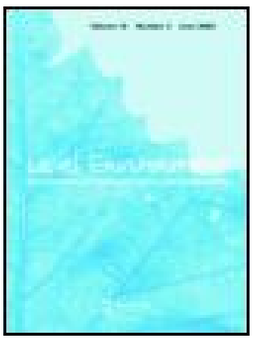

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Some happy, others sad: exploring environmental justice in solid waste management in Kinshasa, The Democratic Republic of Congo

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ABSTRACT

This paper explores the concept of environmental justice (EJ) in solid waste management (SWM) in Kinshasa, the Democratic Republic of Congo (DRC). It evaluates the extent to which EJ occurs in SWM and discusses the factors accounting for this state of affairs. The paper examines the relevant theoretical framework(s) and mechanisms that would facilitate the attainment of EJ in Kinshasa. It is argued that solid waste (SW) often ends up in the poorest and least powerful communities in the cities of the DRC. A qualitative research methodology, which includes exhaustive critical review of the literature, system analysis, reflections from best practices through case studies and discussion with stakeholders, was used for this study. Findings revealed that SWM in Kinshasa is a duty entrusted to publicly-funded municipal authorities. There are evidences of a clear divide between the rich and poor neighbourhoods in the manner SW is managed. This is an inequality that has only recently begun to be recognised as injustice practices in SWM. It is argued that a politico-cultural mechanism on remedying SWM inequities could enable changes that will address EJ in Kinshasa. Such a solution will go directly against the prevailing notion "some happy, others sad".

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Cultural theory; environmental justice; some happy and others sad; social solidarities; solid waste management

1. Introduction

The idea of "some happy, others sad" can be articulated in environmental justice (EJ) discourse as the reaction to perceived inequities in service delivery, and the undue placement of environmental burdens on the poor. Environmental injustice occurs in many poor cities, particularly in sub-Saharan Africa. The EJ discussions initially began in the late 1970s in the USA, where the distribution of negative urban environmental burdens was highly uneven and driven on racial lines (Pollock and Vittes 1996, Kubanza and Simatele 2015). As a result, solid waste (SW) gradually started to receive governmental attention in the USA when the resource conservation and recovery act was launched (Cointreau-Levine 1994). The principle behind this law was the upgrade of solid and hazardous waste management technologies and practices in the USA (Cointreau-Levine 1994). Since then, a gradual development in technology has contributed to the refinement of the procedures necessary to lessen environmental pollution (EP) and the human health effects related to SW (Cointreau-Levine 1994). Yet, as early as the eighteen century, human beings have exploited the resources of the earth in order to survive (see Filemon and Uriarte 2008). At the same time, they have utilised the natural environment for the disposal of SW generated by their activities. The amount of SW

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generated was relatively small and the available space for the assimilation of SW was large; thus, during that time, the disposal of human and other waste presented no problem (Filemon and Uriarte 2008). Solid waste management (SWM) started to become a problem only when people began living together in communities, groups, tribes and villages (Filemon and Uriarte 2008). As communities grew and expanded, the land surrounding them could no longer assimilate the SW generated by their activities and serious environmental and health problems began to appear. In this respect, the need to manage the accumulating SW became apparent and different communities started to find various ways and means to dispose of their SW in a manner acceptable to the affected environment (Filemon and Uriarte 2008).

SW is seen as one of the most conspicuous environmental problems facing the urbanising world. It has been argued that SW is an issue that continues to haunt civilisation by increasingly threatening both the environment and the social order (Diaz 1993). The longer it takes to effectively address the problem, the greater and more challenging it becomes (Noel 2006). Diaz (1993, p. 3) argues that "nature is not affected by rationalisations". Therefore, decisive and comprehensive actions need to be taken in order to avoid irreversible environmental damage. It is generally accepted that the natural assimilative capacity of the environment to absorb SW has considerably diminished over time, while SW production is increasing exponentially (Noel 2006). The belief that "the biosphere has the capacity to transform many wastes over time, either into harmless products or nutrients which can be reused" is being vigorously challenged (Wilson 1981, p. 1). Moreover, as a result of globalisation, which advocates individualism, marketisation, capitalism and expansion of goods and services between nations, SW similarly breaks down all geographical boundaries to defy the proximity principle that ties together waste disposal and waste generation (see Blumberg and Gottleb 1989, Barr 2002, Buclet 2002). SW should, therefore, be disposed of where it is produced. Otherwise, it is unfair to make a whole community pay for products enjoyed by only a few. The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 provided an excellent international forum to debate the issue of waste management. The outcomes of this forum have provided a framework for environmentally sound policy by setting out waste as a key problem to deal with in the pursuit of worldwide sustainable development (UNCED 1992, Barr 2002). SWM becomes a major issue that should be addressed in order to maintain the quality of the earth's environment and to achieve environmentally sound sustainable development (Grover 2000).

