaire had not found its way to the relevant manager responsible for waste within the municipality.

Of the responses received from municipalities, 68.9% were collecting some form of data on waste management. Unfortunately 62.0% of the municipalities collecting waste data believe that the data they currently collect are unreliable.

Of the municipalities collecting waste data, 74.6% are collecting data on landfills, 46.5% on waste generators (not waste generation), 33.8% on waste transportation, 14.1% on recyclers and 4.2% on waste treatment. The priority needs of local government largely reflect the mandated function of municipalities in South Africa. In terms of the Constitution (Act 108 of 1996) (Republic of South Africa, 1996), municipalities are responsible for refuse removal, refuse dumps and solid waste disposal (Part B, Schedule 5). It therefore makes sense that the waste data reflect this focus on waste disposal to landfills and waste collection from generators.

There has been much debate as to whether a national WIS for South Africa should focus on the collection of waste information from generators or the collection of waste information from end-of-pipe disposers, e.g. landfill sites. There is perhaps no one, single answer in this debate, both pieces of information being necessary to close the waste generation–disposal loop. However, to meet the short- to medium-term needs of all three spheres of government an initial focus on disposal is proposed, in line with the needs of government.

Of those municipalities who indicated that they were collecting data, 31.0% were collecting data on both the

waste source/destination and quantity, 25.4% only the waste quantity and 14.1% only the waste source/destination. The frequency at which data are collected by municipalities varies, with 21.1% of municipalities collecting waste data indicating that they collect data daily, 26.8% monthly, 8.5% annually, 4.2% quarterly and 8.5% on an ad hoc basis.

The method of storage of collected data by municipalities provides an indication as to its accessibility and potential for use. 83.1% of municipalities collecting data store their data in hardcopy format, e.g. reports, weigh-bridge printouts, etc. with only 39.4% of municipalities storing their data in electronic format, e.g. spreadsheets, databases or information systems. The storage of data

Table 3  
Current use of information by local government

Current use	Response	
	n	% <sup>a</sup>
1. Planning	28	39.4
2. Budgeting, billing and financial management	23	32.4
3. Reporting	16	22.5
4. Landfill site management	13	18.3
5. Human resource and operations management	10	14.1
6. Monitoring	9	12.7
7. Compliance and enforcement	9	12.7
8. New development initiatives	6	8.5
9. Decision-making	3	4.2
10. Identifying and solving problems	2	2.8
11. Recycling initiatives	2	2.8
12. Environmental assessments	2	2.8
13. Public access to information	2	2.8
14. Capacity development	1	1.4
15. Research	1	1.4
17. Missing (non-respondents)	8	11.3

<sup>a</sup> As a percentage of municipalities currently collecting data.

Table 4  
Basis for planning by local government

Basis for planning	Response (%)
1. Obvious problems	82.6
2. Data and information	50.7
3. Issues identified by national and provincial government	43.5
4. Perceived problems	40.6
5. Consultants identify as problems	37.7
6. Educated guesses	14.5

and information in paper-based records is typical of developing countries (Mundy, 1996) making access and analysis of data difficult for decision-makers. The implementation of a WIS will therefore support municipalities in moving data storage from hardcopy to a more accessible on-line, electronic format of data storage and information recovery.

The current use of waste data by municipalities is reflected in Table 3 with the emphasis being on waste management planning, financial management, reporting, landfill site management and resource management – typical operational requirements of a local government.

Although planning is identified by municipalities as the main use of collected waste data (Table 3), data does not appear to be the main basis for planning (Table 4). 82.6% of municipalities currently collecting data indicated that they base their planning on ‘obvious problems’, 43.5% on issues identified by national or provincial government, 40.6% on what municipalities ‘perceive’ to be problems, 37.7% on what consultants identify as problems, 14.5% on educated guesses and only 50.70% on data and information. Therefore, of the municipalities collecting data, only half are actually re-using this data for strategic waste management. This is possibly due to the poor storage

