Assessing the Potential Role of Open Data in South African Environmental Management

Rachel Adams
Chief Researcher, Human Sciences Research Council, Cape Town; and PhD Candidate, University of Cape Town

Fola Adeleke
Visiting Scholar, Columbia University, New York; and Senior Researcher, Mandela Institute, University of Witwatersrand, Johannesburg

Abstract
This study explores the possibilities for open data as a knowledge governance mechanism that could benefit environmental management in South Africa. The authors consider the potential benefits of open data in support of public participatory governance modalities, and the legislative frameworks and Constitutional Court stance in South Africa in support of the right of access to information and proactive disclosure of environmental information. The article also looks at potential barriers to effective use of open data in South Africa. The authors find that effective deployment of open data as a means to support participatory environmental governance will require a dedicated South African open data legal instrument, as well as political will to compile the necessary data, and steps to ensure meaningful citizen data access and use.

1. Introduction

In 1981 in southern California, the Internet Working Group for DARPA (Defense Advanced Research Projects Agency) published a report calling for development of a worldwide inter-network system for sharing critical information between computers (Information Sciences Institute, 1981). This initiative eventually became known as the World Wide Web, a key element of the Internet. In the same year, in Nairobi, the African Charter on Human and Peoples' Rights was adopted by African heads of state. Thirty-five years later, digital technology is playing an increasingly significant role in governance, through its ability to effectively distribute knowledge products, and the African human rights discourse has evolved such that public participatory governance is now a human rights norm. Accordingly, the need to address the synergies between these phenomena – online networks as a tool for knowledge distribution, and participatory governance – becomes ever more critical.[1]

The study outlined in this article sought to explore the potential for open data in South Africa to serve as both a public online platform to share vast quantities of data and information and as a mechanism of public participatory governance, looking specifically at environmental management. We maintain that open data is an important knowledge governance development that has the potential to facilitate public participatory governance of the environment.

Through doctrinal research, we investigated the legal context currently in place in South Africa in relation to disclosure of environmental management information. We also consulted relevant secondary literature in order to understand both the potential benefits and drawbacks of open data in the South African environmental management context. The inquiry was focused on South Africa's environmental sector because of the government's recent commitment, through the Open Government Partnership (OGP),[2] to adopt open data provisions as a mechanism to disclose environmental management information (RSA, 2012).

2. Participatory governance and environmental management

The concept of public participatory governance has gained increased global appreciation in recent decades (Speer, 2012). One of the most salient applications of this concept is as a means, through localised environmental management, to mitigate environmental degradation (Du Plessis, 2008). In broad terms, public participatory governance is a concept that describes a continuous relationship between citizens and governance structures, whether public or private, such that

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1 For a brief overview of the history of the developments in knowledge governance generated by the Internet and World Wide Web see, also, Wilbanks and Rossini (2014).

2 The Open Government Partnership (OGP) is an international platform launched in 2011 by eight countries, including South Africa. The OGP seeks to provide a space for states committed to making their governments more open, accountable, and responsive to citizens to develop actionable commitments every two years.

citizens are able to meaningfully engage in governance decisions that affect their lives. Public participatory governance therefore requires open channels of communication between citizen stakeholders and relevant public and private entities. These lines of communication are predicated on the availability and accessibility of timely, relevant, and comprehensible information (Braun & Schultz, 2010; Gaventa, 2004).

Across the world, environmental degradation constitutes one of the most significant challenges of modern times. South Africa is no exception. Further, the degradation often disproportionately affects rural communities where most livelihoods are dependent on natural resources and environmental sustainability. Local communities and groups typically hold unique knowledge and insight about their local environments that are not readily available to outside actors, thus making public participation particularly important in respect of environmental management (Ellis, 2005; Raymond et al., 2010). Local communities are often best-equipped to identify areas of concern or problems, as well as to provide potential solutions. They are, further, typically best placed to monitor the implementation, from a grassroots perspective, of environmental policies or commercial activities
that may have an impact on the environment, and to contribute to the "diversity of knowledge and values" that Reed (2008) cites as being essential to environmental management (2008, p. 2418). According to Reed,

> [e]nvironmental problems are typically complex, uncertain, multi-scale and affect multiple actors and agencies. This demands transparent decision-making that is flexible to changing circumstances, and embraces a diversity of knowledges and values. (Reed, 2008, p. 2418)

In South Africa, public participatory governance is a constitutional imperative. The Constitution's section 152, in Chapter 7, reads as follows:

> **Section 152 Objects of Local Government**
> (1) The objects of open government are –
>   (a) To provide democratic and accountable government for local communities;
>   (b) To ensure the provision of services to communities in a sustainable manner;
>   (c) To promote social and economic development;
>   (d) To promote a safe and healthy environment; and
>   (e) To encourage the involvement of communities and community organisations in the matters of local government. (RSA, 1996)

These section 152 objectives are in line with the human rights set out in Chapter 2 of the Constitution, particularly socio-economic rights (section 27), environmental rights (section 24), freedom of expression (section 16), and the right of access to information (section 32). There is also increasing recognition of the need for private

companies to facilitate public participatory governance models in the course of business activities that may have an impact on local communities (Ruggie, 2011). Central to public participatory governance is information availability.

Ready availability of relevant information is central to an effective public participatory governance model because of, inter alia, (1) its potential to empower communities and non-government stakeholders to participate effectively; and (2) its potential to build trust between stakeholders involved in public participatory governance. As noted by Barten et al. (2007), "information and access to information can change the balance of power" (2007, p. 169), and "genuine empowerment depends on the control that community-based organizations ultimately acquire, and meaningful participation requires certain preconditions such as access to information" (2007, p. 166). Further, ensuring access to relevant and timely information shows a commitment to enhanced communication and transparency, which can build trust (Bartenberger & Grubmüller-Règent, 2014).