However, the urban SWM system in the cities of the Democratic Republic of Congo (DRC), particularly in Kinshasa, was regulated by the country's health code over the past few decades (Mbumba 1982, Maximy 1984). This code was later supported by an interdepartmental decree, which set the standards of protection of urban sanitation and SWM in Kinshasa. These policies were intended to contain the spread of endemic diseases and other communicable diseases in Kinshasa; witnesses suggested that some diseases were actually eradicated because of such interventions (Mbumba 1982, Maximy 1984, Pain 1984, Kubanza 2006). However, it is apparent that a decline in environmental standards in the city was observed after the mission of urban SWM was conferred on the Ministry in charge of Environmental Affairs (Pain 1984, Kubanza 2006, Tshishimbi 2006) in 1975. Subsequently, Kinshasa experienced accelerated environmental deterioration, particularly since 1990s (Tshishimbi 2006). Several factors including civil wars, armed conflicts and more importantly the 1991 and 1993 looting that disrupted social, political and economic functioning of the country came into play (Kubanza 2006, Tshishimbi 2006). These factors combined with demographic pressures in the inner city of Kinshasa and the illegal occupation of the geographic areas under the helpless gaze of public authority, if not in its complicity, further exacerbated the declining environmental standard and SWM in the city (BEAU 1996, Wemby 2002, Tshishimbi 2006). This failure of the sanitation policy and SWM standard has had ripple effects on the pollution of the urban environment in Kinshasa.

Most of the people in urban low-income neighbourhoods are apparently living with garbage and piles of refuse, although an operation called "Kinshasa-bopeto" (i.e. Kinshasa-cleaned up), was announced in 2005 with aplomb and briskly. All this is to the chagrin of urban and municipal authorities, which many believe have an almost naive complicity of the population (Tshishimbi 2006,

Kubanza 2010). However, a scholar like Tshishimbi (2006) denounced the operation and reported that although the operation was presented as a plausible alternative solution to the state of unhealthiness and unplanned urbanisation (i.e. uncontrolled construction), it eventually ended up failing dismally. Despite its good intent, the practice of the demolition of some lawless homes built along the streets or public places under the cleaning-up operation has resulted in more unhealthy conditions in the city.[1] The reason for this condition might be attributed to the absence of a rational approach to the management of the problem, if not the fact that this problem was attacked upstream and not downstream.

It is also important to note that the SW problem in Kinshasa has been made worse by an increase in the urban population. The population has increased from 400,000 in the 1990s to more than 6.0 million people in 2008 and it is now estimated to have reached 10 million in 2014 (Kubanza and Simatele 2015). This demographic pressure (with a population density of about 1011 persons/km^2) produces a huge amount of SW per day (13,227.73 tons/day) in the city. Besides, there is an issue of uncontrolled construction without permits or respect of urban standards, which generates additional SWs which remain poorly disposed of. Consequently, SW litters the roads, sometimes piling as high as the plot level, which at times causes the obstruction of the water drainage system where the community members also dispose of garbage illegally (Kubanza 2006, 2010, Tshishimbi 2006). Further, according to Kubanza and Simatele (2015) and supported by Simatele and Etambakonga (2015), SWM in Kinshasa has further been complicated by the increased rural–urban migration and operation of most of the city councils under huge financial constraints. Thus, the disposal and management system to maintain a healthy environment in the city appears to be a challenge in the current scenario, which in essence threatens the healthy existence of the city (Kubanza 2006, 2010, Tshishimbi 2006). In other words, this situation has led Kinshasa to lose its ecological heritage and identity due to enormous environmental problems and an inappropriate (effectively non-existent) SWM and disposal mechanism.