Table 5  
Desired need for information by local government

Desired use	Response	
	n	% <sup>a</sup>
1. Planning	49	47.6
2. Public access to information	20	19.4
3. New development initiatives	15	14.6
4. Human resource and operations management	13	12.6
5. Budgeting, billing and financial management	12	11.7
6. Monitoring	11	10.7
7. Compliance and enforcement	10	9.7
8. Recycling initiatives	10	9.7
9. Landfill site management	9	8.7
10. Decision-making	8	7.8
11. Reporting	8	7.8
12. Capacity development	3	2.9
13. Environmental assessments	3	2.9
14. Identifying and solving problems	1	1.0
15. Missing (non-respondents)	22	21.4

<sup>a</sup> As a percentage of all municipalities who responded to the questionnaire.

format of data, typically in hardcopy format, and the low confidence in collected data as discussed earlier. It is the opinion of the author that the limited use of data may also lie with the fact that few waste managers understand the value of data and know how to use data in their operational planning and decision-making.

The desired future use of waste information by municipalities is given in Table 5, with the emphasis being on planning, public access to information, new developments, resource management and financial management – again typical operational requirements of a local government.

The identified waste information needs (Table 5) should not be seen as isolated activities performed by government, since many of these needs are integral to a ‘cycle’ of waste management, as indicated in Fig. 1, of which planning is seen as being the first and most important step. A cycle aimed at improving the management of waste in South

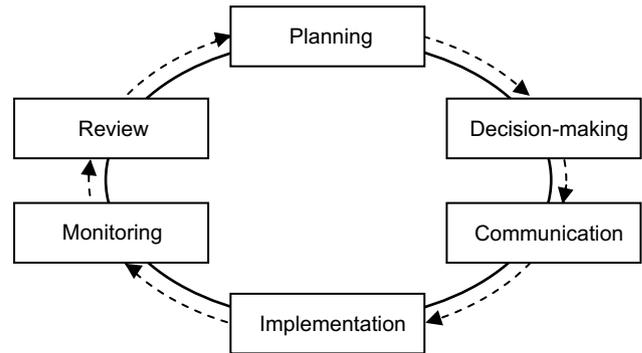


Fig. 1. Cycle of management of waste by government.

Table 6  
Shift in emphasis between current use of, and desired need for, waste data

Identified need	Response (%)		
	Current use	Desired need	Deviation
1. Public access to information	2.8	19.4	16.6
2. Planning	39.4	47.6	8.2
3. Recycling initiatives	2.8	9.7	6.9
4. New development initiatives	8.5	14.6	6.1
5. Decision-making	4.2	7.8	3.6
6. Capacity development	1.4	2.9	1.5
7. To know	1.4	2.9	1.5
8. Environmental assessments	2.8	2.9	0.1
9. Research	1.4	0	-1.4
10. Human resource and operations management	14.1	12.6	-1.5
11. Identifying and solving problems	2.8	1.0	-1.8
12. Monitoring	12.7	10.7	-2.0
13. Compliance and enforcement	12.7	9.7	-3.0
14. Landfill site management	18.3	8.7	-9.6
15. Reporting	22.5	7.8	-14.7
16. Budgeting, billing and financial management	32.4	11.7	-20.7

Africa through the dissemination and use of reliable waste information.

A comparison of the current uses (Table 3) and desired needs (Table 5) for waste information by local government as summarised in Table 6 reflects a shift in ‘waste thinking’, with a move towards public access to information, planning, recycling and new developments. Not surprisingly, these positive shifts reflect a change in approach to the management of waste, a more strategic and integrated approach to waste management more in line with national and international policy and best practice.

### 3.3. Waste management needs

There is unfortunately very little written on the waste management challenges currently facing the three spheres of government in South Africa. The top two waste information needs – planning and compliance/enforcement – identified by national and provincial government are discussed below, within the context of their current waste management environment.

Planning is a very broad subject, ranging from strategic planning at national government, to basic operational planning at local government. According to McKinney and Howard (1998, p. 201) strategic planning is “*the strategy or means of carrying out a policy*”. In the case of South Africa, it reflects government’s plan of action or management framework for the implementation of the White Paper on IP&WM (Republic of South Africa, 2000a) and the National Waste Management Strategy (NWMS) (DEAT, 1999). Information is an important component in this planning and decision-making process (Roux et al., 1997), however, since there is no routine, comprehensive collection of national waste data, it is currently not possible to support strategic waste management planning with reliable information.