Noting the centrality of access to information as a precondition to public participatory governance, it can be argued that open data, as a new and evolving form of transparency and knowledge governance, can enhance and support public participatory governance structures by providing access to data that can be translated into information and knowledge. According to Bartenberger and Grubmüller-Règent (2014), "open government data might enable new and more participative and collaborative forms of governance" (2014, p. 38). They go on to state that:

> The general way of thought is that open (government) data could enable forms of collaborative and participative governance since in order for citizens to participate in public projects or to voice their opinions, they first need to learn about the addressed issue and also need to have a platform where they can share their contributions. From this perspective open data can serve both to lower the barriers for participation and collaboration and to make citizen involvement more attractive. (Bartenberger & Grubmüller-Règent, 2014, p. 38)

We are in agreement with Bartenberger and Grubmüller-Règent regarding the potential benefits of open data for public participatory governance, yet we also note – as discussed below – that there are various limitations to this proposition in the South African context.

3. Open data and disclosure of environmental management information

Contemporary global society is frequently described as an information society, and it is said that we are living in an "information age" (Castells, 2011) driven by advancements in information and communications technologies (ICTs) and ICT-enabled content resources. It follows, then, that ICTs and ICT-enabled content have the potential to serve as important tools for promoting access to information in

support of public participatory governance (Palen & Lui, 2007).

Open data

The concept of "open data" refers to the provision of an online portal whereby data can be shared freely without discrimination and easily accessed (Janssen et al., 2012). (It typically refers to government-held data, but not exclusively so. The data released can be made available by any entity, public or private, in possession of the datasets.) Although the data can contain either textual or non-textual information, the data released are often statistical and non-textual in form. The openness element of the concept of open data refers to the notion of any individual or group being able to freely use, reuse, and share the data (Shadbolt, 2012).

Increasing relevance has been assigned to the concept of open data as an element of open government, particularly in relation to sustainable development (see World Bank, 2015). Certainly, among the most critical potential benefits of open data provision are its potential to promote government transparency, to allow for citizens to hold government accountable, and to advance meaningful engagement by citizens in policymaking. It is for these reasons that open data has been hailed as having the potential to bring about radical social change, by bridging the power-knowledge gap between government and society, and creating a paradigm shift in the way individuals, communities and civil society engage with public institutions (International Open Data Charter, 2015). In South Africa, the National Planning Commission's (NPC's) *National Development Plan: Vision for 2030* recognises the need to transform the government via open data (NPC, 2011).[3]

The open data movement has been influenced in part by the advancement of standards of openness in spheres such as open source software licensing, open educational resources, open access scholarly publishing, and the international open science movement. In the African context, civil society groups such as Code for Africa, the World Wide Web Foundation, Code for South Africa, Open Institute, and Ushahidi,[4] have all done considerable work in promoting open data. And open data's implications in the global Southern and African contexts are receiving increased critical, analytical attention (see Davies, 2014; Mutuku & Mahihu, 2014; Ohemeng & Ofusu-Adarkwa, 2015; Van Schalkwyk et al., 2015; Willmers et al., 2015).

Open data is part of a growing propensity to favour "more open and cooperative knowledge governance" systems (Wilbanks & Rossini, 2014, p. 201). Open data can represent a decentralised knowledge governance system insofar as various state and non-state actors can contribute to it and, as Wilbanks and Rossini (2014) note,

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3 See Chapter 14 of NPC (2011) on "Promoting Accountability and Fighting Corruption".
4 See https://codeforafrica.org, http://webfoundation.org, http://code4sa.org, www.openinstitute.com, www.ushahidi.com

it can serve as a form of "downstream governance of knowledge" (2014, p. 200) that challenges traditional top-down knowledge governance. Among open data's benefits is its provision of a pre-established technological infrastructure and standard for individuals, and other non-state actors, to participate in. But at the same time, there is evidence to suggest that it can be difficult to categorise and measure the impact of open data initiatives. In Kenya, for example, a national open data portal was established in 2011, but a study in 2014 found that "there is little or no recorded evidence to support consequential social impact of these initiatives and technologies or the way grassroots citizens engage with government data" (Mutuku & Mahihu, 2014, p. 4).[5] Further, Wilbanks and Rossini (2014) have noted some of the difficulties of ICT-enabled knowledge governance systems, including

> the difficulty of rewarding participation in peer production of knowledge, the difficulty of defining knowledge into forms that work on wikis and other new models of knowledge creation and distribution, […] the complexity of curating data and databases and […] the limitations of library capability in the long-term storage and preservation of data […] (Wilbanks & Rossini, p. 204)

According to Wilbanks and Rossini (2014), "optimism for open data must be tempered with the reality of data sharing, which is difficult, expensive and often unsatisfying" (p. 218), and "data is of little value if there is no infrastructure to make it comprehensible" (p. 219). Bartenberger and Grubmüller-Règent (2014) stress that "data needs to be organised and made accessible in ways that transform pure data into knowledge" (2014, p. 42). For Reichman, Jones and Schildhauer (2011), access to raw data can be increased through the development of robust metadata, and the World Wide Web Consortium maintains that open data must be both machine-readable and human-readable (W3C, 2016). Concerns around reward, affordability and access are particularly important when considering the implementation of open data in developing-world regions.

Open data in support of the right of access to information
The right of access to information has become globally accepted as a human right (Mendel, 2003). The South Africa Constitution's section 32 enshrines the right of access to information from both public and private bodies. However, there is evidence that this right has not been effectively realised in South Africa, especially when it comes to the delivery of information to disadvantaged communities (see Arko-Cobbah, 2008; Calland, 2009; Diallo & Calland, 2013; McKinley, 2003).
The importance of the Internet and open data to access to information is captured in the recent African Declaration on Internet Rights and Freedoms (2015). The relationship between the Internet and access to information is complex and interwoven. An essential component of the right of access to information is the

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5 See also Jetzek et al. (2012) and Van Schalkwyk et al. (2015).

character, in both form and substance, of information as a resource. Form relates to both access and the means of access, where the Internet plays a crucial role; substance relates to the value of information as an enabler of other rights. Information, and knowledge, can be garnered from data sources, with data sources acting as a kind of "raw material" for information.

