

***Citizen-Engagement Circumvented: An Analysis of Liquid-Waste Information/Knowledge, Control and Environmental Policy-Perspectives in Harare, Zimbabwe<sup>1</sup>***

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**ABSTRACT**

*Evidence of the socio-political and economic impacts of liquid-waste at the global level is rapidly emerging as an important new field of study in the twenty-first century as testified by the works of Gandy, Reid, Barnes, Alley, and Zimmer on the politics and history of liquid waste. This evidence is increasingly being considered by scholars from multidisciplinary backgrounds (Economic History, Water Engineering, Biology, Geography and Environmental Science), who focus on different types of liquid wastes, wastewater, sewage-control, and waste-management. However, whilst the work on environmental forewarnings by Kwiatkowska and Holland plausibly notes that ‘modern environmental consciousness was slow to form’, its reflections may be extended to include information and education as a management-tool and as a catalyst for speeding up awareness/consciousness levels in the policy-formulation and practice-processes. This article proffers an economic history analysis of citizen perception to encapsulate major forces on how citizen-engagement on liquid waste management - emphasising information and education - was circumvented by influential decision-makers in Zimbabwe from 1980 to 2016. There was a lot of political change and scientific advancement throughout this era. Whilst this is quite a lengthy time, it is used to flag enough about decision-making or policy-perspectives by way of analysing common longitudinal trends and methods to give the 36-year period reasonable treatment. The overall aim of the paper is to use environmental policy and education-perspectives on liquid waste-control and society’s responses (and attitudes) to them to identify and understand the major policy-constraints and the environmental impact of liquid-waste on Zimbabwean urban society based on the case study selected of the capital city, Harare.*

**Keywords:** *Zimbabwe, citizen-engagement, liquid-waste information and education, waste-control legislation, environmental policy-perspectives, management*

**INTRODUCTION AND ENVIRONMENTAL HISTORY EDUCATION**

(...) People of all classes, creeds, and ethnic backgrounds have organised themselves to defend democracy and human rights, to fight for more equitable development and a safer environment (...).

M. D. De Oliveira and R. Tandon, ‘An Emerging Global Civil Society’.

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For millennia the world has had a long history of environmental degradation and pollution. Ancient techniques of land exploitation and water-use in agriculture go back 5, 000 years in Central Asia and a great deal further in Mesopotamia. They were used in Imperial China, in old Laos, in old America before the advent of the Spanish and in ancient Africa (e.g. Tanzania and Egypt). In China, Mexico, Turkey, India and the United States of America (USA), water and irrigation development entailed the construction of water delivery systems, dams, reservoirs and canals. Occurring generally, in other parts of the world farmers used aqueducts, ditches and furrows with crude sluices to divert water to their crops, giving them increased yields. The techniques, however, were used without much heed to environmentalism.

Environmental-threats are a problem of the present as-much-as they are problems of the past. Ecological transformation over time is attributable to human action and human destruction of nature which threatens humanity's harmonisation with nature. Previous and recent studies suggest complex multi-causal explanations for environmental squalor.<sup>2</sup> Interactions between landscapes, waterscapes and human impact are responsible for environmental alteration. Archaeologists, economic historians, sociologists, anthropologists, classical writers like Theophrastus (a botanist, considered the forerunner of ecological-studies) and numerous Greek and Roman thinkers/philosophers were aware that the extensive exploitation of natural resources, depletion of biodiversity and changes of the environment could degrade the natural world and lead to unexpected consequences.<sup>3</sup> The emergence of wastes of a liquid type was one of the consequences of the exploitation of world resources by humankind. Liquid-waste is part of the history of the degradation and pollution of the environment's land and water systems. Prior to the ninth century B.C., human activities that accelerated the incidence of liquid wastes and other forms of waste and early warnings of environmental degradation, in most cases, were ignored. This illustrates as noted by Kwiatkowska and Holland that our 'factual knowledge of [people's] impact on natural systems, still deficient today, was little more than fragmentary at the earlier stages of human civilisation'.<sup>4</sup>

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<sup>2</sup> Previous studies include G. P. Marsh, *The Earth as Modified by Human Action*, A new edition of *Man and Nature* (New York: Scribner, Armstrong, 1874; reprinted New York: Arno, 1970); Sextus Julius Frontinus, *The Aqueducts of Rome* trans. C. E. Bennett (London: Heinemann, 1925), II. 88; C. D. Forde, 'Irrigation in South Africa', *The Geographical Journal* 65 (1925): 342-349. Recent studies consist, *inter alia*, of L. H. Brown, *Conservation for Survival: Ethiopia's Choice* (Addis Ababa: Haile Sellassie I University Press, 1973); I. Carruthers and C. Clark (eds), *The Economics of Irrigation* (England: Liverpool University Press, 1983); William Beinart, 'Soil Erosion, Conservationism and Ideas about Development: A Southern African Exploration, 1900-1960', *Journal of Southern African Studies* 11 (1984); Mark Nyandoro, 'Development and Differentiation: The Case of TILCOR/ARDA Irrigation Activities in Sanyati (Zimbabwe), 1939 to 2000, PhD thesis, University of Pretoria (2007).

<sup>3</sup> See Aristotle, *Metaphysics*, Book 1, translated by W.D. Ross (The Internet Classics Archive, <http://classics.mit.edu/>); Frontinus, *The Aqueducts of Rome*; Theophrastus, *Historia Plantarum* 5.3.7; Pausanias, *Description of Greece*, translated by W. H. S. Jones, Loeb Classical Library (London: Heinemann, n.d.) 8, 17-35; Plutarch, *Roman Lives: A Selection of Eight Lives*, trans. Robin Waterfield (Oxford: Oxford University Press, 1999); John Bintliff, 'Time, Process and Catastrophism in the Study of Mediterranean Alluvial History: A Review', *World Archaeology* 33,3 (2002): 417-435; Teresa Kwiatkowska and Alan Holland, 'Dark is the World to Thee: A Historical Perspective on Environmental Forewarnings', *Environment and History* 16 (2010): 455-482.

<sup>4</sup> Kwiatkowska and Holland, 'Dark is the World to Thee'.

However, in this era of new scientific and chemical discoveries environmental threats hitherto witnessed in previous centuries have no place. This partly explains why Zimbabweans fighting the social and environmental costs of waste have questioned decision-makers' attitude towards environmental degradation, arguing that the proliferation of liquid waste was not so much a colonial but a post-colonial legacy. In the main, the article raises a question central to environmental governance as to the nature of law-making and execution in a southern African megacity. This article about liquid-waste information records the increasing environmental alarm caused by waste in Harare (the capital city of Zimbabwe) focusing on the missing educational link between government policy and how society understands/interprets that policy. It proffers a novel interpretation of hydro-politics in Harare. Making use of historical and contemporary evidence, the paper offers a persuasive account of the circumvention of citizen-engagement concerning liquid waste. Traditionally, we have argued that lack of public consultation has been the primary pitfall of these sorts of measures (i.e. stakeholder management); and that we can only promote compliance with a regime by first consulting with those directly affected. Contrary to that and differently from previous research, the idea in the paper is that citizens as stakeholders make the law and thus become ongoing checks-and balances on the regime in practice. In this article, I flip this paradigm by examining the reduced quality of citizen-engagement in the event that relevant decision-makers withhold resources aimed at building capacity. In some ways this is more insidious as it denies opportunity and shifts political burden onto the people. This sort of argument is of increasing relevance the world over, at local, regional, State and national echelons. The article is, thus, a contribution to the history and politics of liquid wastes and sewerage by focusing on how ordinary citizens wrestled with the law and policies in order to be heard. In the southern African country where resources aimed at building citizen capacity were withheld or non-existent the battle against squalor was lost not because there was no citizen-engagement, but because decision-makers failed to heed warnings against liquid waste coming from this constituency, and from growing scholarship on the subject.<sup>5</sup>

## LITERATURE REVIEW

Some works have been written on waste, water legislation and wastewater. In the wider literature on liquid waste, the work of Gandy, Reid, Barnes, Alley, Zimmer, and many others evaluates the history and politics of sewerage in great detail. In engaging with the politics and history of liquid waste and sewerage Gandy argues that in the city of Paris landlords continued to eschew/shun any connection to piped water supplies in preference to drinking directly from rivers such as the Seine, despite the free installation of rising water mains in the 1800s.<sup>6</sup> Landlords, thus, resisted the draining of sewerage into rivers. Powerful resistance and protestations to draining human waste into the Seine also came from the 'fanatics of Seine water', who advocated the continuing use of the river for drinking water, along with

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<sup>5</sup> Whilst this scholarship has been re-examined here, the broad, extended and detailed literature review for this article has been provided as a Blog piece trailing the main paper on the *Environment and History* website.

<sup>6</sup> Matthew Gandy, 'The Paris Sewers and the Rationalization of Urban Space', *Royal Geographical Society, with The Institute of British Geographers* (1999): 31.

influential microbiologists, who feared the public health effects of contaminating the Seine with cholera and typhoid.<sup>7</sup> In the nineteenth century, the fear of the dual pressures of disease and growing water usage remained an integral part of urban society. For Reid, the system of cesspools and vault privies which to some extent was effective in avoiding pollution of waterways through their periodic cleaning out by scavengers and the conveyance of human manure to farms as fertiliser was overwhelmed by the pressure created by the availability of running water. The next ‘natural’ step in the solve-one-problem-at-a-time approach was to connect the cesspools to the sewers,<sup>8</sup> thereby moving the sewage (sludge) from overflowing cesspools into the open sewers of city streets. The result was water-borne epidemics which claimed many lives. Globally the arrival of piped-in water, flush toilets, and open sewers was often succeeded by epidemics of cholera.<sup>9</sup> Whilst in Europe and America by the middle of the nineteenth century the diseases spawned by the convenience of running water and the flush toilet gave rise to a demand for the construction of sewers to carry the sewage not only out of and away from the home, but away from the city (through effective environmental regulations implementation), in Harare sewage pipe bursts kept waste in the homes and in the city. The lack of or ill-managed sewers in the capital of Zimbabwe appealed to human rights sentiment though not in as loud protests as happened in France.

The politics and history of liquid wastes in France which attracted the attention of Barnes led to urban protests. Barnes cites the example of angry petitioners who in 1904 protested that rue Haudry (an inner-city site, in a working-class neighbourhood, selected for the construction of a hospital dispensary) was not served by a sewer line.<sup>10</sup> As a result liquid wastes stagnated and children were therefore ‘in daily contact with morbid germs’ in the dirty water from the dispensary. The residents pleaded with the mayor to ‘defend [their] right to life’ and veto the site. However, their plea was ignored as the dispensary was established at rue Haudry in 1905<sup>11</sup> illustrating a similarity in thwarting citizen-engagement from early twentieth-century Paris with what happened in twenty-first century Harare.

Kareiva and Marvier have presented strong arguments for ‘new conservation’ and the use of ecosystem services in sewerage policy-making and application.<sup>12</sup> For Kareiva, the new ideas

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<sup>7</sup> Ibid.

<sup>8</sup> The sewer is the spatial expression and localisation of the need for sanitation.

<sup>9</sup> Donald Reid, *Paris Sewers and Sewermen* (Cambridge: Harvard University Press, 1991), 161. See also Reid, ‘Down and Dirty: Paris Sewers and Sewermen: Realities and Representations’, *Los Angeles Times*, [http://articles.latimes.com/1991-04-14/books/bk-97\\_1\\_paris-sewer](http://articles.latimes.com/1991-04-14/books/bk-97_1_paris-sewer), Accessed 10 Apr. 2017.

<sup>10</sup> David S. Barnes, *The Making of a Social Disease: Tuberculosis in Nineteenth-Century France* (Berkeley: University of California Press, 1995); Barnes, *The Great Stink of Paris and the Nineteenth-Century Struggle against Filth and Germs*, <http://www.nstperfume.com/2010/07/23/the-great-stink-of-paris-and-the-nineteenth-century-struggle-against-filth-and-germs-by-david-s-barnes-perfume-books/>, Accessed 10 Apr. 2017.

<sup>11</sup> Barnes, *The Making of a Social Disease*.