South Africa has one of the most advanced constitutions in the world in terms of the protection of human rights (Kasrils, 2003), including the right to a safe and healthy environment. In addition, it has some of the most progressive environmental legislation in the world (WESSA, 2005; UNDP, 2003). However, government has typically been perceived to be unwilling and/or unable to enforce pollution and waste-related legislation (Lukey et al., 2004; Seeliger et al., 2003; Republic of South Africa, 2000a; London and Rother, 2000). A public perception exists that government is unwilling and/or unable to “*come down hard on polluters*” (Lukey et al., 2004). According to national government (DEAT, 2004a, p. 2), polluting companies will be “*pursued and held accountable should they not comply with their permit regulations*”. A review of landfill data collected by the national Department of Water Affairs and Forestry (DWA) and the Department of Environmental Affairs and Tourism (DEAT) in 2005, shows that only 43.6% of the 1203 landfill sites in South Africa are known to be permitted (DEAT, 2006), and of those permitted, lit-

tle to no information exists on their compliance with permit conditions. Of the non-permitted/unknown permit status landfill sites, in excess of 90% are thought to be municipal landfills. The biggest culprit of non-compliance in the landfilling of waste, it would therefore appear, is government itself. The need for cooperative governance between the three spheres of government, supported by reliable, accurate waste information is therefore imperative in improving the levels of compliance with waste and pollution legislation. Increasing compliance with environmental quality and protection legislation and authorisations has been identified as a strategic objective of DEAT (2004a), an objective to be supported by reliable, comprehensive information.

The top two waste information needs – planning and public access to information – identified by local government are discussed below, within the context of their current waste management environment.

“*The greatest challenges we have as government in the delivery of infrastructure lies squarely in the proper alignment of planning processes. For municipalities, [Integrated Development Plans] should not be merely viewed as an annoying compliance matter, but rather as a planning instrument that will assist in the acceleration of the delivery of services. Not only do IDPs ensure accelerated service delivery, adhering to the IDP processes is in fact participatory democracy in action. Without proper planning, the project implementation phase will be delayed, resulting in slow service delivery. Experience has shown that ad hoc and improperly planned projects never see their completion stage.*” (Hangana, 2006). According to the Public Service Commission (PSC, 2005), sound strategic planning, budgeting and implementation are critical to ensuring effective service delivery by local government. It allows for development projects to be implemented “*as part of integrated, cohesive and coherent development strategies*” instead of in an ad hoc manner (Atkinson, 2002, p. 25).

Local government is to a large degree immersed in planning processes, including the preparation of Integrated Development Plans (IDPs), Integrated Waste Management Plans (IWMPs), Environmental Management Plans (EMPs), Environmental Implementation Plans (EIPs) (DEAT, 2004b) and Service Delivery Improvement Plans (SDIPs) (PSC, 2005). According to the Municipal Systems Act (Act 32 of 2000, p. 38) (Republic of South Africa, 2000c) all municipalities are required to complete Integrated Development Plans (IDPs) which lay out, amongst other things, the “*council’s vision for the long-term development of the municipality and the council’s development priorities and objectives for its elected term*”. Integrated waste management plans (IWMPs) are seen as a sector plan of the IDPs. According to the National Waste Management Strategy (DEAT, 1999) all municipalities are required to complete IWMPs for their area of jurisdiction (DEAT, 1999) by 2003, however, as yet there is no legislation which enforces the development of such waste plans. It is therefore not surprising that ‘*planning*’ ranks consistently as

the highest current and future need for waste information by local government. However, as at mid-2005, only 58.3% of municipalities who responded to the questionnaire had completed, or were in the process of completing, an IWMP. Of those municipalities completing or having completed an IWMP, 78.3% indicated that there was sufficient data to develop the IWMP. However, since 81.7% of IWMPs have been completed by consultants, it is expected that much of this supporting waste data are currently held by private companies and not by government. As with the contracting out of the preparation of IDPs (Atkinson, 2002), the preparation of IWMPs by consultants raises concerns as to the ownership of the planning process and the likelihood of sustainable implementation. “*The end result of planning is a plan, which is nothing less than a carefully worked out programme of intended action*” (Botes et al., 1992, p. 189). A plan remains a plan until decisions have been taken and actions have been identified and implemented.