In South Africa, the Promotion of Access to Information Act (PAIA) 2 of 2000 was passed to give effect to the aforementioned Constitutional right of access to information. The Constitution also recognises the right to "just administrative action" (section 33), which embodies the norms and standards of public engagement with the state. The Promotion of Administrative Justice Act (PAJA) 3 of 2000, passed in the same year as PAIA, gives effect to this administrative justice right, and provides for a notice and comment procedure for anyone to make representation on a decision that could adversely affect her or his rights, including environmental rights. In terms of PAIA, the primary framework for accessing information is through the submission of individual information requests – a system that various empirical studies have demonstrated is not a sufficiently effective enabler of access to information. For example, a Cape Town-based body, the Centre for Environmental Rights (CER), submitted 240 access to information requests to both public and private bodies over a period of four years, and in that period, less than 30% of the information requests were granted (CER, 2014, pp. 2-3). While PAIA provides, in sections 34-42, several grounds for refusal to disclose, it also provides in section 46 for mandatory disclosure of information in the public interest where

> [t]he disclosure of the record would reveal evidence of a substantial contravention of, or failure to comply with, the law or reveal imminent and serious public safety or *environmental risk* and the public interest in the disclosure of the record clearly outweighs the harm contemplated. (emphasis added)

Thus, PAIA provides an imperative to publicly disclose requested information relating to environmental risks that are deemed sufficiently important to override any exemptions to information disclosure. PAIA also provides for proactive disclosure of information by both public and private entities. Sections 15 and 52 of PAIA provide that public and private bodies may, on a voluntary and periodic basis, describe "the categories of records […] that are automatically available without a person having to request access" (RSA, 2000a). But the extent to which PAIA's proactive disclosure provisions have been complied with to date is negligible (see PAIA Civil Society Network (2014) and SAHRC (2013)). According to McKinley (2003), PAIA's potential to facilitate public participatory governance has been constrained by a combination of factors: the lack of an obligation on public and private entities to create records for public access; delays and refusals by both public and private bodies to grant requests for information; extensive exemptions in PAIA that allow public

and private bodies to refuse requests for information; the fees payable; and the lack of an efficient oversight body to oversee compliance with the law.

A strong call has emerged in South Africa for proactive disclosure of information via open data as a means of increasing public participatory governance. The call has been concretised through establishment of the City of Cape Town Open Data Policy and portal (City of Cape Town, 2014; City of Cape Town, n.d; Willmers et al., 2015), and by the work of civil society organisations such as Code for South Africa. In relation to environmental management information, a call for open data appears to be implicit in the government's OGP commitment to "[e]xplore the possibility of establishing a single agency mandated by Government to develop a comprehensive and publicly accessible portal of environmental management information" on the grounds that "[t]ransparency will be enhanced if citizens have access to reliable environmental data on water quality and other environmental issues" (RSA, 2012). The government states that such a portal would allow members of the public to have the same levels of access to information that government officials enjoy, and would assist the public in determining whether developments will affect their environment or compromise environmental sustainability and livelihoods (RSA, 2015, p. 23). The government has also stated that the proposed portal will be integrated with the Coordinated and Integrated Permitting System, so as to allow users to monitor approval of development applications (RSA, 2015, p. 24).

In respect of open data for environmental management, Reichman et al. (2011) have stated that "access to data is not only important for basic ecological research but also crucial for addressing the profound environmental concerns we face today and, inevitably, in the future" (2011, p. 703). Further, because of the diverse fields and disciplines that need to be engaged in the pursuit of environmental governance (see Reichman et al., 2011), open data portals can be useful platforms for bringing these together.

South African online environmental information datasets

In its 3rd OGP National Action Plan, launched in May 2016 and covering the period 2016-18, government committed to developing a pilot national open data portal that will "consolidate various datasets from across the three spheres of government, enabling citizens and businesses to easily access government data" (RSA, 2016b). (At the time of completion of this article in July 2016, the pilot portal was not publicly available at the www.data.gov.za URL cited in the 3rd OGP National Action Plan. Government did, however, provide us, during the course of our research, with a URL for spatial data: http://egis.environment.gov.za. The expected date for the pilot portal to be fully operational is said to be March 2017).

As it stands, there are four notable South African environmental databases online: the

South African Mineral Resources Administration System (SAMRAD);[6] the South African Waste Information System (SAWIS) available on the South African Waste Information Centre (SAWIC) site;[7] the South African Protected Areas Database (SAPAD);[8] and the Blue Drop System.[9]

The data in SAMRAD, hosted by the Department of Mineral Resources, are produced in terms of the Mineral and Petroleum Resources Development Act (MPRDA) 28 of 2002 . The data allow the public to view information on the locality of applications, rights and permits made in terms of mining and prospecting of mineral resources. SAMRAD also allows for electronic applications for permits. SAMRAD is thus an existing mechanism for the proactive disclosure of information.

SAWIS and SAPAD are initiatives of the Department of Environmental Affairs. SAWIS is enabled by the National Environmental Management: Waste Act 59 of 2008. The Act provides in section 16 for a general duty, on the part of manufacturers of products that may result in the generation of hazardous waste, to inform the public of the impact of that waste on health and the environment. SAWIS is designed to contain information on the quantities, types, and sources of waste in the country's landfill sites. This system further seeks to support the improvement of integrated waste management in South Africa through the dissemination and use of reliable waste information, so as to contribute to protection of the environment and human health. Information about pollution at industrial facilities is often the most difficult for the public to access. (South Africa does not have a pollutant release and transfer register (PRTR), which is an emission inventory that is present in other countries such as Germany, Spain, and Switzerland. A PRTR provides information about the extent to which facilities are complying with standards that limit releases into air and water.)