<sup>12</sup> Peter Kareiva and Michael Marvier, *Conservation Science: Balancing the Needs of People and Nature* (Colorado: Roberts and Company, Greenwood Village, 2011); Kareiva and Marvier, ‘What is Conservation Science?’ *Bio-Science* 62 (2012): 962-969; Kareiva, Marvier and R. Lalasz, ‘Conservation in the Anthropocene’, *Breakthrough Journal Winter* (2012), <http://thebreakthrough.org/index.php/journal/past->

in conservation are intended not to throw away the baby with the bathwater or abandon traditional conservation practices, but to reassure the conservation community that there exists much common ground between traditional conservation approaches and the so-called ‘new conservation’, adding that it must be admitted candidly that some of the proposed strategies associated with the ‘new conservation’ remain as yet unproven.<sup>13</sup> Zimmer has examined the problem of wastewater in Delhi, India. She argues that the Yamuna River, and especially its Delhi stretch, resembles more a ‘sewage Channel’ than actually a river.<sup>14</sup> One can hardly talk about ‘water quality’ in the Indian capital. For northern India, Alley addresses public culture and environmental issues.<sup>15</sup> She examines the potential of decentralised programmes of wastewater management to meet the wastewater challenge in India. In a similar way, Harare residents called for decentralised waste management and citizen participation in shaping their environmental destiny. The establishment of workable sewerage and liquid waste management systems went hand in hand with policies that allowed citizen participation in a process, according to Manzungu, that allowed decentralised thinking.<sup>16</sup> To this end, the success of liquid waste management depended on States’ policies and ability to address the sanitary concerns of citizens.

Internationally, so much has been written on wastewater and the history of liquid waste. However, so far this has not been done in Zimbabwe where not much works are available on wastewater and the environmental education impacts of liquid-waste on the nation, save for the information that exists (for a substantive analysis) under environmental agency and other statutory instruments. Despite the passage of a progressive *Water Act* in 1998, the creation of the Zimbabwe National Water Authority (ZINWA) in the 1990s to manage national water-resources and the enactment of primary sources of law and policy such as regulations governing water, waste and effluent-disposal, namely *Statutory Instruments* 274 and 8 of 2000 and 2007<sup>17</sup> respectively, significant pollution occurred in major water-bodies in the city of Harare and in the country. With environmental regulations generally feebly enforced or weaker than in the industrial developed world, the environment continues to suffer from the problems of pollution and/or contamination. Based on existing literature, ever escalating pollution problems should be addressed collectively. Primary sources and Laurie’s observations in ‘World in Danger’ testify to the growth of the pollution menace ever since

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issues/issue-2/conservation-in-the-anthropocene/, Accessed 10 Mar. 2017; Marvier and H. Wong, ‘Winning Back Broad Public Support for Conservation’, *Journal of Environmental Studies and Sciences* 2 (2012): 291-295; M. Soule, ‘The “New Conservation”’, *Conservation Biology* 27 (2013): 895-897.

<sup>13</sup> Peter Kareiva, ‘New Conservation: Setting the Record Straight and Finding Common Ground’, *Conservation Biology*, 00 (2014): 1-3.

<sup>14</sup> Anna Zimmer, ‘The Need for an Integrated View on Urban Waste Water: A Case Study of Delhi’, *South Asia Network on Dams, Rivers & People* (2012): 1-5.

<sup>15</sup> Kelly D. Alley, Charles Faupel and Connor Bailey, ‘The Historical Transformation of a Grassroots Environmental Group’, *Human Organization*, 54 (1995); Alley, *On the Banks of the Ganga: When Wastewater Meets a Sacred River* (University of Michigan Press, 2002).

<sup>16</sup> E. Manzungu, *Water For All: Improving Water Resource Governance in Southern Africa* (London: International Institute for Environment and Development, 2004).

<sup>17</sup> For the primary sources of law and policy, see Government of Zimbabwe (GoZ), *Zimbabwe Water Act* [Chapter 20:24], No. 31/98 (Harare: Government Printers, 1998); GoZ, *Zimbabwe National Water Authority (ZINWA) Act* [Chapter 20:25] (Harare: Government Printers 1998); GoZ, *Statutory Instrument 274/2000* [Chapter: 20:24], *Water (Waste and Effluent Disposal) Regulations* (Harare: Government Printers, 2000); GoZ, *Environmental Management Agency/EMA* (Harare: Government Printers, 2002); GoZ, *Statutory Instrument 8/2007* (Harare: Government Printers, 2007).

‘man’s [centuries-old] attempts to exploit nature’.<sup>18</sup> They provide an important background to this article. Much of ‘World in Danger’ analyses the impact of industrialisation paying attention to smoke/smog and the sewage-pollution of rivers. Laurie argues that before the eighteenth century, ‘man’s ability to mess up the world’ was there, but was limited because ‘most of his devices wheedled and seduced nature without disturbing it.’<sup>19</sup> There was no pressing need for environmental awareness and action. However, with steam and the Industrial Revolution began ‘the rape, the plunder and battering of the environment’. Some primary documents produced in 1969 by the colonial Department of Conservation and Extension (CONEX) in Rhodesia (Zimbabwe) concur with Laurie’s sentiments.

For CONEX Officers, Howden and Towns, whilst society relishes the obvious immediate successes of technology and the triumphs of the Engineer,<sup>20</sup> technology has to work in the total context of the environment - man, animals, plants, soils, air and water. Because the environment is very complex, because life is fragile, inter-related in innumerable and little understood ways, almost any disturbance to it may produce a host of changes - ‘some good, some indifferent, but many downright bad’.<sup>21</sup> Such observations by these CONEX Officials as to the interconnectedness of the Earth’s ecosystem and biota are to some extent reminiscent of Lovelock’s Gaia Theory/Hypothesis or Principle<sup>22</sup> (which while based on flawed scientific premises according to Tyrrel (an environmental microbiologist), still holds this holistic entity out).<sup>23</sup> That is, it sees the planet functioning as a single organism that maintains conditions necessary for its survival.<sup>24</sup> Kareiva, Marvier and others depict a similar outlook by mounting their arguments for ‘new conservation’ and the use of ecosystem services in policy-formulation and practice.<sup>25</sup> ‘Wherever technology has gone wrong it has been because we [man] did not know of [the] wider consequences - or knew but did not care

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<sup>18</sup> Peter Laurie, ‘World in Danger’, *London Sunday Times*, 30 Apr. 1969, Mashonaland-South-Province GEN-Vol. 2, Oct. 1964-Aug. 1970, National Archives of Zimbabwe-Records Centre (hereafter NAZ-RC) 135183/4.11.7R/ICG 10/ICA, p. 1.

<sup>19</sup> *Ibid.*

<sup>20</sup> R. H. G. Howden, pp Director of Conservation and Extension, CONEX, to All Provincial Conservation and Extension Officers, 1 May 1969, ‘Indiscriminate Uses of Pesticides’, Mashonaland-South-Province GEN-Vol. 2, Oct. 1964-Aug. 1970 (NAZ-RC) 135183/4.11.7R/ICG 10/ICA; I. W. Towns, Group Conservation and Extension Officer to the Provincial Conservation and Extension Officer (Mashonaland-South), 8 May 1969, ‘Use of Insecticides in Agriculture’, Mashonaland-South-Province GEN-Vol. 2, Oct. 1964-Aug. 1970 (NAZ-RC) 135183/4.11.7R/ICG 10/ICA S/1/14/9/55.

<sup>21</sup> *Ibid.*

<sup>22</sup> James. E. Lovelock, *Gaia: A New Look at Life on Earth* (Oxford University Press, 1979); Lovelock, *The Ages of Gaia: A Biography of Our Living Earth* (USA: Norton, 1988). See also Lovelock and Lynn Margulis, ‘Atmospheric Homeostasis by and for the Biosphere: The Gaia Hypothesis’, *Tellus* 24 (1974): 2-9; Luciano Onori and Guido Visconti, ‘The GAIA Theory: From Lovelock to Margulis: From a Homeostatic to a Cognitive Autopoietic Worldview’, *Rend. Fis. Acc. Lincei* 23 (2012): 375-386.

<sup>23</sup> S. T. Wagland, Sean F. Tyrrel, A. R. Godley, R. Smith, *Waste Management* 29 (2009): 1218-1226; Sean R. Tyrrell, ‘Microtopographic Enhancement of Land-Based Wastewater Treatment’, PhD thesis, Cranfield University (2016).

<sup>24</sup> Sean Chamberlin, *The Gaia Hypothesis*, [https://www.bibliotecapleyades.net/gaia/esp\\_gaia01.htm](https://www.bibliotecapleyades.net/gaia/esp_gaia01.htm), Accessed 26 May 2016.

<sup>25</sup> Kareiva and Marvier, *Conservation Science*.

enough'.<sup>26</sup> Water and environmental-pollution, thus, had to be controlled to enhance the quality and quantity of available water.

The Government of Zimbabwe, like most governments in the world has stringent laws not only to control water-pollution,<sup>27</sup> but also to protect people, animal, bird and insect life.<sup>28</sup> Paradoxically, however, for Laurie it may be the most 'harmless' chemicals that are actually the most dangerous largely because they escape controls. Too often, serious harm to water bodies or reservoirs and the environment is inflicted by pollution which everyone is too apathetic or greedy to put right. Hence pollution needs careful controlling and management through information/knowledge-dissemination and astute environmental policies.

The paper illustrates the impact of circumvented citizen-engagement in Zimbabwe where the focus on liquid-waste history is relatively new. The most unequivocal evidence of attempts at management of liquid and other wastes in Zimbabwe did not exist before the 1990s. This was in spite of Fien arguing in favour of education for the environment or environmental education and its critical importance for the school curriculum.<sup>29</sup> Most of the country's population was not exposed to waste and environmental-education until the late 1990s and early 2000s following the recommendations of the Nziramasanga *Commission of Inquiry into Education and Training* in Zimbabwe.<sup>30</sup> Since then, Zimbabwe joined the great age of environmental conservation and awareness through the adoption of legislation to combat wastes, disease and human health problems, but not at all levels of the educational curricula. In Zimbabwe, the challenges were not only a manifestation of the government environmental politics and narratives as presented in the literature, but also a stifling of society as government policies shaped both the national environment, the school curriculum and general ideas about nature in a way which affected citizen-participation as well as the natural environment itself.

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<sup>26</sup> Laurie, 'World in Danger'.

<sup>27</sup> Water-pollution is the contamination of water bodies like lakes/oceans, rivers and underground water by human or natural activities which can be harmful to organisms and plants. See David Krantz and Brad Kifferstein, 'Water Pollution and Society', 24 Apr. 2009, <http://ihaveanenglishblog.blogspot.com/2009/04/water-pollution-and-society-by-david.html>, Accessed 14 Jul. 2016; T. Brinkhoff, 'City Population', 2010, <http://www.citypopulation.de>, Accessed 17 Jun. 2016.

<sup>28</sup> Some of Zimbabwe's major laws, specific legislation or policies to control water pollution, protect life and natural resources such as (a) the air, soil, waters and minerals of Zimbabwe; (b) the mammal, bird, fish and other animal life; (c) the trees, grasses and other vegetation; (d) the springs, vleis, sponges, reed-beds, marshes, swamps and public streams of the country; and (e) any other thing that the President may, by statutory instrument, declare to be a natural resource, including a landscape or scenery which should be preserved on account of its aesthetic appeal or scenic value are the: *Water Act*, 1998; *Statutory Instrument 274/2000*; GoZ, *Environmental Management Act* [Chapter 20:27] (Harare: Government Printers, 2002); GoZ, *National Water Policy* (Harare: Government Printers, 2013). For an international comparison see Canada, *Department of the Environment Act* (Government of Canada, 1971).

<sup>29</sup> Fien, *Education for the Environment*.

<sup>30</sup> C. T. Nziramasanga (Chairman), *Zimbabwe: Report of the Presidential Commission of Inquiry into Education and Training* (Harare: Zimbabwe, 1999).