But planning can only be recognised as a valuable component in the management of waste, if waste is identified as a priority by local government. Waste has typically not been afforded the priority it deserves (Republic of South Africa, 2000a; Godfrey and Dambuza, 2006). Understandably government is faced with basic social and livelihood issues such as access to food, employment, housing, water and sanitation, education and security. However, the mismanagement of waste has the potential to impact greatly upon human health and the environment and as such, is a critical component of the services provided by local government. Planning is a critical aspect in the management of waste by local, provincial and national government, an aspect which to date has not realised its full potential – potential which may be supported through the collection of accurate, reliable waste information.

Public access to information is a constitutional right of all South Africans (Act 108 of 1996) (Republic of South Africa, 1996) enabled through the Promotion of Access to Information Act (Act 2 of 2000) (Republic of South Africa, 2000b). By increasing community awareness and understanding, it provides a mechanism for communities to participate in environmental planning, decision-making and policy development (Nauman, 2004; Kolominskas and Sullivan, 2004), in assessing the potential risks associated with local pollutant releases (Howes, 2001), and in placing pressure on industry and government to reduce emissions and discharges (Antweiler and Harrison, 2003; Kolominskas and Sullivan, 2004). The dissemination of information by government therefore provides a mechanism for supporting informed community participation in the management of waste. According to Kirby (1997), “*Freedom of information is important to justice... In a world of secrecy and opaque government, serious wrongs can occur which may never come to light. Freedom of information legislation is at once a means of casting the light of scrutiny into the dark corners of government and a contribu-*

*tion to a new culture of openness in public administration*”. Public access to waste information has however been slow to materialise. An Internet search of IWMPs in South Africa in June 2005, for example, yielded only three plans. Municipalities have typically been slow to include communities in the IWMP process and to make IWMPs available to the public for consultation and comment, thereby undermining the potential for communities to participate in the waste planning process.

#### 4. Conclusions

As has been shown in this paper, the desired needs for waste information reflect some of the major issues facing national, provincial and local government, issues that reflect the more strategic roles of national and provincial government and the operational/service delivery role of local government. The top priority waste information needs of national, provincial and local government as identified in Tables 1 and 5 are summarised in Table 7.

A WIS is therefore not just about collecting data for the sake of collecting data. It is instead a means to support and inform government to enable them to meet the waste management challenges currently facing the country. It is however, also recognised, that the simple collection of data will not solve the waste management challenges currently facing the young democratic government of South Africa. Data and information is but one tool to be used in the armoury of government in improving the way waste is managed.

This paper has, through a participatory process, identified the needs of the three spheres of government with respect to waste information – needs which are shown to reflect waste management governance challenges currently facing South Africa. A brief discussion of the top two identified needs for waste information by national and provincial government and local government indicates that these are in fact challenges currently facing government with respect to the management of waste. These needs reflect the strategic issues of national and provincial government and the more operational issues of local government, in line with the roles and responsibilities of the three spheres of government with respect to the management of waste.

Table 7  
The top 5 needs of national/provincial and local government

National and provincial government	Local government
1. Planning	1. Planning
2. Compliance and enforcement	2. Public access to information
3. Public access to information	3. New development initiatives
4. Decision-making	4. Human resource and operations management
5. Policy development	5. Budgeting, billing and financial management

A shift in governments approach to waste is evident from the current and future needs for waste information. This shift is in line with national and international policy towards waste minimisation, reuse and recycling and sustainable waste management through sound waste management planning and the involvement of communities in planning through the dissemination of information. However, the focus on waste disposal to landfill and the need for information on landfilling remains entrenched within government, possibly due to the poor compliance of the majority of landfill sites in South Africa and the problems around the illegal disposal of both general and hazardous waste. Reviewing the current status of waste data collection has highlighted the diverse and varying approach across municipalities, in terms of the type of data, frequency of collection, etc., as well as the limited reuse and integration of this data and information into the management of waste.