In addition to the mounting SW and related environmental problems, the city also grapples with socio-spatial inequalities in the distribution of the waste burdens as evidenced from Figure 1 (Schubeler *et al.* 1996, Petts 2001, 2005). In an unequal society like in Kinshasa, undesirable wastes often end up in the poorest and least powerful communities. Consequently, the urban poor residents of the city live closer to potential SW-induced pollution sources, thereby making them susceptible to various health hazards, while the rich people enjoy relatively better garbage-free neighbourhoods. This practice as observed by Petts (2001, 2005) is unfair, unjust and a breach of social and EJ. He argued that services for waste removal need to be fairly and equitably provided for all residents of the cities, irrespective of class, ethnicity or culture (Petts 2001, 2005). Furthermore, social and EJ in its different manifestations would require the organisers (i.e. urban managers) of SW disposal service to ensure fairness and equity in providing the service to the various segments of the populations. In other words, municipal authorities responsible for the organisation of SW disposal have a social responsibility to ensure that all residents of a city, irrespective of social class, ethnicity or gender, receive fair, equitable and adequate service for waste removal and disposal to protect them from the nuisances associated with SW.

However, due to weak local government institutions, lack of political will and financial difficulties faced by many local government authorities, SWM has increasingly become a remit of non-governmental organisations (NGOs), community-based organisations (CBOs) and private companies who have taken on the urban challenges (Tukahirwa *et al.* 2010). Although the involvement of NGOs, CBOs and other stakeholders in SWM in Congolese cities is not coordinated by local governments, the participation of these stakeholders is important (Tukahirwa *et al.* 2010) for the constructive engagement, collaboration and cooperative management to meet the challenge and attain environmentally justifiable and sustainable SWM in the city. Thus, under this premise, the objective of the investigation is to explore the concept of EJ in the context of SWM in Kinshasa, DRC; to examine the relevant theoretical framework(s) and mechanism(s) that would facilitate the attainment of EJ in Kinshasa and to proffer alternative solutions based on sociopolitical and governance mechanisms

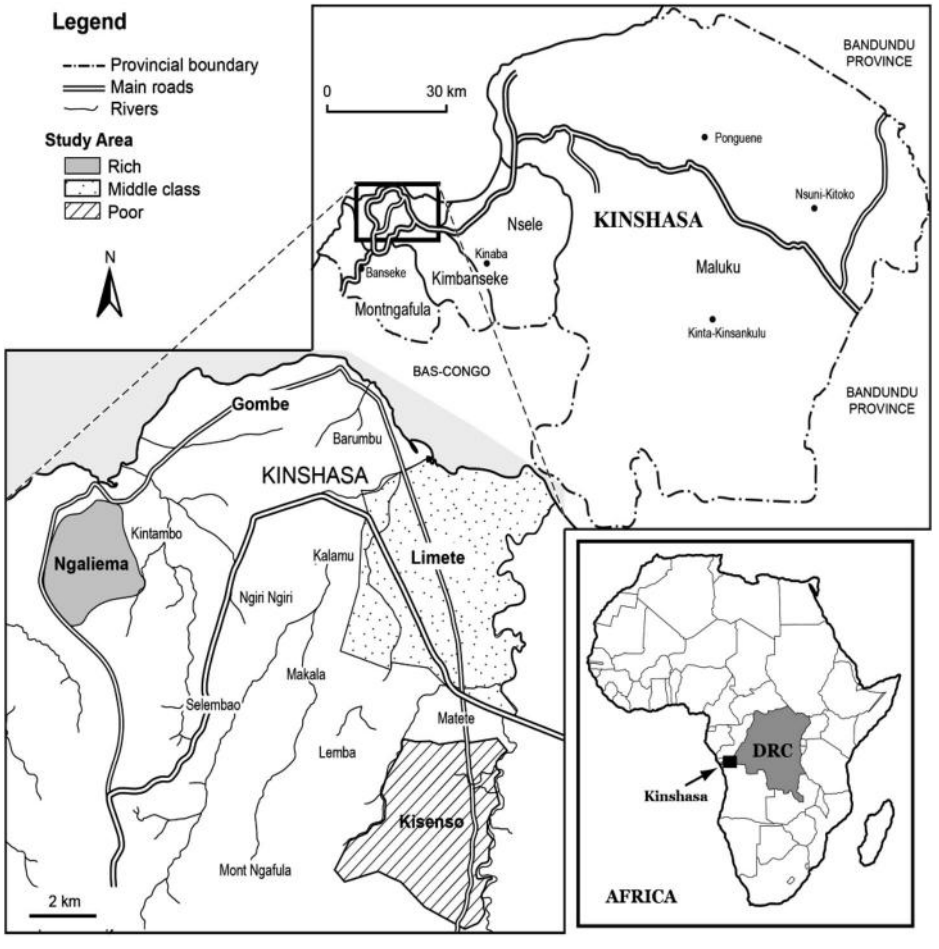

Figure 1. Location of Ngaliema, Limete and Kisenso in Kinshasa. Source: Cartography Unit (2015), School of Geography and Environmental Studies, University of Witwatersrand, South Africa, and field survey (2015).