SAPAD, established by section 10 of the Protected Areas Act 57 of 2003, holds information on "land cover, conservation, protected areas, special data for environmental impact assessments for renewable energy project proposals, solar data, and distribution maps of mammals in South Africa" (OGP, 2015, p. 35). However, while the portal is open to the general public, it is primarily aimed at technical users such as "environmental practitioners, policy-makers, and the private sector to produce studies that enhance the richness of policy dialogue" (OGP, 2015, p. 36).

The Blue Drop System is a national Department of Water Affairs online portal where users can access information about the water quality in their area. Although it was developed prior to South Africa's involvement in the OGP, South Africa included

6 See http://portal.samradonline.co.za
7 See http://sawic.environment.gov.za
8 See www.padcollaboration.org
9 See https://www.dwa.gov.za/dir_ws/DWQR

reference to the Blue Drop System in its commitment, under its initial OGP action plan, for establishment of an online portal to host environmental information (RSA, 2012, p. 10).

These four online databases do not, however, conform to the standards for open data set out by the World Wide Web Consortium (W3C, 2016). SAPAD, SAMRAD and SAWIS require users to register online before accessing data, potentially limiting access. Further, Chien and Davies (2015) note that:

> Despite […] SAMRAD being advertised as a portal "where the general public can view the locality of applications, rights and permits made or held in terms of the [Mineral and Petroleum Resources Development Act]", […] SAMRAD has never functioned in a way that allows the public to access copies of mining licences or any other regulatory information relating to mining operations. (Chien & Davies, 2015, p. 28)

With regard to the Blue Drop System, the national government itself has commented on the failure of rural municipalities to provide accurate and up-to-date information (Rivett et al., 2013, p. 410).

Legislation mandating possible open data datasets
There are a number of other South African laws that support public disclosure of the kinds of data that a South African open data portal for environmental management could host.

National Environmental Management Act (NEMA) 107 of 1998
NEMA recognises, in section 31, the importance of both transparency in environmental decision-making and promotion of public participation in environmental governance. The Act provides for public access to information on the state of the environment, environmental threats, environmental management, environmental implementation plans, and emergency hazardous incidents. Moreover, NEMA excludes the confidentiality of information where the information relates to environmental quality or the state of the environment; any risks posed to the environment, public safety, health and well-being of people; or compliance with or contraventions of any environmental legislation (section 31Q).

Water Services Act 108 of 1997
This Act requires, in section 69, that water service providers must provide the public with information on water services, and further that the public is entitled to reasonable access to information contained in the national information system on water services. The Act further provides (section 67) that the Minister must take reasonable steps to ensure that information is made available in an accessible format.

National Forest Act 84 of 1998
This Act provides, in section 6, that information in support of sustainable forest management should be disclosed to the public.

National Environmental Management: Biodiversity Act 10 of 2004
In accordance with sections 38, 40, 52, 56, 67 and 70 of this Act, information on the following is published in the *Government Gazette*: bio-regions; lists of threatened ecosystems; lists of critically endangered species; lists of endangered species; lists of vulnerable species and protected species; list of alien species; and lists of invasive species.

National Environmental Management: Air Quality Act 39 of 2004
This Act requires public access to air quality information and public participation in setting of national norms and standards on air quality (section 57).

National Environmental Management: Integrated Coastal Management Act 24 of 2008
This Act requires, under section 93, disclosure of information, in order to enable public participation, concerning protection and management of coastal zones.

Judicial support for proactive disclosure
The principal of proactive disclosure has also found support in a decision of the South African Constitutional Court. In its decision in *Bengwenyama Minerals (Pty) Ltd v Genorah Resources (Pty)*, the Constitutional Court noted the importance of proactive disclosure of substantive information. This case involved a community's challenge to what it saw as a mining company's defective compliance with a community consultation requirement in applying for a mining licence (2011 (4) SA 113 (CC)). The court noted the necessity of providing the community with the "necessary information on everything that is to be done so that they can make an informed decision in relation to the representations to be made […]" (2011 (4) SA 113 (CC), paragraph 66).

4. Analysis, conclusions and recommendations
There are a number of potential tensions within the open data concept in the South African context, and these tensions will need to be taken into account and worked through in development of the concept as a mechanism of public participatory governance.

Legal support for proactive disclosure
As outlined above, PAIA is the overarching law for access to government and privately-held information in South Africa. It provides that anyone can make a request for access to information from a *public* institution without giving a reason for the request. Meanwhile, requests for access to information from *private* institutions require demonstration that the information is required for the exercise or protection

of a right in terms of the Constitution's Bill of Rights. In terms of PAIA, when an access to information request is refused, remedies must be obtained through an application to the courts. (A recent amendment of PAIA, through the Protection of Personal Information Act 4 of 2013, creates the possibility of seeking remedies through an independent administrative tribunal called the Information Regulator, but this body is yet to be established.) Also outlined above were PAIA's provisions for public and private institutions to voluntarily and proactively disclose information. Thus PAIA seeks, to some extent, to foster a culture of proactive transparency. And we saw above that there are several South African Acts specific to environmental matters that require a measure of proactive disclosure. We also saw support for the proactive disclosure principle in a decision of the Constitutional Court. However, as stated above with reference to research by the PAIA Civil Society Network (2014) and SAHRC (2013), proactive disclosure by public and private entities, has to date been limited in South Africa.

Accordingly, a robust legislative mechanism that specifically deals with proactive disclosure through open data is required. The African Union (AU) Model Law on Access to Information for Africa proposes an expansive approach to proactive disclosure of information, thus potentially serving as a valuable starting point for drafters of South African open data legislation (AU, 2013). Article 7 of the AU Model Law provides for automatic disclosure of various policies, contracts, licences, permits, authorisations, public-private partnerships and reports, in addition to budget, revenue and expenditure information.