Highlighting the needs of government with respect to waste information has also provided an understanding of the required framework for a national WIS, the requirements of role-players and data requirements. In particular, the needs analysis has identified two critical requirements – the need to provide usable information to government to support the informed management of waste, while providing a mechanism to disseminate reliable waste information to the public.

While it is recognised that fulfilling all information needs identified by government is important to improving the management of waste in the country, it is also recognised that not all needs can be met in the short to medium term. It is also recognised that the needs reflect government's current approach/thinking towards waste management, which may change over time, resulting in a reprioritisation of waste information needs. As such a phased implementation approach to data collection has been identified (Godfrey et al., 2005), which allows for the collection of data on immediate priorities, while at the same time accommodating medium- to long-term needs in line with growing national and international trends in waste management.

It is also recognised that there are certain waste management needs which a WIS may not be able to accommodate, e.g. enforcement and compliance which have been identi-

fied as major needs of government. Collecting reliable data on the management of waste creates a potential dichotomy in the collection of compliance and enforcement information. The knowledge that information will be used for legal compliance and enforcement has the potential to undermine the accuracy and reliability of data provided to a WIS, e.g. planning purposes. As such, the Department of Environmental Affairs and Tourism (Godfrey et al., 2005) has recognised the need to develop two separate information systems, linked through a national registry of waste role-players.

There are many social, institutional and technical challenges currently facing the South African Government in the management of waste. While the implementation of a national WIS in South Africa is identified as a possible mechanism to support government in addressing these needs, it would be naïve to think that the same challenges will not threaten the implementation of the WIS (Godfrey, 2006). The current and desired state of waste information management must be identified, and mechanisms put in place to close any gaps, thereby supporting the long-term sustainability of waste data collection in South Africa (Godfrey, 2006).

In conclusion, this paper has shown both hypotheses to be true: the identified needs of government have provided an understanding and insight into the design of the national WIS and the needs for waste information reflect greater, currently unfulfilled needs in the sustainable management of waste. These needs, which, if fulfilled through reliable, accurate waste information, has the potential to lead to the improved management of waste in South Africa.

#### Acknowledgements

The author acknowledges the South African Department of Environmental Affairs and Tourism for providing support for further research on this topic; the Danish Foreign Ministry who provided project development assistance to the South Africa Government; and the Council for Scientific and Industrial Research (CSIR) for providing the financial support for this research.

**WASTE INFORMATION SYSTEM  
NEEDS ANALYSIS QUESTIONNAIRE <sup>(1)</sup>**

The following questions have been drafted to allow members of local and provincial government the opportunity to provide input into the needs analysis programme of the South African Waste Information System project.

**Name:** ..... **Position:** .....

**Local Authority name:** ..... or

**Provincial Department name:** .....

**Tel:** ..... **Fax:** ..... **Email:** .....

**SECTION 1**

This section is aimed at capturing the status quo with respect to information on waste in your municipality or Province

**Waste Data**

1. Does your Department / Directorate have data on waste within your area of jurisdiction (e.g. list and location of generators, transporters, landfills, or types and quantities of waste generated, landfilled, treated)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
---	------------------------------	-----------------------------

If yes, very briefly describe (i) what data you have and (ii) who provides this data .....

2. Is this waste data reliable and up to date?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

If yes, very briefly describe (i) how often this data is collected .....