The post-World War Two literature, including Humphreys and Black, suggests that relevant government agencies have tended to resist regulation in the area of liquid-waste pollution.<sup>31</sup> What has been glossed over by these sources is not the impact of waste on humanity, but the reactions of society to government measures in this field. There may be some direct correlation between Governments and governing agencies and how they try to address the problem of industrially and domestically-generated wastes which have led to Harare's environmental problems of water-pollution and water shortage. However, the lack of such correlation, misinformation and the lack of education partly explains the negation of social and political impacts of waste on most urban-centre 'waterscapes' and their interaction with humanity in Africa. Recent scholarship on liquid-waste by Nyandoro (which provides substantial background to this article) demonstrates that the problems of waste in Zimbabwe were reflected through the myriad pollution challenges of major centres like Harare, and that there was a link between waste and population.<sup>32</sup>

## THE GENERAL FRAMEWORK FOR ZIMBABWE

### General Regulation of Liquid-Waste in Zimbabwe

Contemporary Zimbabwe has a record of liquid-waste dilemmas. Despite this fact, it has not in recent times made extensive investments in waste-management except for the general liquid-waste provisions like the primary sources of law and policy governing waste and effluent disposal already stated. Recent assessments of urban services undertaken by the donor community and the World Bank (WB) give a clear picture of failure of wastewater-treatment plants, with effluent and raw sewerage entering rivers, dams and percolating to affect groundwater resources.<sup>33</sup> The country's ability to manage its water resources, which includes preventing waste from infecting water bodies, is critical to its economic growth. In spite of the existence of the *Water Act*, the creation of ZINWA to manage national water-resources and the setting up of laws/regulations governing water, waste and effluent-disposal, considerable pollution continued to affect Harare's major water-bodies. Zimbabwe's water supply and sanitation programme initiated in the 1980s reached its apogee in the 1990s as the nation became an African and international leader in water policy reform and service provision in the water sector.<sup>34</sup> However, the sector experienced a setback in the 2000s as a result of very limited new investment leading to a decline in service delivery and maintenance of infrastructure. The progressive decline in water, sewerage services, liquid waste-disposal and education awareness culminated in one of the worst outbreaks of cholera

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<sup>31</sup> Walter Humphreys, 'The Disposal of Liquid Waste from the Viewpoint of One in the Petroleum Industry', *Sewage Works Journal* 16, 5 (1944): 936-939; Hayse H. Black, 'Planning Industrial Waste Treatment', *Journal (Water Pollution Control Federation)* 41, 7 (1969): 1277-1284.

<sup>32</sup> Mark Nyandoro, 'Historical Overview of the Cholera Outbreak in Zimbabwe (2008-2009)', *Journal for Contemporary History* 36, 1 (2011a): 154-174.

<sup>33</sup> World Bank, Zimbabwe Technical Assistance Report, 'Water Resource Management, Supply and Sanitation', Chapter 7 (WB).

<sup>34</sup> *Ibid.*

in living memory in 2008/09.<sup>35</sup> This history pointed to the need to rebuild the decrepit water-infrastructure and to improve waste-management services. The involvement of civic society and other non-State actors was vital, but their voice was not always heard. Whilst society at large was keen to ensure a habitable and safe environment, some members of this constituency were responsible for polluting the city. Limited education on waste and lack of broad citizen-involvement were at the core of the problem.

Citizen-participation in liquid-waste knowledge-formulation and dissemination is an important democracy and human rights issue, but it has been obscured by State dominance through policy measures not always adhered to by political leaders. Environmental policy awareness was compromised by a reluctance to involve, in the Harare metropolitan region, other players especially Non-Governmental Organisations (NGOs), civic society and residence associations which are motivated by humanitarian and developmental concerns and are keen to work with communities and local authorities on waste management generally. These include associations like the Combined Harare Residents Association (CHRA), Practical Action, Oxfam, Environment Africa, Zimbabwe Ahead, USAID and UN-Habitat. Just like the Harare Residents Trust (an advocacy group), they all agree that ‘council [Harare City Council/Municipality] was struggling to manage waste’ and that waste is a ticking environmental and health time bomb in the country, but the reluctance to allow these stakeholders full participation is hindering both their work and citizens’ access to information.<sup>36</sup> Such participatory interaction - an integral part of the formal educational curricula - has been trodden under foot as citizen-engagement was not only controlled but circumvented. In the circumstances, voices by people from all walks of life fighting ‘for more equitable development and a safer environment’ have been heard and sometimes ignored as they were not captured in the formal education system.<sup>37</sup>

### **The Case of Harare, Zimbabwe**

Harare experienced exceptional population growth rates of over five per cent per annum throughout the first decade of independence and in the preceding decades. For instance, the city’s population phenomenally increased from 310,360 in 1961 to 658,400 in 1982. By the 1992 census it exceeded a million. Greater Harare’s population was estimated at 1,896,134 in 2002. The Zimbabwe Statistics Office (ZIMSTAT) *Harare Census Provincial Report* shows that Harare Urban witnessed a rise in population from 658,400 in 1982 to 1,485,209 in 1992.<sup>38</sup> After adding the figures for Chitungwiza (Harare’s satellite town), Epworth and

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<sup>35</sup> Nyandoro, ‘Historical Overview of the Cholera Outbreak’. For an international parallel see Reid, *Paris Sewers and Sewermen*.

<sup>36</sup> Organisations which are active in waste management as a critical environmental issue that should be prioritised in Harare can be gleaned from Nyandoro, ‘Historical Overview of the Cholera Outbreak’; UN Habitat, ‘Think, Eat and Save’, *The Independent*, 17 Jun. 2013; L. Johnson, *Guidelines on Industrial Waste Management in Zimbabwe* (Karlstad: Envive, 1993); Sydney Kawadza, ‘From Sunshine City to Garbage Town’, *The Herald*, 19 May 2017.

<sup>37</sup> Miguel Darcy de Oliveira and Rajesh Tandon, ‘An Emerging Global Civil Society’ in Miguel Darcy de Oliveira and Rajesh Tandon, *Citizens: Strengthening Global Civil Society* (Washington DC: McNaughton and Gunn, 1994).

<sup>38</sup> ZIMSTAT, *Harare Census Provincial Report* (Harare: GoZ, 2012).

Harare Rural (Harava), the population came to a total of 2,013,048.<sup>39</sup> At this rate of increase, Harare's population was much more by the 2012 census. *The Herald*, without clearly defining which towns it covered, reported that Greater Harare's population was estimated to be approximately 4.2 million people by 2014.<sup>40</sup> This quantitative data implies that with population increase came pressure on existing urban facilities like sewer pipes (which frequently burst) and resources such as water (a national security issue), land and other municipal-infrastructure. The evidence for this is that in the water sector, for clean water supply to the people, the City continued to rely on the Morton Jaffray Waterworks whose last expansion was commissioned in 1976 when Harare's population was just 615,000 - a mere seventh of Greater Harare's population by 2014.<sup>41</sup> By 2016, Harare's main Waterworks persistently suffered from periods of sporadic use and closure as a result of overdue maintenance because of lack of funds.

Increasing rural poverty, recurrent spells of drought between the 1980s and 2000s, and the rising shortage of communal farming land (land pressure) led to massive rural-urban migration. This coupled with a high natural increase in the urban population exerted enormous pressure on existing sewer and water reticulation facilities. However, evidence from ZIMSTAT shows that Harare's growth was fuelled more by a high natural increase rate rather than rural-urban migration. High levels of unemployment related to the 1991-1995 Economic Structural Adjustment Programme (ESAP) work-retrenchments together with population growth trends fuelled a major exodus from the country to the city culminating in the emergence of many 'squatter camps' or informal settlements.<sup>42</sup> The growing population and the incoming migrants were not all absorbed by the predominantly agro-processing industries which, apart from drought, faced imminent collapse as a consequence of the dual impact of ESAP<sup>43</sup> and the long-drawn economic crisis bedevilling Zimbabwe from 1983 to the mid-1990s, and was still being felt by 2016. Under these circumstances, existing urban populations and the migrants who failed to secure employment were, therefore, among the groups which piloted the proliferation of the informal urban sector in which municipal services (directly supervised by the Government Ministry of Local Government, Public Works and National Housing) such as sewer lines were absent. Such services were non-existent because they were neither provided for under the *Urban Councils Act* nor the Municipal or City by-laws.<sup>44</sup> This, coupled with a State and City Council that were unresponsive to local needs, culminated in the problems of water-pollution; hence the

<sup>39</sup> Ibid; Central Statistical Office (CSO), *1982 Census Report* (Harare: GoZ, 1982); Central Statistical Office, *2002 Census Report* (Harare: GoZ, 2002); T. Brinkhoff, 'City Population', 2010, <http://www.citypopulation.de>, Accessed 17 Jun. 2016.

<sup>40</sup> F. Gwaka, 'Power of Population in Economic Growth', *The Herald*, 9 Sept. 2014.

<sup>41</sup> Ibid.

<sup>42</sup> Informal settlements cannot officially be perceived as the source of wastewater since they were not on the Municipal sewer system. They did not significantly contribute to wastewater, but solid waste.

<sup>43</sup> ESAP did not have a major focus on addressing liquid waste.

<sup>44</sup> The *Urban Councils Act*, together with the *Rural District Councils Act*, empowers municipalities or councils to make their own by-laws as enshrined in government statutory instruments. The *Urban Councils Act* empowers city councils to perform two main functions within their areas of jurisdiction, namely: waste-disposal and water supply. This involves the construction of dams, weirs, boreholes, water and sewer-reticulation infrastructure as well as solid waste dumps. See *Urban Councils Act* [Chapter 29:15] (Harare: Zimbabwe, 1996); W. K. Bagg, 'River Pollution in Harare', *Geographical Education Magazine* 15 (1992): 7-15; Jemitias Mapira, 'Urban Governance and Mismanagement: An Environmental Crisis in Zimbabwe', *Journal of Sustainable Development in Africa* 13, 6 (2011): 258-267.

frequent outbreaks of cholera, typhoid, dysentery and other water-borne diseases which the Government and water governing agencies frequently denounced, but did not always act against. Without adequate education awareness and information, human activities and lack of effective intervention produced undesirable results due to water and liquid-waste pollution.

Confirming this, the former Minister in the Ministry of Environment, Water and Climate (MEWC), Saviour Kasukuwere, said his ministry '[would] put a stop to all riverbank mining activities, industrial pollution and the discharge of raw sewage into Lake Chivero [Harare's main water source] and all other rivers throughout the country' as the consequences were dire.<sup>45</sup> The evidence that water-pollution around mines due to toxic liquid wastes was extensive has been historically corroborated by Georgius Agricola (George Bauer), using the example of late fifteenth-century Venice.<sup>46</sup> He does so by quoting the arguments of those who oppose the idea that mining destroys nature when asserting that: '(...) once the [mining] ores are washed, the water which has been used poisons the brooks and streams, and either destroys the fish or drives them away'. However, in reference to Minister Kasukuwere's statement, members of the public felt that the government was not being sincere. People who spoke to the *ZBC News* said 'something must be done urgently [by the custodians of water and the environment] to reduce Lake Chivero pollution', and they were 'fed up of talking about the same issue with nothing being done by the government'.<sup>47</sup> The following sections describe why information on liquid-waste management is important. They provide environmental data for the analysis of pollution and its social implications in Zimbabwe's capital city where citizen-engagement was not prioritised.

## **LIQUID-WASTE IMPACT: THE NEED FOR INFORMATION**

In the colonial period the Settler State put in place an array of segregationist ordinances which included decrees and laws to facilitate and strengthen urban administration. However, since the State merely regarded African suburbs as areas for cheap labour provision, it did not make efforts to resolve the emerging waste-management problems in those areas. Notwithstanding the focus on cheap labour, the colonial State's desire for a sanitary and pleasant environment for the white settlers was clear. Its desire to achieve a similar environment for Blacks, albeit with colonial restrictions, cannot be underestimated completely. The reality was that all of Harare's high density suburbs (Mbare, Highfield, Mufakose et cetera) were put on a sewer and water reticulation system compared to the plush low-density suburbs of Mount Pleasant, Hatfield and Waterfalls which were put on septic tanks. The colonial government always controlled urban population growth, but after Independence there were no comparable controls. This meant expanding housing programmes without expanding sewage treatment<sup>48</sup> works.

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<sup>45</sup> *ZBC News*, 'Govt Moves to Stop Lake Chivero Pollution', 2014, [http://zw.zbc.co.zw/index.php?option=com\\_content&view=article&id=42663:govt-moves-to-stop-lake-chivero-pollution&catid=46:environment-a-tourism&Itemid=92](http://zw.zbc.co.zw/index.php?option=com_content&view=article&id=42663:govt-moves-to-stop-lake-chivero-pollution&catid=46:environment-a-tourism&Itemid=92), Accessed 22 Oct. 2014.

<sup>46</sup> Georgius Agricola (George Bauer) cited in Kwiatkowska and Holland, 'Dark is the World to Thee', 474.

<sup>47</sup> *ZBC News*, 'Govt Moves to Stop Lake Chivero Pollution'. See also Sifelani Tsiko, 'Zimbabwe: Lake Chivero - A Polluted Lake', *The Herald*, 15 Jan. 2007.

<sup>48</sup> Sewage treatment covers any process in which sewage is subjected to a process to remove or alter its objectionable constituent to make it less dangerous or offensive.