drawing upon the application of cultural theory (CT), system thinking and system dynamics (SD) modelling principles.

The paper starts with an introduction that elucidates the scenario of SWM and EJ in SWM, followed by the research approach or method used for the study. The remaining sections provide a brief explanation of the theories of environmental injustice, including SWM challenges in Kinshasa, discourses from two case studies (Kampala and Yaoundé) as a response to lessen environmental injustice and SWM challenges in Kinshasa and CT-inspired diagnosis and framing of environmental injustice in Kinshasa. Finally, the paper analyses the Kinshasa case study and generates perspectives of future scenarios based on systems analysis-inspired SD mechanisms to elucidate plausible scenarios to attain EJ in SWM in Kinshasa. The conclusion highlighted that a politico-cultural mechanism for remedying SWM inequities could foster changes that will address EJ in Kinshasa.

1.1. Research approach

A qualitative research approach was followed in this study. A critical review of the literature, an appraisal of two comparative case studies (Kampala, Uganda, and Yaoundé, Cameroon) and an in-depth analysis of archival information were conducted to develop a framework for EJ in SWM.

Research papers referenced in previously published research papers and reviews were critically assessed and analysed. Search engines and platforms such as Scopus and Google Scholar were used for the search of relevant articles for further references by using a number of keywords combinations ("SWM", "EJ", "CT", "landfill", etc.). More than 90 papers were reviewed and analysed from the global level. Some of these peer-reviewed papers were European, including global south papers. All of them were published either in the international journals or in the local journals, except for some research reports. The review process was aimed at highlighting the injustice and inequities in SWM and how new approaches can be developed for better waste management practices in Kinshasa, the DRC. The review process of archival records and existing literature also involved a search of the literature using the library database of different Universities in the DRC and South Africa (i.e. University of Kinshasa, Kinshasa Protestant University, Witwatersrand, Pretoria, Johannesburg, Cape Town, KwaZulu Natal and Stellenbosch). After initial filtration and evaluations of the literature on SWM and EJ-related issues, a total number of 110 peer-reviewed published research articles were comprehensively reviewed and analysed.

Archival documents from the municipal councils in Kinshasa and authentic organisations at the national level and newspapers stories were analysed during the period from January 2013 to September 2015. To complement the literature review, a field survey was conducted among the stakeholders in the city between 4November 2013 and 15 September 2015 through semi-structured qualitative discussions. Besides, discussions with city officials, such as councillors, city planners and SW managers, in a reflexive manner were conducted through non-structured interviews during the same period. These officials were drawn from the local municipality in Kinshasa, the city authorities in the Department of Environmental Affairs/City Governance, Local Government and Housing using a snowball technique. Other organisations include NGOs and CBOs whose remit include, among other things, SWM. The choice of these research actors was influenced by the roles that they play in SWM in Kinshasa. A total of 20 local government officials, NGOs and CBOs were interviewed in Kinshasa. Discussions with these stakeholders were conducted through a field survey and the stakeholders were selected purposively through a snowballing approach in order to get a wide range of opinions and perspectives. They provided a forum to analyse the severity of the current SWM crisis, and to engage in discourses about the plausible strategies that should be put in place to regulate the system and address the problem. The discussions were narrowed to the policies that should be enacted and the necessary steps that should be taken in order to design a comprehensive and integrated SWM system in Kinshasa. They shed light on several issues such as governance, the politicisation of the SWM sector, the role of private companies, financial constraints, community behavioural patterns and involvement in SWM.