3. What is this data used for? .....
4. How is this data stored? .....

<input type="checkbox"/> Reports	<input type="checkbox"/> Paper / Filed	<input type="checkbox"/> Spreadsheet	<input type="checkbox"/> Database / Information System
----------------------------------	--	--------------------------------------	--

5. Has your Department / Directorate developed (or are developing) an Integrated Waste Management Plan (IWMP)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

6. If yes, was there adequate data available to inform the IWMP?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

7. If yes, who is developing the IWMP?	<input type="checkbox"/> Self	<input type="checkbox"/> Consultant
--	-------------------------------	-------------------------------------

8. How is your Department / Directorate currently planning or making decisions around waste management activities ? Are you basing decisions on:	<input type="checkbox"/> obvious waste problems	<input type="checkbox"/> educated guesses
	<input type="checkbox"/> what you perceive to be strategic issues	<input type="checkbox"/> commissioning of waste investigations by consultants
	<input type="checkbox"/> what provincial or national government identifies as	<input type="checkbox"/> available, reliable waste data

<sup>(1)</sup> This questionnaire has been shortened in length for the purposes of inclusion in this paper. While no questions have been removed, the space provided for answers has been reduced.

strategic issues

**Information Systems**

9. Does your Department / Directorate have any environmental information systems in place?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

10. If yes, what environmental data are you collecting? .....

11. Does your Department / Directorate have a Waste Information System (WIS) in place?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

If **No** to Question 11, please complete Section 2 of this Questionnaire.

If **Yes** to Question 11, please complete Section 3 of this Questionnaire.

**SECTION 2**

This section is aimed at capturing your requirements or expectations of a local or provincial WIS? (**Note:** It is important to convey your actual waste information needs rather than a 'wish list'!)

12. Would your Department / Directorate need access to a WIS?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
---	------------------------------	-----------------------------

13. If yes, very briefly describe (i) Why you would need access to a waste information system .....

14. What waste information do you require to support *strategic* planning or decision-making? .....

15. Who should provide this information to you? .....

16. Who should keep and maintain this information? .....

17. Does your Department / Directorate have any plan to develop and implement a WIS within the next year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
---	------------------------------	-----------------------------

18. If yes, very briefly describe when and how the system will be developed .....

19. Has your Department/Directorate made financial provisions in the IDP, IWMP, Business Plan for the collection of waste data or the development of a WIS?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
---	------------------------------	-----------------------------

**SECTION 3**

This section is aimed at capturing your learning if a Provincial or Local Authority Waste Information System is being/or has been developed.

20. Is your WIS currently operational, i.e. are you collecting and storing waste data in the system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

21. If not, very briefly describe (i) Why the system is not operational .....

22. What data is (will be) reported to the WIS? .....

23. Who reports (will report) to the WIS and when? .....

.....

24. Who has (will have) access to the WIS and data in the WIS? .....

.....

25. What software system/platform was (will be) utilised for development? .....

.....

26. What is (will) the data be used for, i.e. what were the objectives of developing a system? .....

.....

27. Who manages (or will manage) the WIS? .....

.....

28. Is reporting to the WIS?	<input type="checkbox"/> Enforced through Regulations	<input type="checkbox"/> Voluntary
------------------------------	---	------------------------------------

29. What lessons were learnt in the development and operation of the system? .....

.....

30. What are/were the critical problems encountered in development? .....

.....

31. Has your Department/Directorate made financial provisions in the IDP, IWMP or Business Plan for the collection of waste data / development of a WIS?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
--	------------------------------	-----------------------------

\*\* If you have any additional, general comments, please feel free to add these in your response.

Feedback on these questions will be used to draft a report on the needs analysis and current status of waste information systems in South Africa. The report will assist in developing the framework for the National Waste Information System to be developed and rolled out during 2005-2006.