Adopting a prescriptive approach to disclosure, which specifies how and when disclosures should be made as well as their format, would be useful for ensuring the automatic availability of information already embedded in the principles of PAIA and of many of the environmental sector Acts reviewed above. This approach would be consistent with open government policy shifts that other countries are adopting. The Obama government's Open Government Directive in the United States requires that government agencies "should proactively […] disseminate useful information, rather than waiting for specific requests under FOIA" (Fung, 2013. p. 188). Furthermore, "open government policies in the United States and the United Kingdom often stress the release of 'data-sets' and the importance of providing information in machine-readable formats that can be searched and analyzed using computational tools and methods" (Fung, 2013, p. 188).

There is a need for a law to back an open data policy approach, because it is central to promotion of what the PAIA Preamble refers to as "a society in which the people of South Africa have effective access to information to enable them to more fully exercise and protect all of their rights" (RSA, 2000a). This is part of the idea of what Fung (2013) calls "democratic transparency", where the principle of public information is based on availability, proportionality, accessibility, and actionability

(2013, p. 190). According to Fung, the public should be able to access information without restrictions imposed through excessive government confidentiality or "proprietary intellectual property restrictions that govern much of the information produced and collected by private corporations" (2013, p. 191).

There is no existing law in South Africa that provides for comprehensive open data disclosures. The South African OGP commitment to a comprehensive open data portal is being pursued in a legal vacuum. The various laws outlined above prescribe only limited disclosures in the South African environmental sector. A comprehensive, proactive open data disclosure law is necessary.

Political will

Open data, as with any effective government transparency system, requires the maintenance of effective record-keeping by government bodies (Darch, 2013). Darch and Underwood (2005) explain that an access to information culture in South Africa has failed to blossom because

> [O]rganizations do not, by and large, operate efficient record keeping systems, either for paper or for digital records. At the provincial level, record keeping (including selection for destruction) is either 'out of control or in complete chaos'. Digital documentation is equally disorganized, and 'a Wild West scenario prevails'. […] there is little capacity for the provision of workable public access. Many departments and other bodies 'seem to assume that they can rely on existing staff already heavily overburdened by other responsibilities' – with predictable negative results. (Darch & Underwood, 2005, pp. 79-80, with quotes from Pickover & Harris, 2001)

Without political will that translates into policy requirements and budgets for record-keeping and disclosure, much of the promise of open data will remain unfulfilled. Over and above effective record-keeping in the public sector, and noting the concerns raised by Darch and Underwood, as cited above, in relation to the lack of personnel, an open data portal would likely require dedicated teams of experts and ICT technicians within relevant government departments to ensure data is captured and uploaded in line with necessary standards (e.g., standards of the kind set out by the World Wide Web Consortium (W3C, 2016)). In addition to building political will, it is also necessary to avoid a situation, as described by Janssen (2012), where there is an element of capture of government open data initiatives by certain stakeholders:

> [T]he danger arises that the focus of the public bodies, who have to make choices in assigning their limited time and resources, will move from making information available for a large audience to disseminating data to a small group of developers and activists, just because their cry for data is louder and the immediate rewards for government in terms of reputation

and goodwill from the public will be better. (Janssen, 2012)

Citizen access and use

To ensure open data accessibility, Fung (2013) argues, government regulation is required to determine disclosure priorities, in terms of the creation, collection, organisation, analysis, publication and utilisation of information that prioritise the ability of citizens to exercise and protect essential rights. The principle of proportionality, Fung (2013) states, requires that "information about organizations should be publicly available in proportion to the extent that the actions of those organizations threaten and create risks to citizens' vital interests" (2013, p. 192).

Where information is proportionally made available, the public must also have the capacity to process the information in specific and meaningful ways. Communities and community organisations need to be empowered to utilise information presented from open data disclosures. This requires the provision of "economic, political, and social structures that appropriately facilitate action based on that information" (Fung, 2013, p. 202).

Of concern with respect to citizen open data access and use in South African are the still-low levels of broadband ICT access and, in turn, digital literacy, in impoverished South African communities. As is made powerfully clear in the 2014 African Declaration on Internet Rights and Freedoms, public participatory governance processes need to take into account myriad elements of ICT availability and usage (African Declaration on Internet Rights and Freedoms, 2014). Such elements include affordability of data, technological and data literacy, geographical locations where digital access might be difficult, and age and gender inequalities.

In order to be interpreted and mediated into useful information and knowledge, open data need to be engaged with by people with knowledge and understanding of data value (Bartenberger & Grubmüller-Règent, 2014; Janssen, 2012; Wilbank & Rossini, 2014). In this regard, intermediaries, including journalists, research institutions and researchers, will have an important role to play in South Africa in ensuring that data provided on online portals are translated into meaningful information and knowledge. At the same time, Janssen (2012) provides the important warning that if this power of intermediaries is misused, "open data risks the creation of an illusion of transparency and accountability, while in reality causing information inequality and a disempowerment of the citizens" (Janssen, 2012).

In addition, in order for public participatory governance to be effective, information must be shared on a two-way basis between local communities and authorities. As noted above, this is particularly key for environmental management, where communities are often in possession of critical information about the state of their local environment. While open data can provide a means for communities to access information held by public and private bodies, it will not serve as a tool of true two-

way communication of information if it does not allow citizens to themselves upload information or datasets. For example, the Ghana open data initiative was found to be "too narrowly focused on the supply side of the project", and it was suggested that the portal should "generate an even platform to improve interaction between government and citizens to ensure a balance in knowledge sharing with and among all constituencies" (Ohemeng & Ofusu-Adarkwa, 2015, p. 419).