In addition to discussions with stakeholders, a total of 60 residents were interviewed at the grassroots level and more specifically in the municipalities of Ngaliema, Limete and Kisenso in Kinshasa. In order to select the participants from the three municipalities, a random sampling method was applied to every street and then an interval of three houses was applied across the study sites (Ngaliema, Limete and Kisenso). Every first and third houses on each street were selected and surveyed. Moreover, in complexes with several households, at least two households in each complex were randomly selected and a questionnaire was distributed to the heads of the households. Despite these sampling methods, some homeowners refused to participate in the survey and the researcher had to move to the next closest household. Figure 1 presents the location of the study area.

As shown in Figure 1, the study was carried out with the local community members in the selected sites (*Ngaliema*, *Limete* and *Kisenso*). The choice of these three sites was justified by the observations that the urban low-income communities in most parts of Kinshasa face the consequences of poor SWM and those of the siting of environmental burden onto their local environment. This situation stemmed from poor and harmful living conditions for most of the urban poor residents in Kinshasa. The choice of these three study areas was important to assess variations in the quality of SWM services provided for residents in different socio-economic communities. As can been seen, the local residents surveyed belonged to both rich and poor classes, in order to avoid any bias based on class.

Furthermore, the investigation was underpinned by the CT framework and SD-inspired causal feedback principles to develop policy intervention mechanism. The CT framework is observed to be particularly suited to the analysis of EJ in SWM and contending ideas of fairness (Beck, *et al*. 2013). The system thinking and SD principle have the ability to elicit causal feedback relationships among the controlling variables, which enable policy interventions (Sterman 2000), and thus are found to be relevant for a complex phenomenon such as SWM in Kinshasa. Three main frames of reference were adopted in approaching the causal relationships existing in solid waste management in the city. These frames of reference include the socio-economic, environmental and technological contexts for larger inclusivity as well as to avoid variations and isolation in the cause and effect relationships observed in SWM.

2. Theoretical discourse on EJ in SWM and lessons from case studies

2.1. Theoretical perspectives on EJ

Academic reflections on the concept "EJ" initially concentrated on the existence of inequity in the distribution of environmental bads in society (Schlosberg and Carruthers 2010). Dominelli (2014) argues that the term "EJ" was used to illustrate that some communities received more environmental risks than others. Mebane (2013) and Seymour (2012) are of the view that those environmental bads were simply another example of social injustice in the city. According to Bullard (1990, 2000), exposure to such risks and bads are not limited to only poor communities; rather, both underprivileged class and race are affected by it. Moreover, equity was a key element in the initial consideration of environmental injustice (Bullard 1990, 2000). However, the early focus on inequity quickly expanded to include a variety of issues that range from the generally unequal nature of environmental protection to the distribution of an array of environmental goods as well as bads. Besides, some scholars argue that despite all the focus on the reality of the inequities, EJ was never only about such mal-distributions (Seymour 2012, Mebane 2013). Thus, the study and theorising of EJ encompass three key areas: the definition of "environment", the factors behind the production of environmental injustice and the pluralist conception of the "justice" of EJ (Seymour 2012, Mebane 2013).

From its initial concept, environment being a wilderness and the "big outside" has been shifted to a much more broadly defined concept as "where we live, work, and play" (Bullard [1990] 2000, Schlosberg and Carruthers 2010). The importance of this shift cannot be understated as this aspect of environment was woefully underemphasised by major environmental organisations, particularly in the USA (Dominelli 2014). Although EJ may have been originally focused on the inequity of the distribution of toxics and hazardous waste in the USA, it has currently moved far beyond its original context (the USA). It advocates bringing attention to the environmental conditions in which people are immersed in their everyday lives (Walker 2009).

According to Leonard and Pelling (2010), the shift is a long-standing characteristic of the EJ movement. The various tributaries of this movement included the civil rights and anti-toxics movements, indigenous rights movements, the labour movement (including farm labour, occupational health and safety, and some industrial unions) and traditional environmentalists (Bullard [1990] 2000, Dodds and Hopwood 2006). Schlosberg and Carruthers (2010) added the solidarity movement and the more general social and economic justice movements to it. Further, immigrant rights groups and urban environmental and smart growth movements, climate justice as well as local foods and food justice movements can also be easily added to the list.

Thus, it is no exaggeration to argue that there has been a push to globalise EJ as an explanatory discourse. There are two distinct moments to the expansion of the EJ discourse: the application of the frame to movements in a variety of countries, and the examination of the globalised and transnational nature of EJ movements and discourse. Such developments have brought both horizontal diffusion of EJ ideas, meanings and framings, and the vertical extension of an EJ frame beyond borders, and into relations between countries and truly global issues (Walker 2009, Leonard and Pelling 2010).