## References

- Antweiler, W., Harrison, K., 2003. Toxic release inventories and green consumerism: empirical evidence from Canada. *Canadian Journal of Economics* 36 (2), 495–520.
- Atkinson, D., 2002. A passion to govern: third-generation issues facing local government in South Africa. A think-piece in the interests of public debate on local government. Centre for development and enterprise, June 2002. <[http://www.hsarc.ac.za/research/output/output-Documents/1879\\_Atkinson\\_PassiontoGovern.pdf](http://www.hsarc.ac.za/research/output/output-Documents/1879_Atkinson_PassiontoGovern.pdf)> (Accessed 31 March 2006).
- Botes, P.S., Brynard, P.A., Fourie, D.J., Roux, N.L., 1992. *Public Administration and Management. A Guide to Central, Regional, and Municipal Administration and Management*. Haum Publishers, Pretoria.
- Brynard, P.A., Hanekom, S.X., 1997. *Introduction to Research in Public Administration and Related Academic Disciplines*. J.L van Schaik Publishers, Pretoria.
- Department of Environmental Affairs and Tourism, 1999. *National Waste Management Strategy. National waste management strategies and action plans, South Africa. Strategy formulation phase. Version D, 15 October 1999*.
- Department of Environmental Affairs and Tourism, 2004a. *Strategic plan, 1 April 2004–31 March 2007. Forward by Minister Marthinus van Schalkwyk*.
- Department of Environmental Affairs and Tourism, 2004b. *Development of a core set of environmental performance indicators to be integrated into IDP, EIP/EMP and SoE reporting processes. Situation analysis – identification of local level responsibilities for the environment, March 2004*.
- Department of Environmental Affairs and Tourism, 2006. *Implementation plan for the transfer of the waste permitting function. Final report, February 2006, Pretoria*.
- Godfrey, L., 2005. *National Waste Management Strategy Implementation, South Africa. Waste Information System Needs Analysis, Final Report, 29 March 2005. Department of Environmental Affairs and Tourism*.
- Godfrey, L., 2006. *The importance of information system design improvisation in meeting the needs of an emerging democracy in South Africa, a case study of a national waste information system. In: EnviroInfo 06 – Managing Environmental Knowledge. 20th International Conference on Informatics for Environmental Protection, 6–8 September 2006, Graz, Austria*.
- Godfrey, L., Dambuza, T., 2006. *Integrated Waste Management Plans – A useful management tool for local government or a bureaucratic burden? In: WasteCon 2006 Biennial International Waste Congress and Exhibition, Somerset West, Cape Town, South Africa, 5–8 September 2006*.
- Godfrey, L., Baloyi, O., de Roos, H., van Vuuren, D., 2005. *National Waste Management Strategy Implementation, South Africa. Waste Information System Framework Document, Final Report, 31 March 2005. Department of Environmental Affairs and Tourism*.
- Hangana, N., 2006. *Fast tracking sustainable infrastructure delivery for the accelerated shared growth initiative for South Africa. Speech by the deputy minister for provincial and local government, Ms Nomatyala Hangana, 28 March 2006. <http://www.dplg.gov.za/> (Accessed 1 April 2006)*.
- Heeks, R., 2002. *Information systems and developing countries: failure, success and local improvisations. The Information Society* 18, 101–112.
- Henry, G.T., 1990. *Practical Sampling. In: Applied Social Research Methods Series, vol. 21. Sage Publications, California*.
- Howes, M., 2001. *What's your poison? The Australian national pollutant inventory versus the US toxics release inventory. Australian Journal of Political Science* 36 (3), 529–552.
- Kasrils, R., 2003. *A decade of delivery by Mr. Ronnie Kasrils, Minister of Water Affairs and Forestry. <http://www.dwaf.gov.za/Communications/Articles/Kasrils/2004/TEN%20YEARS%20OF%20DELIVER%> (Accessed 31 March 2006)*.
- Kirby, M., 1997. *Freedom of information: the seven deadly sins. British Section of the International Commission of Jurists: Fortieth Anniversary Lecture Series, London 1997. <www.hcourt.gov.au/speeches/kirbyj/kirbyj\_justice.htm> (Accessed 6 April 2006)*.
- Koen, Renee, 2006. *Statistician, CSIR Built Environment – Logistics and Quantitative Modelling, pers comm*.
- Kolominskas, C., Sullivan, R., 2004. *Improving cleaner production through pollutant release and transfer register reporting processes. Journal of Cleaner Production* 12, 713–724.
- Lafontaine, A., 2000. *Capacity development initiative. Assessment of capacity development efforts of other development cooperation agencies, July 2000. GEF-UNDP strategic partnership. <http://*