Full citizen access and use also require datasets that are free from restrictions such as copyright, patents, and fees, and that are designed to be reused, disaggregated and re-compiled with other datasets. As Willmers, Van Schalkwyk and Schonwetter (2015) point out, for open data to be effective, the datasets must be accompanied by clearly-articulated open licensing rules:

> The absence of an open licence implies that all rights are reserved to the author or copyright holder, and serves as a potential barrier for re-use. It is therefore not only important that data are made open, but also that the potential users of such data are clear about being able to re-use data without fear of legal sanction (Janssen et al., 2012). In order for users to operate autonomously in this manner, licensing provisions should be expressed clearly and in alignment with other organisational terms of use or policies governing content distribution. (Willmers et al., 2015, p. 27)

Willmers et al. (2015) present valuable insight into open data provision in developing countries, looking specifically at the Kenyan Open Data Initiative and the City of Cape Town Open Data initiative. The authors note challenges with regard to understandings of what open licensing is, and also find that the "current state of licensing is nascent and practice is manifesting in a non-uniform fashion" (2015, p. 34).

Another dimension of citizen access and use is that open data practices must remain sensitive to the value of indigenous information and knowledge. In this respect, the arguments of Darch and Underwood (2002) still have relevance:

> The technology of the information age has proved for the most part robust and attractive, with the potential to be a driver of social change rather than merely a consequence of developing social need. Such powerful forces have a destructive as well as a shaping consequence. The baleful effects can already be seen in communities where the value of indigenous knowledge is being ignored in favour of documentary knowledge from the outside. (Darch & Underwood, 2002, p. 34)

This concern is particularly relevant to environmental management, where indigenous knowledge is critical. Open data efforts designed to promote public participatory governance in the environmental management sector will need to include measures

to ensure that the necessary value is placed on information and knowledge produced by indigenous and local communities, in line with the objectives of the recently-tabled Protection, Promotion, Development and Management of Indigenous Knowledge Systems Bill (RSA, 2016a).

Finally, in recognition of the realities of South Africa where, for the reasons discussed in this article, many of the people most impacted by environmental matters will not be able to fully benefit from environmental management open data, it is necessary for there to be other forms of information disclosure and feedback – via, for instance, offline consultations and proactive collaborations with communities. Such face-to-face engagements will continue to be essential to enabling inclusive public engagement. And these engagements must necessarily be geared towards free, prior and informed consent of communities in environmental management matters.

References

African Declaration on Internet Rights and Freedoms. (2014). Retrieved from http://africaninternetrights.org

African Union (AU). (2013). Model Law on Access to Information for Africa. Retrieved from www.achpr.org/files/news/2013/04/d84/model_law.pdf

Ansell, C., & Gash. A. (2008). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory, 18*(4), 543-571.

Arko-Cobbah, A. (2008). The right of access to information: opportunities and challenges for civil society and good governance in South Africa. *IFLA Journal, 34*(2), 180-191.

Barten, F., Mitlin, D., Mullholland, C., Hardoy, A., & Stern, R. (2007) Integrated approaches to address the social determinants of health for reducing health inequality. *Journal of Urban Health, 84*(1), 163-173.

Bartenberger, M., & Grubmüller-Règent, V. (2014). The enabling effects of open government data on collaborative governance in smart city contexts. *Journal of eDemocracy, 6*(1), 36-48.

Bengwenyama Minerals (Pty) Ltd v Genorah Resources (Pty) Ltd 2011 (4) SA 113 (CC).

Braun, K., & Schultz. S. (2010). "…a certain amount of engineering involved": Constructing the public in participatory governance arrangements. *Public Understanding of Science, 19*(4), 403-419.

Calland, R. (2009). Illuminating the politics and the practice of access to information in South Africa. In K. Allan (Ed.), *Paper wars: Access to information in South Africa* (pp. 1-16). Johannesburg: Wits University Press.

Castells, M. (2011). *The rise of the network society: The information age: Economy, society, and culture*. Oxford: Blackwell Publishing.

Centre for Environmental Rights (CER). (2013). *Turn on the floodlights: Trends in disclosure of environmental licences and compliance data*. Cape Town. Retrieved from http://cer.org.za/wp-content/uploads/2013/03/Turn-on-the-Floodlights.pdf

CER. (2014). *Money talks: Commercial interests and transparency in environmental governance*. Cape Town. Retrieved from http://cer.org.za/wp-content/uploads/2014/11/CER-Money-Talks-Nov-2014.pdf

Chien, L.-F., & Davies. T. (2015). How increased transparency in the mining sector would facilitate the realisation of environmental rights. In Open Society Foundation for South Africa (Ed.), *In good company?: Conversations around transparency and accountability in South Africa's mining industry* (pp. 25-29). Retrieved from www.publishwhatyoupay.org/wp-content/uploads/2015/11/OSF-Mining-In-Good-Company-web-FINAL_3-Nov-2015.pdf

Chui, M., Farrell, D., & Jackson, K. (2013). *How government can promote open data and help unleash over $3 trillion in economic value*. Washington DC: McKinsey Global Institute.

City of Cape Town. (2014). *Draft open data policy*. Retrieved from www.capetown.gov.za/en/PublicParticipation/Documents/HYS_Open_Data_Draft_Policy_version_21_February_%202014.pdf

City of Cape Town. (n.d.). City of Cape Town Open Data Portal. Retrieved from https://web1.capetown.gov.za/web1/OpenDataPortal

Company Secretary of Arcelor Mittal South Africa and Another v Vaal Environmental Justice Alliance (69/2014) [2014] ZASCA 184; 2015 (1) SA 515 (SCA).

Darch, C. (2013). The problem of access to information in African jurisdictions: Constitutionalism, citizenship and human rights discourse. In R. Calland & F. Diallo (Eds.). *Access to information in Africa: law, culture and practice*. Leiden: Brill Publishers.

Darch, C., & Underwood, P. G. (2002). Information literacy in Africa: Empowerment or impoverishment? *ACAS Bulletin, 62/63*, 30-34.

Darch, C., & Underwood, P. G. (2005). Freedom of information legislation, state compliance and the discourse of knowledge: The South African experience. *The International Information & Library Review, 37*, 77–86.