The *Water Act* of 1976 (a revision of the *Water Acts* of 1927 and 1947, as amended by the *Water Act* of 1998) prohibited the discharge of any matter into any surface or groundwater either directly or indirectly, so as to cause pollution of the water. This, among other statutory instruments, enabled the colonial government to efficiently manage waste within the capital city. Nevertheless, in the post-colonial period as a result of natural increase and rural-urban migration by people in pursuit of better livelihoods and improved access to social services, the impact of liquid-waste on the city rose to nearly unmanageable levels. Sewer systems and reticulation ponds installed in the colonial era imploded as Greater Harare's population exceeded four million. In the circumstances, liquid-wastes and water-pollution (contamination) became the order of the day. Sewage contamination naturally disturbs the environment and produces a number of negative transformations in the co-existence between nature and humankind as observed by Tyrrel, Kareiva and Marvier.<sup>49</sup>

According to Harare residents, cholera outbreaks were caused by 'contaminated water as government [and the Local Government-supervised Municipality] financially struggled to chlorinate its water supplies'.<sup>50</sup> ZINWA had taken over most water responsibilities.<sup>51</sup> It was a parastatal which represented a distrust of the State as the country was broke due to corruption, and in the water sector there was not much political interest in the 1990s. By 1991 things were bad and the WB was on the scene. The WB said it needed more of the same, that is, more private, more market and more liberalisation.<sup>52</sup> The Government of Zimbabwe agreed because it had no money. However, in view of the outbreak of diarrhoeal diseases in January 2007, the state-run ZINWA whose creation in the 1990s was influenced by the country's economic crisis was in a dilemma. ZINWA as in the Zimbabwe and China cases studied by Nyandoro and Muscolino constituted part of the most devastating attempt to turn water into a political weapon against citizens who were forced to drink sewage-contaminated and liquid waste-contaminated water.<sup>53</sup> It then issued a stark warning through the *Associated Press* that 'a breakdown at a major sewage treatment plant had left it spewing 72 mega-litres of raw sewage per day into a river that feeds into Lake Chivero, Harare's main source of drinking water [causing cholera and death]'.<sup>54</sup> Countrywide, of the reported 84, 027 cholera cases in February/March 2009, nearly 4, 000 led to death, and this represented an overall fatality rate of 4,7 per cent - nearly five times what the World Health Organisation (WHO)

<sup>49</sup> See Tyrrel, various works; Kareiva and Marvier, *Conservation Science*.

<sup>50</sup> A. Bell, 'Zimbabwe, Harare: Residents Slam ZINWA after Fatal Cholera Outbreak', 2008, <https://sanitationupdates.wordpress.com/2008/09/08/zimbabwe-harare-residents-slam-zinwa-after-fatal-cholera-outbreak/>, Accessed 9 Jan. 2009; Interview with anonymous residents, Harare, Sept. 2009; Johann W. N. Tempelhoff, 'Leaving Behind a "Twisted Soul": The 2008-9 Cholera Outbreak in South Africa', *Journal for Contemporary History* 34, 3 (2009): 174-191.

<sup>51</sup> ZINWA was established as the State moved in to control both rural and urban water supply in Zimbabwe. In May 2005 a government decision led to the transfer of the governance of water resources and sanitation from the Harare Metropolitan area (Municipality) to ZINWA - a decision that exacerbated the water management situation as water-borne diseases broke out regularly in the capital.

<sup>52</sup> World Bank, Zimbabwe Technical Assistance Report.

<sup>53</sup> Nyandoro, 'Historical Overview of the Cholera Outbreak'; Micah S. Muscolino, 'Violence against People and the Land: The Environment and Refugee Migration from China's Henan Province, 1938-1945', *Environment and History* 17 (2011): 291-311; Olga Cossi, *Water Wars: The Fight to Control and Conserve Nature's Most Precious Resource* (New York: New Discovery Books, 1993); Frances Cleaver, 'Water as a Weapon: The History of Water Supply Development in Nkayi District, Zimbabwe', *Environment and History* 1, 3 (October 1995): 313-333.

<sup>54</sup> Bell, 'Zimbabwe: Harare residents slam ZINWA'; Nyandoro, 'Historical Overview of the Cholera Outbreak'.

regarded as ‘acceptable’ - which was indicative of a very ‘terrible toll’.<sup>55</sup> This also revealed Harare’s limited public consciousness about liquid-waste problems.

The cholera outbreak and the cholera incidence data coupled with typhoid outbreaks in Harare pointed not only towards the need to reduce the impact on the health of mankind by protecting water sources against pollution (protecting ecosystems), but also towards the need for committed liquid waste, educative and information-management systems. This effort which existed by the late 1990s was significantly assisted by the 2013 *National Water Policy* (an amendment of the 1998 water law) which recognised that the quality and condition of Zimbabwe’s surface and groundwater resources were deteriorating.<sup>56</sup> The deterioration of quality due to liquid wastes, in turn, meant that the demand by residents for clean water far outstripped supply. Early warnings to the challenge and the importance of education in limiting the impact of human activity on the natural world can be traced back to the passage of water laws and the institution of policies and State laws governing waste-disposal to improve what may be termed ‘environmental quality’.

Government policy on water-pollution and waste as enshrined in the *Water Act* of 1998 states that water-resource management should be consistent with the country’s environmental approaches. ZINWA which derives its powers from the *Act* had to enforce this based on the same *Act*. The *Act* stipulates that subject to section (68) subsection (2), any person who discharges or disposes of

- (a) any organic or inorganic matter, including water containing such matter, into a public stream or into any other surface water or groundwater, whether directly or through drainage or seepage, so as to cause pollution of the public stream, other surface water or groundwater, as the case may be; or
- (b) any effluent or wastewater which has been produced by or results from the use of water for any purpose into a public stream or into any other surface water or groundwater, whether directly or through drainage or seepage was liable to a fine or penalty amounting to ZW\$100, 000.00 or imprisonment.<sup>57</sup>

Under the *Environmental Management Agency (EMA) Act* and waste legislation (statutory instruments) of 2000 and 2007 or waste-management regulations, including municipal by-laws, EMA was authorised to provide for the sustainable management of natural resources and the protection of the environment.<sup>58</sup> These State instruments generally constitute Zimbabwe’s operational legal framework in waste-management and entailed the prevention of pollution and environmental degradation. Another measure used by EMA to control and

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<sup>55</sup> Ibid; WHO, ‘Zimbabwe’s Cholera Crisis Worsens as Number of Dead, Infected Climbs - UN’, UN News Centre, 20 Feb. 2009, <http://www.un.org/apps/news/story.asp?NewsID=29972#.V4S2S-T3d-w>, Accessed 5 Mar. 2009; C. McGreal and J. Gilchrist, ‘Mugabe Splashes Out on Birthday Bash as Cholera Spirals Out of Control: Guardian Film Exposes Horrors of Man-Made Epidemic Claiming Thousands of Lives’, *The Guardian*, 26 Feb. 2009.

<sup>56</sup> Amon Murwira et al, ‘Zimbabwe-Strategy for Managing Water Quality and Protecting Water Sources’, *Final Report, Phase 1: Rapid Assessment - Identification and Characterization of Hotspots of Water Pollution and Source Degradation* (Harare: MEWC, UZ and WB, 2014).

<sup>57</sup> *Water Act*, 1998.

<sup>58</sup> *Statutory Instrument 274/2000; EMA Act; Statutory Instrument 8/2007*; Government of Rhodesia, *Statutory Instrument 477 of 1979* (Salisbury: Government Printers, 1979).

reduce the impact of emissions was through the enforcement of the ‘polluter pays principal’. By legislating to restore water purity and keeping a pristine (clean) water environment, lawmakers understood the importance of water quality for a healthy society. The passing of laws by the State at the country level and the municipal city by-laws’ focus on penalties against liquid-waste and water-pollution show awareness of the problem by the government and the stewards of the City of Harare. However, clandestine disposal was rife in the Greater Harare area due to the tediousness of the process to acquire permits. In the circumstances, the volume of sewage was big and due to monetary constraints the City no longer had the capacity to purify liquid waste, thereby forcing residents to drink untreated dirty water.

Confirming this, C. Tanyaradzwa, a high density suburban resident of Kambuzuma in 2009 said: ‘I do not know what the water situation in the rest of the country is like, but if it is even as bad as what we are seeing in Harare then there is no way we are going to completely deal with cholera’.<sup>59</sup> What was particularly shocking was that the relevant authorities were absolutely quiet, as if everything was running smoothly. As Tanyaradzwa argued, ‘there are parts of Harare that have forgotten what tapped water looks like [due to dry taps] ... [as there are] parts that only know tapped water as dirty liquid that threatens to poison their families’.<sup>60</sup> The cholera crisis, however, revealed that there were some parts of the city that had very good supplies of water whilst others were getting a raw deal. The affluent suburbs were generally better supplied than the poorer ones. This then suggests that cholera was both a racial and a poverty issue.

The enactment of laws that required polluters to pay for polluting the environment was an essential step which was guided by specific and acceptable liquid-waste discharge levels. For example, the *Water Act* operated in conjunction with guidelines that were explicit on the permissible effluent-standards for the discharge of liquid-waste as indicated in the *ZINWA Operational Guidelines Handbook*.<sup>61</sup> ZINWA, on the one hand, stipulated that any individual or organisations wishing to dispose of wastewater into a public stream or any other surface or groundwater had to apply for a permit to the Water Pollution Control Unit authorising such disposal. On the other, acceptable liquid-waste discharge levels were stipulated by the Municipality of Harare, ZINWA and EMA. The ZINWA handbook classifies permits into four major categories, which ranged from safe or environmentally friendly (Blue) to low-hazard (Green), medium-hazard (Yellow) to high-hazard (Red). For ZINWA, acceptable levels of pollution (i.e. blue and green, as opposed to yellow and red) did not attract a fine.<sup>62</sup> In spite of these efforts to educate, regulate or standardise waste-management, waste-treatment was not adequately carried out due to oversaturation of the City mains and sewer ponds with an assortment of liquid wastes from various sources such as manufacturing plants, peri-urban agricultural, mining and domestic sources and from food outlets and supermarkets requiring different but systematic treatment. The problem was compounded by Harare City’s water mains being situated parallel to the sewage pipes.<sup>63</sup> When pipes imploded this led to

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<sup>59</sup> C. Tanyaradzwa, Letter to the Editor, ‘Let’s Have Equitable Rationing of Water: What Exactly is Happening with Water in Harare?’ *The Herald*, 31 Mar. 2009; Nyandoro, ‘Historical Overview of the Cholera Outbreak’.

<sup>60</sup> *Ibid.*

<sup>61</sup> *ZINWA: Operational Guidelines Handbook for the Control of Pollution in Zimbabwe* (Harare: GoZ, Government Printers, 2002).

<sup>62</sup> *Ibid.*; Mapira, ‘Urban Governance and Mismanagement’.

<sup>63</sup> NMOA, CuDyWat, September 2009.

water contamination. Zimbabwe law clearly reveals attempts by policymakers to control natural resource use and prevent environmental pollution. This though was not accompanied by sufficient educative instruments for the efforts to register significant impact on the city and society at large.

Education was required to address water-pollution or the amount of discharged wastewater. For Saville et al, because the importance of information in water research was not emphasised in most studies ‘deficiencies in water resources information’ have been noted.<sup>64</sup> Almost 80 years after this study, public awareness, education and knowledge about liquid-waste management has not been sufficiently spread among the most vulnerable groups in the City of Harare such as women, children and communities at grassroots levels. The information-deficiencies that resulted from the failure to harness existing scientific knowledge for the benefit of these and other groups in dire need of new municipal waste techniques that protected lives can be addressed through education and inclusive relationships between grassroots groups and State or national institutions.

Several municipal water-served high density suburbs such as Budiriro, Kuwadzana, Mabvuku and Tafara among others continued to be highly susceptible to deadly water-borne diseases due to unending water contamination.<sup>65</sup> However, water contamination was a result of lack of water supply from the Harare mains. Individuals, residents, private companies, hospitals and disused gold mines were major culprits causing the pollution of city water. Disused mines which occurred around the Golden Quarry and the associated problem of Acid Mine Drainage (AMD) were a consequence of illegal gold panning activities around Harare.<sup>66</sup> This mining was a phenomenon of the colonial period and the abandoned mines were filled in by solid waste from the suburbs around Harare.<sup>67</sup> Most of the mining activities had ceased by Independence in 1980. The Ministry of Mines was involved in waste-management by closing disused mines in order to curb AMD. The disused mines around the Golden Quarry may have been filled-in using solid waste, but there were leakages into underground water from these dumps. The Harare Municipality failed to curb the increasing threat from liquid wastes generated by various activities which in the post-colonial period were contaminating the city’s water sources such as Manyame, Lake Chivero, Hunyani and Mukuvisi. Recent Angwa and Mazoe River reports on State television and radio raised enormous alarm on the desiltation activities of local and Chinese firms that were illegally allocated permits for their ventures along the country’s major rivers surprisingly by ZINWA and not by the Ministry of Mines.<sup>68</sup> These were fresh mining/panning and siltation-causing activities with dire consequences on water quality and human health as reported in the press, and as the new

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<sup>64</sup> T. Saville, F. A. Barbour and A. Wolman, ‘Deficiencies in Present Water Resources Information [with Discussion]’, *Journal (American Water Works Association)* 27, 8 (1935): 964-982.