- [www.gefweb.org/Documents/Enabling\\_Activity\\_Projects/CDI/documents/CD\\_Efforts.pdf](http://www.gefweb.org/Documents/Enabling_Activity_Projects/CDI/documents/CD_Efforts.pdf)> (Accessed 12 January 2006).
- Leedy, P.D., Ormrod, J.E., 2005. *Practical Research. Planning and Design*, eighth ed. Prentice Hall, New Jersey.
- London, L., Rother, H.-A., 2000. People, pesticides, and the environment: Who bears the brunt of backward policy in South Africa? *New solutions: A Journal of Environmental and Occupational Health Policy* 10 (4), 339–350.
- Lukey, P.J., Brijlall, A., Thoos, M., 2004. Gearing-up for efficient and effective pollution and waste management enforcement. In: *Biennial Congress of the Institute of Waste Management of Southern Africa, WasteCon 2004*, 11–15 October 2004, Sun City, South Africa.
- Maxwell, J.A., 2005. *Qualitative Research Design: An Interactive Approach*, second ed.. In: *Applied Social Research Methods Series*, vol. 41 Sage Publications, California.
- McKinney, J.B., Howard, L.C., 1998. *Public Administration. Balancing Power and Accountability*, second ed. Praeger Publishers, Westport, USA.
- Moussa, A., Schwart, R., 1992. Informatics in Africa: lessons from World Bank experience. *World Development* 20 (12), 1737–1752.
- Mundy, D., 1996. IT in developing countries: a loss of independence? In: Roche, E.M., Blaine, M.J. (Eds.), *Information Technology, Development and Policy*. Avebury Publishers, Great Britain.
- Nauman, T., 2004. The environmental right-to-know movement: role and agenda of organised civil society in the Americas: Learning from experience. IRC (Interhemispheric Resource Centre) Americas program discussion paper, 23 March 2004. <<http://www.americaspolicy.org>> (Accessed April 2004).
- Neuman, W.L., 2000. *Qualitative and Quantitative Approaches*, fourth ed. Allyn and Bacon, Boston.
- Public Service Commission (PSC), 2005. State of the public service report – 2005. <[http://www.psc.gov.za/docs/reports/2005/sops\\_2005\\_-\\_final\\_17\\_feb\\_2005.doc](http://www.psc.gov.za/docs/reports/2005/sops_2005_-_final_17_feb_2005.doc)> (Accessed 16 February 2005).
- Rea, L.M., Parker, R.A., 1992. *Designing and Conducting Survey Research: A Comprehensive Guide*. Jossey-Bass Publishers, San Francisco.
- Republic of South Africa, 1996. Act 108 of 1996. Constitution of the Republic of South Africa.
- Republic of South Africa, 2000a. White paper on integrated pollution and waste management for South Africa. A policy on pollution prevention, waste minimisation, impact management and remediation. *Government Gazette Vol. 417, No. 20978*, 17 March 2000. General Notice 227 of 2000.
- Republic of South Africa, 2000b. Act 2 of 2000. Promotion of public access to information act.
- Republic of South Africa, 2000c. Act 32 of 2000. Local Government: Municipal Systems Act.
- Rogelberg, S.G., Luong, A., 1998. Nonresponse to mailed surveys: a review and guide. *Current Directions in Psychological Science* 7 (2), 60–65.
- Roux, N.L., Brynard, P.A., Botes, P.S., Fourie, D.J., 1997. Critical issues in public management and administration in South Africa. Kagiso Tertiary, Pretoria.
- Seeliger, L., van der Westhuizen, C., van Zyl, A., 2003. Budgeting for long-term sustainability of the economy: Building capacity in the Department of Environmental Affairs and Tourism. <<http://www.essa.org.za/download/papers2003.htm>> (Accessed 31 March 2006).
- United Nations Development Programme (UNDP), 2003. National human development report 2003. Chapter 6: Environmentally sustainable development. <<http://www.undp.org.za/Nhdr2003/chap06.pdf>>. (Accessed, 10 March 2006).
- Wildlife and Environment Society of South Africa (WESSA), 2005. Annual report, 2005. <<http://www.wildlifesociety.org.za/documents/2005%20Annual%20Report.doc>> (Accessed, 30 March 2006).