Davies, T. (2014). *Open data in developing countries: Emerging insights from phase 1*. Retrieved from www.opendataresearch.org/sites/default/files/publications/Phase%201%20-%20Synthesis%20-%20Full%20Report-print.pdf

Diallo, F., & Calland, R. (Eds.). (2013). *Access to information in Africa: Law, culture and practice*. Leiden: Brill.

Donovan, K. P. (2012). Seeing like a slum: Towards open, deliberative development. *Science and Technology*, Winter/Spring, 97-104. Retrieved from http://blurringborders.com/wp-content/uploads/2013/02/97-104-ST-Donovan-1.pdf

Du Plessis, A. (2008). Public participation, good environmental governance and fulfilment of environmental rights. *Potchefstroom Electronic Law Journal, 11*(2), 1-34.

Ellis, S. C. (2005). Meaningful consideration?: A review of traditional knowledge in environmental decision making. *Artic 58*(1), 66-77.

Fung, A. (2013). Infotopia: Unleashing the democratic power of transparency. *Politics & Society, 41*, 183-212.

Gaventa, J. (2004). Towards participatory governance: Assessing the transformative

possibilities. In S. Hickey & G. Mohan (Eds.), *Participation: From tyranny to transformation?: Exploring new approaches to participation in development* (pp. 25-41). London: Zed Books.

Hughes, T. (2012). *South Africa: A driver of change: Increasing transparency and accountability in the extractive industries.* Working Paper Series 2012. Cape Town: Transparency and Accountability Initiative and Revenue Watch Institute. Retrieved from www.resourcegovernance.org/sites/default/files/SouthAfrica_TAI.pdf

Information Sciences Institute. (1981). *Transmission control protocol: DARPA Internet program protocol specification*. RFC: 793. Retrieved from www.ieft.org/rfc/rfc793.txt.

International Open Data Charter. (2015). Principles. Retrieved from http://opendatacharter.net/principles

Janssen, K. (2012). Open government data and the right to information: Opportunities and obstacles. *The Journal of Community Informatics, 8*(2). Retrieved from www.ci-journal.net/index.php/ciej/article/view/952/954

Janssen, M., Charalabidis, Y., & Zuiderwijk, A. (2012). Benefits, adoption barriers and myths of open data and open government. *Information Systems Management, 29*(4), 258-268.

Jetzek, T., Avital, M., & Bjorn-Andersen, N. (2012). *The value of open government data: A strategic analysis framework*. Orlando, FL: SIG eGovernment pre-ICIS Workshop.

McKinley, D. T. (2003). *The state of access to information in South Africa.* Centre for the Study of Violence and Reconciliation (CSVR). Retrieved from www.csvr.org.za/wits/papers/papmckin.htm.

Mendel, T. (2003). *Freedom of information: An internationally protected human right.* Retrieved from www.juridicas.unam.mx/publica/rev/comlawj/cont/1/cts/cts3.htm.

Mutuku, L., & Mahihu, C. (2014). *Open data in developing countries: Understanding the impacts of Kenya open data applications and services*. Retrieved from www.opendataresearch.org/sites/default/files/publications/ODDC%20Report%20iHub.pdf.

National Planning Commission (NPC). (2011). *National development plan: Vision for 2030.* Pretoria. Retrieved from http://led.co.za/sites/default/files/cabinet/orgname-raw/document/2011/npc_national_development_plan_vision_2030.pdf

Nissanke, N. (2006). *Human capital development programme for effective ICT in Africa: Framework paper for the AERC project on ICT Policy and economic development in Africa.* Retrieved from http://aercafrica.org/index.php/publications/doc_download/475-human-capital-development-programme-for-effective-ict-in-africa

Ohemeng, F. L. K., & Ofosu-Adarkwa, K. (2015). One-way traffic: The open data initiative project and the need for an effective demand side initiative in Ghana. *Government Information Quarterly, 32*(4), 419-428.

Open Government Partnership (OGP). (2015). *South Africa progress report 2013–2014.* Independent Reporting Mechanism (IRM), OGP. Retrieved from www.opengovpartnership.org/sites/default/files/IRMReport_SouthAfrica_final.pdf

Palen, L., & Lui, S. B. (2007). Citizen communication in crisis: Anticipating a future of ICT-supported public participation. *Proceedings of the SIGCHI conference on human factors in*

computing systems, 727-736.

PAIA Civil Society Network. (2014). *PAIA Civil Society Network shadow report 2014*. Retrieved from http://foip.saha.org.za/uploads/images/PCSN_ShadowRep2014_final_20150202.pdf.

Raymond, C. M., Ioan. F., Reed, M. S., Stringer, L. C., Robinson. G. M., & Evely. A. C. (2010). Integrating local and scientific knowledge for environmental management. *Journal of Environmental Management, 91*, 1766-1777.

Razzano, G. (2015). Accessing information? What we know from user experiences. Cape Town: Open Democracy Advice Centre. Retrieved from www.opendemocracy.org.za/images/docs/publications/PAIA_Users.pdf

Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation, 141*(10), 2417–2431.

Reichman, O. J., Jones. M. B., & Schildhauer. M. P. (2011). Challenges and opportunities of open data in ecology. *Science, 331*(6018), 703-705.