<sup>65</sup> Interview, Harare, 2 Mar. 2013.

<sup>66</sup> Interview, Sept. 2009; Nyandoro, ‘Innovation Opportunities in Irrigation Technology’; J. W. N. Tempelhoff et al, ‘The 2012 Acid Mine Drainage (AMD) Crisis in Carolina’s Municipal Water Supply’, *African Historical Review*, 46, 2 (2014): 77-107.

<sup>67</sup> C. A. Hunter, pp. Secretary of Treasury to the Secretaries for Agriculture, Mines and Lands, Internal Affairs, the Director of Water Development and the Chairman (ICC), 16 Oct. 1967, Ministry of Internal Affairs, ‘AGR 7 Water Supplies General 97-117’, 1966-1968 (NAZ-RC) 100816/3.13.7F.

<sup>68</sup> *ZBC Main News Bulletin* 20:00 pm, Harare, 24 Jul. 2015.

Minister of Environment, Water and Climate (Oppah Muchinguri-Kashiri) indicated, should be banned.<sup>69</sup> Her timely intervention forced the then ZINWA boss, Ndoro, to step down.

More waste-removal and liquid-waste problems were reported in the print and electronic media. For example, in December 2013 Shelter Ruzvidzo of Kuwadzana 8 high density suburb complained that residents had a dull Christmas holiday because ‘we have now gone for over a week without tap water and this situation has driven us to resort to unprotected wells which are a health hazard [due to exposure to raw sewage]’.<sup>70</sup> Statistics from the Harare Residents Trust indicated that only 192, 000 households in Harare were connected to the main water system, while the rest depended on boreholes or rainwater. Panganayi Charumbira, a councillor from Harare’s Budiro low-income suburb, told *Inter Press Service (IPS)* - the world’s leading news agency on development, environment, human rights and civil society issues - that both Zimbabwe’s urban and rural areas were affected, but the water crisis was getting worse in towns. However, as open protests were generally outlawed there were only subdued expressions of dissatisfaction in twenty to twenty-first-century Harare compared to the loud and clear remonstrations or struggles against stench and filth in the cases of nineteenth-century Paris cited by Barnes.<sup>71</sup> Out of fear of riling the law, a top council official in Harare told *IPS* on condition of anonymity that ‘water shortages have been going on for over a decade now, dating back to the beginning of Zimbabwe’s economic crisis around 2000, when revenue collection dwindled after commercial farmers who used to contribute faithfully to paying water bills were evicted from ... farms’.<sup>72</sup> There was no improvement by 2016/2017 as the Deputy Chief Secretary in the Office of the President and Cabinet, Ray Ndlukula, deplored the situation and warned that the Harare City Council’s (HCC) 2025 vision of a world-class city could be derailed by poor service delivery. He admitted that, ‘Dilapidated water and sewer reticulation systems ... caused problems in the city in the form of burst sewer pipes and sewage thereby posing some health dangers to the population’.<sup>73</sup> Additionally, he expressed concern that ‘the response and reaction time by council employees to calls to redress the challenges ... [left] a lot to be desired, hence causing [stench and] streams of sewerage water to flow across residential areas into City Rivers and streams’.<sup>74</sup> But many underprivileged urban communities did not access this information due to cost and affordability factors, and alternative information-dissemination media were also not encouraged.

The Harare Municipality and the Local Government ministry under whom it fell did not play an active role in implementing astute liquid wastewater-governance. This was necessary given the significant increase in liquid-waste and its environmental and economic impacts in Harare. Besides, the dissemination of information on the proliferation of waste demanded transparency, honesty, diligent monitoring and implementation of environmental programmes and policies. The scant attempt made by 2016/2017 in the technical and lay print media about

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<sup>69</sup> Ibid.

<sup>70</sup> Nyemudzai Kakore, Herald Reporter, ‘Dry Taps Sap Christmas Cheer’, *The Herald*, 31 Dec. 2013.

<sup>71</sup> Barnes, *The Great Stink of Paris and the Nineteenth-Century Struggle against Filth and Germs*.

<sup>72</sup> Anon, ‘Making Business out of Water-Rationing’, *NewsDay*, 10 Jun. 2013.

<sup>73</sup> Helen Kadirire, ‘Now Mugabe Says Harare Stinks’, *Daily News*, 1 Jun. 2017. Compare with Barnes, *The Great Stink of Paris and the Nineteenth-Century Struggle against Filth and Germs*.

<sup>74</sup> Ibid. See also Gandy, ‘The Paris Sewers and the Rationalization of Urban Space’; Zimmer, ‘The Need for an Integrated View on Urban Waste Water’.

the deficiencies in information on liquid-waste and on the state of public water supplies was not encouraging. The limited attempt to portray the effects of waste in the media pointed to the fact that comprehensive, accurate and easily accessible information with respect to liquid-waste was necessary in the planning and development of public water supplies and environmental protection. A pre-requisite for any sound planning of liquid waste-disposal was accurate waste-management information. Harare could take advantage of its many private and public training institutions to realise this goal and achieve the standardisation of environmental teaching courses and methods. Liquid-waste information lacked constant support by those benefiting from it.

A nation-wide programme of data collection and publication guided by appropriate water legislation as well as social and political intervention would be indispensable. It would help in the invention of a national liquid-waste information-system which was user-friendly similar to what the US Environment Protection Agency (USEPA) developed in 1974 in compliance with *Safe Drinking Water Act (SDWA)* regulations.<sup>75</sup> For Harare, beyond the city level, increased support for efforts to pool information about successful pollution-control efforts and their dissemination in general and liquid-waste control in particular was missing. The *Water Act*, among other things, was enacted to prevent the pollution of drinkable water by liquid, sewage and other toxic agents. The decree, despite the known hazards of liquid-waste in Zimbabwe is not silent, but it is not quite emphatic and forceful about transforming wastewater-governance in the city except mentioning in some of its clauses that pollution of water was an offence.

The quantity of waste produced in the capital continued to increase at a faster rate than the ability of the city authorities to deal with this menace. The city had to improve ‘the financial and technical resources needed to parallel this growth’.<sup>76</sup> Zimbabwe’s cholera outbreak was just one sign of the disintegration of a once-admired water, wastewater and healthcare structure that had virtually ceased to function at the height of the country’s economic conundrum due to a crippling lack of funds. It was estimated in 2009 that Harare alone needed 63 million euros to rectify its water problems.<sup>77</sup> The inherited waste-management system from the colonial government was skewed and lacked a broad outlook. In comparison since the colonial era, superficial attention was given to issues of waste-management in the African suburbs in contrast to the areas designated for white-settlement which were well-provisioned. Areas inhabited by colonialists were well-planned and characterised by basic sanitation facilities provided either free or at heavily subsidised rates. Although there was no complete seclusion of the African areas in the colonial period, efforts to address waste there were inadequate.

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<sup>75</sup> In the US, this national database of public water system (PWS) information, originally developed in response to the SDWA of 1974, was initially known as the Federal Reporting Data System (FRDS). On legislation/regulation of such reporting system see J. S. Rosen and K. Tilton, ‘Reinventing a National Drinking Water Information System’, *Journal (American Water Works Association)* 89, 2 (1997): 16.

<sup>76</sup> Rodney G. Tsiko and Sydney Togarepi, ‘A Situational Analysis of Waste Management in Harare, Zimbabwe’, *Journal of American Science* 8, 4 (2012): 692-706.

<sup>77</sup> Municipal Reporter, ‘Harare Needs 63 Million Euros for Water’, *The Herald*, 10 Apr. 2009; Nyandoro, ‘The Role of Water and Environmental Awareness in the Resuscitation of the Zimbabwean Economy under the GNU (2008-2013)’, *Social Science Research* 2, 2 (2014): 110-136.

Similarly, the contemporary era (following independence) did not produce a sedentary situation for liquid-waste management since City authorities were encumbered by lack of financial resources to manage waste. The situation was exacerbated by obsolete and often malfunctioning water-reticulation infrastructure such as the Morton Jaffrey Waterworks, inefficient environmental control mechanisms, an urban populace with apparently no social accountability for the pollution they were responsible for causing and a government that was hamstrung to finance any waste public awareness education, training and management campaigns.

Information on liquid-waste management which was in the public domain was not always relayed nationwide to the primary targets mainly the urban poor (who comprised women and children with limited access to information) due to cost factors and lacklustre or inefficient dissemination methods. The information-deficiencies were growing at a time they were supposed to be closing given the enormous strides made in information-technology at the global level. Harare was not necessarily left behind by this technological-wave. Nevertheless, it lacked appropriate information and education targeting all the people. The council did not even have the civility of informing residents about any interruption/breakdown of water supply as testified by one Harare resident, Richard Gate, of Kuwadzana high density suburb. He complained that ‘the council should have the courtesy to inform us if there are any technical problems they encounter’, adding that ‘the council must improve its communication with residents and avoid situations in which we hear about the problems in newspapers’.<sup>78</sup> This did not assist in rectifying the perennial water shortages in the city which were not only caused by lack of quantity, but also by a serious lack of quality due to pollution caused by human activities.<sup>79</sup> It does not need reminding that anything that affected water affected social and economic activities in the capital and the country. For example, agriculture (the mainstay of the economy of Zimbabwe), peri-urban farming, industry, mining and the domestic consumptive sectors all needed and depended on clean water supply or good quality water for most of their operations.

The importance of water and the need to value information about it has been emphasised for America by Saville et al’s collaborative article aptly titled: ‘Deficiencies in Present Water Resources Information’. Written before World War Two, they argue in a way that similarly applies to the necessity to preserve information and the water resources of Harare in the 21<sup>st</sup> century when they say:

Water, in the atmosphere, on the surface of the earth, or underground, is the greatest mineral treasure which this [the USA], or any, country possesses. Although it is a renewable treasure, it is neither limitless in amount nor distributed equally throughout the country, nor susceptible of complete control by man.<sup>80</sup>

According to Magadza and Moyo, when discussing liquid-waste and its impact, the way man has tempered with the environment and humankind’s failure to observe recommended waste-

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<sup>78</sup> Nyemudzai Kakore, Herald Reporter, ‘Relief as City Restores Water Supplies’, *The Herald*, 2 Jan. 2014.

<sup>79</sup> Sara Feresu, *Zimbabwe Environment Outlook: Our Environment, Everybody’s Responsibility: Zimbabwe’s Third State of the Environment Report* (Harare: GoZ, Ministry of Environment and Natural Resources Management, 2010): 141 & 152.

<sup>80</sup> Saville et al, ‘Deficiencies in Present Water Resources Information’.

disposal and control-measures definitely deserves attention.<sup>81</sup> They amply demonstrate the impact of waste inflows into Harare and Chitungwiza water sources and the necessity for information in addressing the problem. Thus, information and education were complementary to any efforts the City of Harare was making to redress the challenge of liquid waste.

### **Necessity for Liquid-Waste Management Education**

The City of Harare's waste-management system did not only need serious rethinking, rehabilitation and resuscitation, but it needed to be replaced by new and sustainable measures.<sup>82</sup> Knowledge alternatives can be supported by building into the information domain and national educational-curricula new complementary, yet leveraging technologies commensurate with contemporary information-technology. Such technology valued the theory of effective quality education offered through diverse types of modern media and other means without any physical lecture room or class-room contact. Harare was arguably the hub of knowledge-giving institutions and media sources in the country. Lamentably, its capacity to empower and leverage educational access and opportunities for the under-served populations was still very limited. Education philosophy was not redirected towards an agile conscience for the environment. As a result, the environment was frequently at the receiving end of an inefficient liquid-waste management-approach and inappropriate human attitudes.