Republic of South Africa (RSA). (1996). Constitution of the Republic of South Africa, Act 108 of 1996. Retrieved from www.gov.za/sites/www.gov.za/files/images/a108-96.pdf

RSA. (1997). Water Services Act 108 of 1997. Retrieved from www.gov.za/sites/www.gov.za/files/a108-97.pdf

RSA. (1998a). National Forest Act 84 of 1998. Retrieved from www.unodc.org/res/cld/document/national-forest-act-84-of-1998_html/NATIONAL_FORESTS_ACT.pdf

RSA. (1998b). National Environmental Management Act (NEMA) 107 of 1998. Retrieved from www.environment.gov.za/sites/default/files/legislations/nema_amendment_act107.pdf

RSA. (2000a). Promotion of Access to Information Act (PAIA) 2 of 2000. Retrieved from www.saflii.org/za/legis/consol_act/poatia2000366.pdf

RSA. (2000b). Promotion of Administrative Justice Act (PAJA) 3 of 2000. Retrieved from www.saflii.org/za/legis/num_act/poaja2000396.pdf

RSA. (2002). Mineral and Petroleum Resources Development Act (MPRDA) 28 of 2002. Retrieved from http://cer.org.za/wp-content/uploads/2010/08/28-OF-2002-MINERAL-AND-PETROLEUM-RESOURCES-DEVELOPMENT-ACT_7-Dec-2014-to-date-1.pdf

RSA. (2003). National Environmental Management: Protected Areas Act 57 of 2003. Retrieved from www.saflii.org/za/legis/consol_act/nempaa2003467/

RSA. (2004a). National Environmental Management: Biodiversity Act 10 of 2004. Retrieved from www.saflii.org/za/legis/consol_act/nemba2004476/

RSA. (2004b). National Environmental Management: Air Quality Act 39 of 2004. Retrieved from www.environment.gov.za/sites/default/files/legislations/nema_amendment_act39.pdf

RSA. (2008a). National Environmental Management: Waste Act 59 of 2008. Retrieved from www.saflii.org/za/legis/consol_act/nemwa2008394/

RSA. (2008b). National Environmental Management: Integrated Coastal Management Act 24 of 2008. Retrieved from http://saflii.org/za/legis/hist_reg/nemicma24o2008rangnr4961014/

nemicma24o2008rangnr496a27j20141097.pdf

RSA. (2012). *Open Government Partnership (OGP) action plan: Republic of South Africa*. Retrieved from www.opengovpartnership.org/country/south-africa/action-plan

RSA. (2013). Protection of Personal Information Act 4 of 2013. Retrieved from www.saflii. org/za/legis/consol_act/popia2013380/

RSA. (2015). *Mid-term self-assessment report: National action plan 2013-2015*. Retrieved from www.gov.za/sites/www.gov.za/files/OGP%20MidTerm%20Self%20Assessment%20 Report%20March%202015_Draft_4%20March%202015%20(2).pdf

RSA. (2016a). Protection, Promotion, Development and Management of Indigenous Knowledge Systems Bill [B6-2016]. Retrieved from www.parliament.gov.za/live/ commonrepository/Processed/20160415/615036_1.pdf

RSA. (2016b). *The 3rd South African Open Government Partnership country action plan, 2016-2018*. Retrieved from www.ogp.gov.za/documents/OGP%203rd%20Country%20Action%20 plan%202016-2018.pdf

Rivett, U., Champanis, M., & Wilson-Jones. T. (2013). Monitoring drinking water quality in South Africa: Designing information systems for local needs. *Water South Africa, 39*(3), 409-414.

Ruggie, J. (2011). Report of the Special Representative of the Secretary-General on the Issue of Human Rights and Transnational Corporations and Other Business Enterprises. *Netherlands Quarterly Human Rights 29*, 224-253.

Shadbolt, N. (2012, 28 June). Britain is at the forefront of the open data revolution. *The Guardian*. Retrieved from www.thegaurdian.com/commentisfree/2012/jun/28/britain-open-data-revolution.

South African Human Rights Commission (SAHRC). (2012). *The Promotion of Access to Information Act (PAIA) and records management: Consolidated audit report: 2008-2012*. Retrieved from www.sahrc.org.za/home/21/files/Consolidated%20PAIA%20Audit%20 Report%202012.doc2.pdf

SAHRC. (2013). *Promotion of Access to Information Act annual report 2012-2013*. Retrieved www.sahrc.org.za/home/21/files/PAIA%202012-13%20Annual%20report.pdf

Speer, J. (2012). Participatory governance reform: A good strategy for increasing government responsiveness and improving public services? *World Development, 40*(12) 2379-2398.

UN Conference on Trade and Development (UNCTAD). (2010). *Information economy report 2010: ICTs, enterprises and poverty alleviation*. Retrieved from http://unctad.org/en/docs/ ier2010_embargo2010_en.pdf

Vaal Environmental Justice Alliance (VEJA) v Company Secretary of Arcelor Mittal 2013 South Gauteng High Court Case No: 39646/12. Retrieved from https://www.elaw.org/system/ files/vaal-enviromental-judgment_0.pdf

Van Schalkwyk. F., Willmers, M., & Schonwetter. T. (2015). *Embedding Open Data Practice: Developing Indicators on the Institutionalisation of Open Data Practice in Two African Governments*. Cape Town: University of Cape Town IP Unit. Retrieved from http://

webfoundation.org/docs/2015/08/ODDC-2-Embedding-Open-Data-Practice-FINAL.pdf

Wilbanks, J., & Rossini. C. (2014). An interoperability principle for knowledge creation and governance: The role of emerging institutions. In L. Burlamaqui, A. C. Castro, & R. Kaffel (Eds.), *Knowledge governance: Reasserting the public interest* (pp. 199-226). London: Anthem Press.

Willmers, M., Van Schalkwyk. F., & Schonwetter, T. (2015). Licensing open data in developing countries: The case of the Kenyan and City of Cape Town open data initiatives. *The African Journal of Information and Communication (AJIC), 16*, 26-37. Retrieved from http://wiredspace.wits.ac.za/bitstream/handle/10539/19312/AJIC-Issue-16-2015-Willmers-et-al.pdf

World Bank. (2015). *Open data for sustainable development*. Retrieved from http://pubdocs.worldbank.org/en/741081441230716917/Open-Data-for-Sustainable-development-PN-FINAL-ONLINE-September1.pdf

World Wide Web Consortium (W3C). (2016). *Data on the web best practices*. Retrieved from https://www.w3.org/TR/2016/CR-dwbp-20160830/