Whilst the Zimbabwe school curriculum offered environmental studies at Grades one to seven and included the theoretical (not practical) teaching of environmental sciences from Forms one to two, the content that was taught in schools was not frequently reviewed.<sup>83</sup> A comparison of rural and urban schools reveals that the syllabi content was skewed towards urban pupils where waste was an 'everyday' occurrence as they saw it every day and almost everywhere, but rural pupils did not see that. The status of environmental science in the school curriculum lacked re-evaluation. The University of Zimbabwe (UZ) Department of Geography and Environmental Science (GES) taught environmental academic courses. However, the yawning environmental science education gap at the ECDC<sup>84</sup> and other intervening levels (Forms three to six) remained unexplained.

Whilst the GES at the UZ was the fountain of environmental knowledge, intersecting or overlapping disciplines such as agriculture, science, and civic education did not carry components of environmental education.<sup>85</sup> The common challenges were information-related

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<sup>81</sup> C. H. D. Magadza, *Water Pollution and Catchment Management* (Harare: UZ Publications, 1997); N. A. G. Moyo, *Causes of Massive Fish Deaths in Lake Chivero* (Harare: UZ Publications, 1997a).

<sup>82</sup> For a discussion of related issues and the transition to sustainable development based on environmental protection see Neil Carter, *The Politics of the Environment: Ideas, Activism, Policy* (Cambridge: Cambridge University Press, 2001). Deeply embedded in Environmental Education (EE) is the concept of sustainable development - a term that refers to a form of development that is geared to meet the needs of the present without compromising the ability of future generations to meet their own needs. Although it was first used in Germany in 1713, the concept of sustainability was popularised by the publication of the *Brundtland Report* on the global environmental crisis in 1987. Over the years, the concept of sustainable development has been subjected to much research and debate.

<sup>83</sup> *Environmental Science Syllabus: Grades 1-7* (Harare: Government Printers, 1994). See also Fien, *Education for the Environment*; Interview with anonymous education officer, Harare, 12 Jul. 2016.

<sup>84</sup> ECDCs are Early Childhood Development Centres. These are sometimes known as *crèches*, play, day nursery or pre-schools in Zimbabwe and other countries.

<sup>85</sup> See various GES Honours dissertations at the UZ.

as a result of information-dissemination bottlenecks. Despite the education curriculum focusing on teaching Environmental Sciences at Grades one to seven, Forms one to two and at the university level, there was lack of a coherent or integrated curriculum on waste-management in general and liquid-waste in particular at the ECDC, primary, secondary school and tertiary levels. Thus, the communication strategy was weak and left a gap that was not filled. Public awareness raising challenges existed. For example, public participation levels were low, hence a number of solutions to the liquid-waste challenges facing Harare proved either difficult to empirically apply in a systematic way or were not proffered to address the lack of effective participatory approaches.<sup>86</sup>

## **SOLUTIONS TO HARARE'S LIQUID-WASTE CHALLENGES**

Designing novel and relevant solutions to address the conspicuous information-deficiencies in liquid-waste management was important. Suggested solutions included, but were not restricted to:

- (a) the introduction of practical and not merely theoretical environmental education which included waste and water management at all levels of the curriculum;
- (b) cooperation and synchronised (coordinated) approaches among institutions and across sectors;
- (c) law enforcement [on the basis of the 1998 water law] to effectively implement the 'polluter pays principle' for the pollution caused;
- (d) development of societal awareness materials such as posters, pamphlets, videos, compact discs (CDs) and other innovative ways for providing concrete and not abstract messages to the public;
- (e) encouragement of participatory and practical approaches through production of materials (t/shirts, hats/caps, bags with clear messages) and effective dissemination and communication strategies;
- (f) the initiation and expansion of liquid-waste awareness training programmes for community leaders, local natural resource officers, local NGO officers working with the communities, city councillors, community popular opinion leaders, and leaders of faith-based organisations;
- (g) toleration of civil society presence and voice; information gathering techniques coupled with citizen representation and campaigns against liquid and other wastes as valuable resources mobilised in opposition to the hazardous wastes and
- (h) intensification of community participation and community organisation in waste-management using voluntary community operations (collective responsibility) to clean the city similar to the community programme launched in Harare's Mbare suburb in 2014.<sup>87</sup>

These recommendations were received in different ways. Government response was rather lukewarm. Pursuant to the aforementioned recommendations, the development of an integrated waste-management curriculum in schools which prioritised a needs assessment

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<sup>86</sup> A participatory approach promotes feelings of programme ownership or citizenship as opposed to non-cooperation resulting from perceived imposition of programmes. In Harare, it provides people with the opportunity to give their understanding of the causes of liquid waste, impacts and solutions in their areas. This was not always done.

<sup>87</sup> *ZBC Main News Bulletin*, 20:00 pm, Harare, 19 Nov. 2014.

was vital. Whilst there were several wastewater treatment processes in Zimbabwe, in the education sector, the Primary and Secondary as well as the Higher Education Government Ministries were not actively involved in waste education and training particularly targeting the youths to grow up with the right attitude, behaviour and practice towards waste management. The government seemed to believe that the legislation already passed (for example, the *water, waste and effluent disposal regulations* of 2000) was a sufficient deterrent against liquid waste, but more needed to be done with respect to the implementation and enforcement of the laws. At the government level, sustained consultation with relevant NGO stakeholders like CHRA, Practical Action, UN-Habitat and others remained a far cry as sometimes these were erroneously perceived to be agents of opposition political parties. However, Zimbabwe radio and television (TV) broadcasting stations were active in airing topics on different types of liquid wastes, wastewater, sewage or effluent and their disposal. They invited several university and college lecturers and waste practitioners or resource persons to present and discuss the subject to increase awareness. Some programmes enabled listeners to phone in and ask questions, comment and contribute to what the resource persons would have presented. The programmes constituted a lively interchange between the experts and the public.

The public also responded to NGO and Ministry of Health calls to eradicate waste by engaging in city cleaning and sweeping campaigns, but most of these community participation activities focused on solid and not liquid waste management. With respect to general waste management, the City of Harare Municipality responded by installing “No Dumping” signs or billboards. The billboards were visible around Harare Urban as a publicity and awareness campaign tool/instrument. Nonetheless, the signs lacked a liquid waste orientation. Besides, the government-run Council itself was not doing enough to address the problem due to declining piping/sewer infrastructure and funding challenges. It was further accused of not coming together with the people on the issue. For example, residents associations and other citizens frequently alleged that the municipality itself was guilty of dumping raw sewage into Harare riverine sources of water like Lake Chivero and lacking communication. Thus, in spite of the relatively high media awareness-raising campaigns in Zimbabwe in general and Harare in particular it still remained important to correct the problem of people and Council attitudes towards waste management.

In addition to community and other programmes, in-service training targeting teachers in ECDCs, primary, secondary schools and institutions of higher learning, and the training of municipal, local natural resource (especially water) and waste-management officers working in the city were necessary. Relevant Non-Governmental Organisations such as Oxfam, USAID and UN-Habitat were key instruments in advocacy and mobilisation of resources such as finance and non-bureaucratic human capital. Another way was to learn or borrow alternative solutions of addressing waste from other countries’ experiences. Mauritius, for example, adopted a new stance on waste, namely the recycling or extraction of useful nutrients for energy generation purposes and the production of fertilisers and other chemicals for agriculture and industry. This is an emerging new theme in the developing world in the field of sanitation where Mauritius started with a full-scale process. Such innovative experiments targeted at the whole nation in Mauritius could be tried in Zimbabwe where Harare’s waste can be turned into productive use. These ground-breaking solutions (already initiated by the industrial capitalist world, but resisted in many parts of Africa) were relevant

to Harare in that sewage and industrial-effluent not yet harnessed could be converted into energy for an electricity-deficient City.

In the USA for instance, as observed by Swartz, the installation of waste-treatment equipment had long been perceived by industry to be financially devastating.<sup>88</sup> A 1939 study estimated that it would cost American industry \$900 million to provide ‘practicable’ treatment of their wastes.<sup>89</sup> Experimentation with waste technology had increased dramatically during the 1930s. This sudden response to environmental problems caused by industrial-effluent was sparked by federal programmes supporting waste-treatment. However, research was driven by the desire to find a return on the cost of pollution control, not the urge to purify streams.<sup>90</sup> The first option, therefore, was to recover usable wastes,<sup>91</sup> but when no profitable by-products were found, researchers recommended diverting industrial sewage to municipal treatment plants<sup>92</sup> as Tyrrel, Kareiva and Marvier concur.<sup>93</sup> There would be continuity rather than discontinuity between what happened in the USA in the inter-war years with what can be done in Zimbabwe in the new millennium. This can only happen if Harare’s liquid waste, sewage and wastewater-treatment were backed not merely by the central government, but by industry, citizen-engagement, research and educational-information. Provision of a platform for educators (at the ECDC<sup>94</sup> and other levels), researchers and consultants, training managers, the Government, experts, curriculum developers and entrepreneurs to pull intellectual and other resources towards inventing new methods and restructuring education to suit the information-needs of an ever-changing environmental landscape was essential. Such an initiative could be complemented by establishing a national institute for pollution and waste-management research. This development would lead to the formation of a council<sup>95</sup> or central research organisation assisted by countrywide information-centres on waste-education awareness-raising.

<sup>88</sup> G. Swartz, ‘Report of the Committee of Industrial Wastes’, *American Bureau of Public Health: Papers and Reports* 29 (1903): 166.

<sup>89</sup> US Congress, *Water Pollution in the United States*, House Doc. 155, 76<sup>th</sup> Congress, 1<sup>st</sup> Session, 1939.

<sup>90</sup> C. L. Knowles, ‘Industrial Wastes from the Equipment Manufacturers’ Viewpoint’, *Industrial and Engineering Chemistry* 31 (1939): 1338-1345.

<sup>91</sup> This reflected the desire to conserve natural resources during World War One. See W. Berkeley, ‘Industrial Wastes: A Tax Paid to Ignorance’, *Industrial Management* 54 (1917): 312-22; R. Conover, ‘Salvaging and Utilizing Wastes and Scraps in Industry’, *Industrial Management* 56 (1918): 449-51. However, during the 1930s emphasis shifted to wringing a profit from by-products. See C. M. Baker, ‘Wastes and Pollution versus Recovery for Profit’, *Water Works and Sewage* 80 (1933): 296-98; S. T. Powell, ‘Profits from Trade Wastes’, *Chemical and Metallurgical Engineering* 40 (1933): 359-60.

<sup>92</sup> G. V. Brown, ‘Classification and Treatment of Industrial Effluents’, *Public Works* 68 (1937): 40-42; U. F. Turpin, ‘Sewage Plant Rebuilt to Treat Rayon Wastes’, *Engineering News-Record* 109 (1932): 780-82; H. Bach, ‘The “Tank Filter” for the Purification of Sewage and Trade Wastes’, *Water Works and Sewage* 84 (1937): 389-93; N. J. Ranney, ‘Treatment of Pickling Wastes’, *Iron Age* 143 (1939): 24-27; L. F. Harlow, ‘Waste Problems of a Chemical Company’, In *Industrial and Engineering Chemistry* (1939). See also Reid, *Paris Sewers and Sewermen*.

<sup>93</sup> Tyrrel, various works; Kareiva and Marvier, *Conservation Science*.

<sup>94</sup> In spreading information and education on liquid and other wastes the school curricula should integrate public awareness on waste management from the ECDCs to the Tertiary institutions.

<sup>95</sup> The Government could provide leadership by reaching out to business interests for financial support to set up a waste management council and encourage major private sector corporations to join. The funds could be utilised for awareness raising against environmental pollution and for environmental conservation. See Ronald G. Shaiko, *Voices and Echoes for the Environment: Public Interest Representation in the 1990s and Beyond* (New York: Columbia University Press, 1999).

As the UN has succinctly observed, the world needed relevant information and communication-technologies to deal with preventable diseases and the accumulation of waste which affected water given the massive influx of people into the already ‘overpopulated’ urban areas such as Harare. For the UN, this lessened the burden of water managers. Thus,

*The key challenges of contemporary water management can only be understood within the very broad context of the world’s socio-economic systems. Changing demographics and population movements; shifts in geopolitics, with new country boundaries and alliances; fast developing information and communication technologies; plus the impacts of climate change and extreme weather conditions are all making the world a more challenging place for decision-makers. Poverty, warfare and preventable disease still affect much of the world’s population, often in developing countries and in increasingly crowded urban conditions. These are elements of the broad and often fast changing contexts within which we must place our discussions on water resources management. It is within this setting that the world’s water managers must administer what is becoming an increasingly scarce and fluctuating resource.*<sup>96</sup>

Urban residents’ participation in educational programmes to avert escalating water-pollution levels and in managing ‘scarce and fluctuating [water] resource[s]’ was paramount. Information-sharing on liquid-waste as an alternative management-tool was largely ignored in Harare. It is overlooked in the literature on water-pollution because it is presumed to be difficult to implement in a city where population statistics were no longer as accurate as before as a result of the emergence of many informal and unplanned settlements and changing belief systems or attitudes. For Kwiatkowska and Holland, ‘the lack of ecological [environmental] knowledge and the unplanned pattern of human development, exacerbated in some cases by uncompromising belief systems, led to unexpected and unpredictable consequences’.<sup>97</sup>

Unplanned settlements in Harare included Churu Farm (which no longer exists), Epworth, Chitungwiza, pre-‘Operation Murambatsvina’ or Operation Restore Order settlements.<sup>98</sup> Such settlements in the post-‘Operation Murambatsvina’ period were a result of corrupt government officials not inclined to implement waste legislation conscientiously. For instance, the media alleges that the ruling political party, the Zimbabwe African National Union-Patriotic Front (ZANU-PF), still basking in the glory of its resounding but heavily disputed election victory in 2013, reportedly embarked on an ambitious membership drive which included annexing and regularising several illegal peri-urban settlements dotted around

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<sup>96</sup> UN, *Water, A Shared Responsibility: The United Nations World Water Development Report 2 (WWDR 2)*, UN-WATER/WWAP/2006/3 (2006).

<sup>97</sup> Kwiatkowska and Holland, ‘Dark is the World to Thee’.

<sup>98</sup> ‘Murambatsvina’ was a government operation to ‘clean-up’ cities in reaction to the disorder caused by informal urban settlements and informal business enterprises that were sprouting. Such settlements led to insurmountable garbage and other wastes accumulating in Harare that municipality lacked the capacity to handle. In 2015, the City Council forcefully removed informal traders (‘vendors’) from the CBD, but the traders clandestinely came back to operate in the evening/night when the policing eye was turned away. L. Zinyama and R. Whitlow, ‘Changing Patterns of Population Distribution in Zimbabwe’, *GeoJournal* 13, 4 (1986): 365-384.

Harare to extend its hegemony.<sup>99</sup> Likewise, corrupt Harare City Municipality officials and wardens engaged in the illegal parcelling-out of land for residential housing stands as land became a major political weapon. The *NewsDay* indicated that ZANU-PF had ‘mapped out plans to dole out land to its members who ... formed apparently pseudo-housing co-operatives in Mbare, Chitungwiza, Epworth, Budiriro, Kuwadzana and Kambuzuma [high-density suburbs], among many areas’.<sup>100</sup> It is further alleged that Party officials said the grand scheme was aimed at neutralising the Movement for Democratic Change-Tsvangirai’s (MDC-T) support bases ahead of the 2018 general elections. This reflected no lack of knowledge that these areas would be harbingers of waste, but just lack of political will. In the context of its production, there was merit in Zimbabwe’s waste legislation or statutory instruments. The failure by the government and City Municipality to implement laws and by-laws on waste was not really a problem of the legislation. It was a problem of the economic and political situation Zimbabwe was in and perhaps confounded by administrative compromises and inadequacies associated with the history and especially the politics of the period. The politics of the day, not quite governmental land policy, have been behind such compromising land allocations. Similar land settlements were stimulated, since Independence, by the increasing rural-urban migration as illustrated by shifting population dynamics indicated in the statistics provided.

Urban planning and the municipality’s water-treatment function which used to be so effectively carried out virtually collapsed due to the changing demographics, a crippling brain drain of water and liquid-waste experts, the political environment, finance setbacks and an apathetic society regarding water quality degradation. In this connection, Tihansky has argued that information on basic cost-parameters was essential for water quality improvement.<sup>101</sup> Despite the financial challenges besetting the city of Harare, communicating the cost of delivering municipal services to a growing population was lacking. For Tihansky, operation and maintenance expenses for the day-to-day usage and upkeep of waste-disposal and treatment-facilities functions were an important knowledge and management issue.<sup>102</sup> Operation costs can be divided into two that is, direct costs which include maintenance, plant supplies, labour and supervision, utilities, chemicals and disposal of wastes and indirect costs such as depreciation, real estate taxes, insurance, interest and general overheads.<sup>103</sup> While costs of waste-management were not part of the information-gap, they sometimes determined the inefficiency of information-dissemination.

Most operation and maintenance cost relations pertained to the direct items, although indirect costs were significant. In Harare, pressure using the medium of education to close information-deficiencies on a cost-benefit basis was not sufficiently intensified to ensure that not only the city fathers, but residents also contributed to safeguarding the city against further proliferation of liquid waste. Citizens were not sufficiently educated on the environmental and health hazards of waste. Lack of education and correct attitudes was reflected through the illegal church ceremonies now common at street corners, the throwing of litter at

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<sup>99</sup> *NewsDay* cited by Zimbabwe Situation Representative, 2013, ‘Zanu-PF Parcels Out Harare’, [http://www.zimbabwesituation.com/news/jb\\_zanu-pf-parcels-out-harare/](http://www.zimbabwesituation.com/news/jb_zanu-pf-parcels-out-harare/), Accessed 9 Jun. 2016.

<sup>100</sup> Ibid.

<sup>101</sup> Tihansky, ‘Historical Development of Water Pollution Control Cost Functions’.

<sup>102</sup> Ibid.

<sup>103</sup> Ibid.

undesigned places by informal traders ('vendors'), the activities of Small-to-Medium-Scale Enterprises (SMEs) or 'businesses' operating at street corners and the disposing of wastewater by illegal car wash operators in the city. These are some of the most obvious human activities largely associated with current socio-economic practises not quite common in previous millennia but now seemingly driven by a difficult macro-economic environment. Such attitudes epitomised that pollution was not perceived as harmful in the short term. Raising people's sensitivity to the consequences of inappropriately disposed liquid wastes and inculcating in them a sense of stewardship of the natural environment irrespective of their gender and age was, therefore, beneficial to a City whose population generally believed that the responsibility did not start with them, but with the Government. Civic society organisations such as the Combined Harare Residents Association, whilst they needed to do more, required space to actively assist in raising awareness among the city's residents as evidenced by their outstanding effort during Harare and Zimbabwe's worst cholera nightmare in 2008/09.

This is important given that the central problem was that competition for water resources and officially-designated waste dumping facilities (i.e. sewer systems) increased the potential if not the actual necessity for knowledge dissemination about the human health risks and the ecological-catastrophe of uncontrolled liquid waste. Liquid wastes contaminated underground water resources which were an alternative source of supply given the scarcity of surface water in the capital. Waste-contamination was exacerbated by the uncontrollable proliferation of waste and sub-standard waste-disposal-methods in the city, coupled by unsanctioned disposals by informal traders and other street corner activities. Pollution, thus, led to the aggravation of the acute water shortages besetting the city of Harare. Consequently, the city, not least the country, had a crisis of quantity which was affected by quality as the little that was available was not usable - a factor which propelled the emergence of bulk water suppliers. Bulk water suppliers started in 2005 (with no State regulation) as a method of selling domestic water to middle and high-income suburbs because of shortcomings in the city's water delivery system.<sup>104</sup> Harare and all cities in Zimbabwe could do more, using relevant information, education and appropriate treatment as well as disposal-techniques to minimise reliance on bulk water, reduce liquid-waste and augment the amount of water available for various uses. An ecological-transition to a green economy which recognised the core political principles of most versions of a green society, that is, grassroots democracy, decentralisation, social justice and non-violence was desirable for Zimbabwe.<sup>105</sup> However, it was costly to implement and was not feasible under the prevailing economic, political and social environment.

Notwithstanding this, existing legal instruments like the *Water Act* provided for the control and regulation of access to water and usage.<sup>106</sup> Nonetheless, while the laws themselves are comprehensive (e.g. where statute is technically supported by other instruments in implementation such as Municipal by-laws), the execution of the regime has been largely

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<sup>104</sup> E. Manzungu et al, 'Bulk Water Suppliers in the City of Harare - An Endogenous Form of Privatisation of Urban Domestic Water Services in Zimbabwe?' *Water Alternatives* 9, 1 (2016): 56-80.

<sup>105</sup> Decentralisation is the expansion of local autonomy through the transfer of powers and responsibilities away from a national political and administrative body. For this definition and the core principles of a green society see Carter, *The Politics of the Environment*.

<sup>106</sup> *Water Act*, 1998.

ineffective due to the lack of accessible information by residents of the sprawling City. It was effective policy regulation rather than the *Act* alone which ensured the success of waste control. This confirms that in Zimbabwe and other developing countries, environmental regulations were weaker than in the industrial capitalist countries.<sup>107</sup> The need for information on liquid-waste was clearly greater in Harare than in the outlying areas of the country whose capacity to generate liquid-waste was minimal due to less population concentration and limited industrial development and effluent-discharge. One can assume that effluent-discharge in the city together with the release of liquid wastes was only kept in abeyance by the decline in the manufacturing sector (de-industrialisation) of the country due to the persistent economic crisis, though, of a different dimension by 2016/2017. Once industrial activity picks up again, and if that development was not followed up by new and more effective regulations and control, education, as well as a change in societal attitudes, the wastewater situation may reach new unmanageable proportions. Perhaps, the time to correct the problem of liquid-waste was now.

The relative availability of water and land and the prospect of finding employment led to an urban population boom. This initially produced and subsequently intensified competition for the existing water and land resources - a trend that produced different water-use patterns in the city which imposed further difficulties in dealing with the incipient, but growing liquid-waste menace. Local liquid wastewater-governance was not strengthened through education and amply funded research for information-gathering and for distribution to inculcate a spirit of collective social responsibility about waste-management in Harare and other parts of the country. The spirit of community as opposed to individualism could be premised on the theme: 'Waste-management begins with me, begins with you and begins with all of us'. Cultural values whilst logically coherent were not sufficiently modified to provide an indigenous basis for improving technological-information input for constructing and sustaining a liquid waste-free urban environment. The range of information to be gained from the growing repertoire of new international techniques of dealing with and curbing liquid-waste production and reproduction can be borrowed and adapted to local conditions where necessary. This yielded new ways, new solutions and prevented the cavalier attitude exhibited by society and the Municipality towards the environment.

Major areas requiring education, training, awareness and information about liquid-waste management were as follows:

- (a) The City of Harare had to improve internal (municipal) conditions of service to attract or lure back water and wastewater experts who joined the Diaspora;
- (b) The sprouting informal urban settlements which did not receive formal waste collection services from the municipality had to be planned for as the City of Harare cannot pretend that they did not exist;
- (c) Street corner ceremonies and activities had to be controlled;

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<sup>107</sup> P. Christoff, 'Ecological Modernisation, Ecological Modernities', *Environmental Politics* 5, 3 (1996): 476-500; J. Dryzek, *The Politics of the Earth* (Oxford: Oxford University Press, 1997); Carter, *The Politics of the Environment*.

- (d) The City Council-operated open waste dump sites (the Pomona and Golden Quarry landfills)<sup>108</sup> had to be closely monitored and managed since they were an eyesore and major breeding grounds for communicable diseases which thrive under these circumstances; and
- (e) Sustainable funding sources [given the rising profile of liquid waste] had to be found to facilitate the training of personnel and the maintenance of deteriorating equipment. Donors though are not forthcoming because of an un-conducive political-economic climate.

### **Liquid-Waste Management in Harare: A Priority**

Up to 2016/2017, the improvement of liquid-waste management in Harare had not been given serious priority. Big manufacturing firms had collapsed, leaving the still standing major industrial companies in the capital with a social and corporate responsibility to assist in the prevention of the spread of liquid-waste but these lacked capacity and funds to curb the problem. At the same time, they did not ensure that they too were not found guilty of contaminating the environment. Because this was not happening, in a desperate bid to contain the rampant proliferation of liquid waste, the City of Harare in 2014, in a move that appeared it was advocating for *in-situ* treatment of liquid-waste by industrial concerns, threatened to descend on industrial enterprises that had not constructed their own waste-treatment systems to curb the problem. In a worst case scenario, the City of Harare threatened to close factories and companies that were polluting the capital's water sources with liquid toxins.<sup>109</sup> The city fathers claimed that most factories and industries within the Greater Harare area did not have waste-treatment systems and unleashed toxic products, poisons, non-biodegradable substances and organic matter into the environment.<sup>110</sup> The main contaminants were sulphuric acid, caustic soda, ammonium salts, phosphates and sulphate organic substances. Pulp and paper mills (whose work took place outside Harare along the Manyame River), breweries and textile factories were among the worst industrial polluters. This is because the production of pulp and paper requires large quantities of water, so a large volume of liquid-waste was produced. Clifford Muzofa, the City of Harare's director in the environment department, as quoted in the *Financial Gazette* said 'The spillage of toxic chemicals from pulp companies [had] dire consequences to [sic] water quality'.<sup>111</sup> He threatened that the city would stop operations of companies that failed to comply with environmental regulations, describing the emission from industries as worrisome.<sup>112</sup> The industries he was referring to included manufacturing concerns.

Presenting a report on the state of pollution during a meeting in the city, Muzofa added that 'Manufacturing and services industries [were] primary sources of pollution, producing millions of effluents, tons of millions of solid waste and hundreds of millions of

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<sup>108</sup> The Golden Quarry landfill is no longer very active as the Chinese have put up some buildings on this site. Now it takes limited amounts of solid and liquid waste in cases where some disused mines still remain to be filled in.

<sup>109</sup> City of Harare cited by a *Financial Gazette* Correspondent, 'Harare City Council Threatens Companies', *The Financial Gazette*, 24 Jul. 2014.

<sup>110</sup> Ibid. Also, Hrudey and Eng, 'Sources and Characteristics of Liquid Process Wastes from Arctic Offshore Hydrocarbon Exploration'; Tsiko and Togarepi, 'A Situational Analysis of Waste Management in Harare'.

<sup>111</sup> *The Financial Gazette*, 24 Jul. 2014.

<sup>112</sup> Ibid.

emissions'.<sup>113</sup> Referring to the pollution caused by textile factories (in concurrence with Muzofa) Christopher Magadza, a water and environment expert from the UZ, said 'Textile mills use caustic soda and other chemicals such as acids, dyes, detergents and starch. Treatment involves passing the effluent into sedimentation tanks from which sledge [sic] is removed and burnt'.<sup>114</sup> Thus, textile firms were implored to rectify the pollution problems caused by their division of the manufacturing sector.

In general, in steel manufacturing,<sup>115</sup> it was found that the raw materials used which included lime, iron ore and coal were the biggest polluters. In the crushing and cleaning of limestone and ore, sludge-disposal had the potential of causing serious environmental problems. Oil leaks from service garages as well as untreated industrial residues (from cement and battery factories, oil and soap factories) were inadvertently polluting Harare's water sources.<sup>116</sup> The excessively high offloading of liquid pollutants into water resources on which the city depended was a major environmental concern. However, industrialists hit back at the Harare Municipality and said the city had to first put its house in order before blaming other stakeholders. They alleged that the municipality and the neighbouring towns of Ruwa, Chitungwiza and Norton were known to have polluted Harare's water by dumping raw sewage into rivers that supply Harare with water.<sup>117</sup> This is illustrated by the fact that Lake Chivero received effluent-discharges from Ruwa, Chitungwiza and Harare primarily because the lake lies lower than all the rivers that feed into it.<sup>118</sup> The main water treatment plants were Zengeza, Firle and Crowborough sewer works. Until recently, the Zengeza sewage works had been discharging over 15 million litres per day of partially treated effluent into a tributary of the Nyatsime River, which in turn feeds the Manyame River on which Lake Chivero is situated.<sup>119</sup> Municipal-run Firle and Crowborough were equally discharging sewage into Mukuvisi and Marimba rivers respectively. The question is why they could not be made to close too.

At the same meeting, it was further observed that all the sewage-effluent which was partially treated and nutrient-rich was finding its way into Lake Manyame and that the level of pollution was worsened by the poor rainfall patterns.<sup>120</sup> Zimbabwe's recurrent droughts (1981-1983, 1986, 1990-1994, 2001-2003) assisted in confining the pollution to a smaller area instead of spreading it to other areas before being offloaded into the ocean. What was needed, therefore, was not these accusations and counter-accusations, but a commitment not only by the companies concerned but also by the government to streamline liquid waste, environmental policy and its infrastructural support as a major priority. This was helpful in

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<sup>113</sup> Ibid. See also Richard J. Frankel, 'Technologic and Economic Interrelationships among Gaseous, Liquid, and Solid Wastes in the Coal-Energy Industry', *Journal (Water Pollution Control Federation)* 40, 5 (1968): 779-788; Black, 'Planning Industrial Waste Treatment'; Kuo, 'Pressure Behavior in Subsurface Disposal of Liquid Industrial Wastes'.

<sup>114</sup> *The Financial Gazette*, 24 Jul. 2014.

<sup>115</sup> N.B. There is no steel manufacturing in Harare. It was done at the giant Zimbabwe Iron and Steel Company (ZISCO) in Kwekwe, formerly Que Que. In the colonial period, ZISCO was the Rhodesia Iron and Steel Company (RISCO).

<sup>116</sup> *The Financial Gazette*, 24 Jul. 2014.

<sup>117</sup> Ibid. The major river supplying Harare with water is the Manyame River.

<sup>118</sup> *ZBC Main News Bulletin*, 24 Jul. 2015; Nyandoro, 'The Role of Water and Environmental Awareness'.

<sup>119</sup> *The Financial Gazette*, 24 Jul. 2014.

<sup>120</sup> Ibid.

efforts to have a balanced approach, fed by advanced research that was accommodative of environmental implications and sensitive to citizen-participation at the grassroots level, for stable waste-management to be achieved.

According to Gupta and Gangopadhyay, the huge quantities of liquid and solid waste generated by major urban centres have to be effectively managed and disposed.<sup>121</sup> It is a huge task to manage both liquid and solid waste, its efficient collection, treatment, segregation and disposal. The challenge for Harare was that in respect of municipal wastewater, the liquid-waste treatment industry had reached a state of near-nonexistence since the onset of the economic crisis in the early 1990s. Closures of the Morton Jaffrey Water Treatment Plant were frequent. One complete shutdown of the Plant said to allow major rehabilitation works occurred from Friday, 29 January at 14:00 hours to Monday, 1 February 2016 at 09:00 hours. Rehabilitation (part of the ongoing Harare Water and Sanitation Infrastructure Rehabilitation Programme meant to improve reliability of water supply) involved the installation of valves at the trunk mains to the Central Business District (CBD) and Lochnivar and the repair of leaks at the treatment plant and mains. It meant no water supply in the whole of Harare, Norton, Ruwa, Epworth and Chitungwiza as has become the norm. The same, however, cannot be said for some towns in the country like, Mutare, Gweru and Bulawayo which managed their systems relatively well in the face of economic adversity. The crisis imposed many financial challenges for the Harare Municipality which for its various functions depended to a large extent on central government transfers which rarely increased in proportion to the demographic growth of the city, thus contributing to declining municipal revenues and expenditures in per capita terms.<sup>122</sup> According to Melvor and Tibaijuka this vicious circle continued to translate into a serious erosion of local government capacity when it came to city planning, environmental management and the provision of basic services.<sup>123</sup>

The management of all forms of waste was a critical challenge facing the Harare Municipality in light of inadequate funding for the City Council to cope with its garbage and refuse collection mandate.<sup>124</sup> The main depositories of Harare's solid waste were the Pomona and Golden Quarry open dump sites or landfills.<sup>125</sup> Their location, design, operation and monitoring did not always ensure compliance with the MEWC-Environmental Management Agency regulations.<sup>126</sup> The State agency (EMA) was the major environmental policy organ in

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<sup>121</sup> Rahul Gupta and Sumita Gupta Gangopadhyay, 'Peri-Urban Agriculture and Aquaculture', *Economic and Political Weekly* 41, 18 (2006): 1757-1760.

<sup>122</sup> The work of the city municipality was hampered by financial problems.

<sup>123</sup> C. Melvor, 'Do Not Look Down on Us: Child Researchers Investigate Informal Settlements in Zimbabwe', *PLA Notes* 42 (2001): 34-38; A. K. Tibaijuka, *Report of the Fact-Finding Mission to Zimbabwe to Assess the Scope and Impact of Operation Murambatsvina by the UN Special Envoy on Human Settlement Issues in Zimbabwe* (New York: UN, 2005).

<sup>124</sup> Due to financial constraints the provision of essential services like refuse collection and disposal were severely undermined. See Practical Action Southern Africa, 'Proceedings of the Emerging Issues in Urban Waste Management Workshop' (Harare: Practical Action Southern Africa, 2006).

<sup>125</sup> Zimbabwe's landfills and transfer stations do not accept liquid waste of any type. A guide for landfill waste-acceptance criteria shows that bulk liquids are not suitable for disposal to any class of landfill because they increase the volume of leachate generated and requiring treatment and/or disposal; can result in increased odour nuisance; and can reduce the stability of the refuse mass under certain conditions. For sound liquid waste-disposal systems designed with built-in costs for the USA see Haynes and Grubbs, *Conservation of Fresh-Water Resources by Deep-Well Disposal of Liquid Wastes*.

<sup>126</sup> GoZ, *Environmental Management Agency Act*.

Zimbabwe. In Harare there were no open dumps for liquid wastes as such wastes were conveyed through sewer pipes as the main disposal method. This method posed a health risk with the implosion of pipes. It influenced calls for proper waste-disposal information-management in the capital in light of leakages from old or broken piping (some of which have been replaced) and the layout of sewer and potable water lines in close proximity to each other. For Sood, open dump sites only have the potential to significantly pollute groundwater sources when liquid-waste and rainwater infiltrated the solid refuse.<sup>127</sup> Water percolation leads to the absorption of hazardous chemicals and micro-organisms generated by rotting matter. The uncontrolled discharge of liquid formed in solid waste dumps (leachate) contaminated both surface and groundwater resources thereby causing environmental and public health risks. The groundwater in the area and adjoining ones was, therefore, generally unsafe for domestic use. Education of society involving civic groups such as residents associations, as a result, serves as a platform for the exchange of information, ideas, experiences, lessons learned and best practices in liquid-waste management. Harare may have been unsuccessful in addressing the challenge of liquid waste and wastewater, but its citizens were committed to sharing information with others as a way to take what they had learned beyond the city to other urban centres in the country sharing similar risks. Having studied the potential of liquid-waste to cause environmental harm, one can agree that waste education and awareness in pre-schools, schools and tertiary institutions for attitude, let alone behaviour change was vital.

## Conclusion

Based on the foregoing analysis of liquid-waste in post-colonial Zimbabwe, education or information-dissemination on environmental pollution has management and policy-level implications. The article has provided an analysis of liquid-waste management in Zimbabwe spanning 36 years, noting how the effectiveness of regulatory systems has been undermined by lack of due consideration for citizen capacity to access and comprehend information. In this, the article presents a number of recommendations tendered, but stresses the importance of driving information dissemination and education campaigns for greater uptake and implementation. The impact of waste on society was big and it called for coordination between people and the government at both levels. Circumvention of citizens and civic society was counterproductive. The recognition by the *National Water Policy* of 2013 that the quality and condition of all water resources in Zimbabwe were fast deteriorating due to pollution was plausible. Nonetheless, beyond this it was essential to address the disjuncture between people and politicians in line with educational-information which focused on the management of liquid-waste from trans-disciplinary environmental, economic, political, social and technical premises. The extent to which Greater Harare's liquid-waste affected surface and groundwater resources was, therefore, a major concern for the city, but the inadequacy of formal or informal educational data/information on the topic was even more worrying.

With the exception of the limited published sources and government-generated documents (e.g. statutory instruments) in existence, the topic clearly left glaring information and

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<sup>127</sup> D. Sood, "Solid Waste Management Study for Freetown, Sierra Leone", *Component Design for the World Bank, Draft Report Project No. P078389* (Great Falls: Virginia 22066, USA, 2004).

knowledge-inadequacies requiring filling in order to take waste-management to a level where the growing environmental/ecological-crisis was prevented. The gap in information and the differences between theories, practices and attitudes may be plugged (closed) by eliminating preventable contradictions between the various socio-political stakeholders discussed in this paper who ideally should all be working together towards controlling liquid-waste and other wastes. The blame-game and the golden-age narrative which cast humans as helpless onlookers rather than primary agents of change should be over. Education and apt information-dissemination techniques about liquid-waste and its hazardous effects on the environment give society the much-needed agency. Going forward, this then marks a crucial confluence between the three major issues discussed in the paper, that is, the importance of un-circumvented citizen-engagement, astute management or control of easy-to-use liquid-waste information/knowledge for awareness raising and effective environmental policy-formulation.