However, based on the experiences from different countries, such as waste management in the UK, postcolonial EJ in India, agrarian change in Sumatra, nuclear waste in Taiwan, salmon farming in Canada, gold mining in Ghana, oil politics in Ecuador, indigenous water rights in Australia, wind farm development in Wales, pesticide drift in California, energy politics in Mexico and many more (Walker 2009, Leonard and Pelling 2010, Schlosberg and Carruthers 2010), arguments have emerged that the applications of the theoretical framework of EJ have been more broad than the way it is perceived. Besides, a plethora of EJ focused on issues and movements found in Latin America, South Africa, Canada and the ex-Soviet Union. Clearly, the discourse of EJ has expanded horizontally and vertically, and has been engaged by both activists and academics involved in issues across the globe.

Although the EJ discourse has expanded across the globe, only a limited number of countries in Africa such as Angola, Cameroon, Ghana, Mozambique, Nigeria, South Africa, Tanzania, and Zambia have adopted the term "EJ" in their policies (Fan 2006, Hillman 2006, Walker 2009). Moreover, EJ is yet to become a policy priority for most of the sub-Saharan African countries (Scott and Oelofse 2005, Myers 2008). Many barriers such as the precarious plight of the sociocultural, political, and economic environments in which civil society operates; lack of public participation in national and local development initiatives; unequal distribution of power; intimidation of the civil society activists; and ruling of elites are found against the creation of a strong EJ discourse in sub-Saharan African countries (Scott and Oelofse 2005, Myers 2008). However, political will and poor institutional set-up remain as the paramount in sub-Saharan African cities. Besides, the urban development and planning policy, particularly in sub-Saharan African cities, hardly raises and addresses the challenges of urban EJ (Patel 2009, Kubanza and Simatele 2015). The DRC is no exception from the above reality.

2.2. Environmental injustices in the DRC and Kinshasa

Two fundamental aspects of sustainable development can be considered as the starting point to conceptualise EJ suitable for the DRC in general and Kinshasa in particular. First, the basic needs of humanity (food, clothing, shelter, and employment) must be met. The other is that the limits to development are not absolute but are imposed by present states of technology and social organisation and by their impacts upon environmental resources and upon the biosphere's ability to absorb the effect of human activities (Bindu 2006). The first aspect, which is crucial for the DRC's people and for its environment, should inform the meaning of EJ in Kinshasa. Equity is at the heart of such a concept (Field 2006). It includes the notions of transformation and redress because basic needs cannot be met if there is no transformation – in the sense of addressing the deep fault line that divides human society between the rich and the poor or redress of the harm that has already been caused, the cost of which is being borne unequally (Field 2006).

The DRC has been documented as one of the countries that have experienced instability since its political independence in 1960 from Belgium. Although concerted efforts have been made by the Government to include environmental issues and natural resource management in development and planning policies, environmental provisions have found to be incorporated on the basis of motivations that largely revolve around benefiting selected and powerful political and economic actors (Kihangi 2012). So, an argument has lately emerged that only if the biases stemming from these motivations are eliminated, environmental management in Kinshasa and in the DRC as a whole will come in line with the principles of EJ. However, some argue that the stubborn persistence of the state, the presence of state agents and the institutionalisation of negotiation processes remain as barriers to ease the challenge (Trefon 2009, Kihangi 2012).

2.2.1. Environmental injustice in the context of SWM in Kinshasa

Kinshasa is considered as one of the dirtiest cities on the planet. It seems that the city is emerging in two contrasting ways. On one side, it offers an image of a city built respecting the urban standards. On the other side, it illustrates an example of pseudo-urbanisation with poorly designed avenues,

streets and built infrastructure. For example, streets, sidewalks, green spaces and gutters do exist, but have been transformed into dumpsites. The basic infrastructure for SWM is poorly maintained (Kubanza 2006, Tshishimbi 2006, Kubanza and Simatele 2015).

SW has been observed to be central in polluting the air and water, and the major cause of the outbreak and spreading of both endemic and epidemic diseases in the city (BEAU 1996, Wemby 2002, Kubanza and Simatele 2015). Diseases such as malaria, polio, cholera and tuberculosis, once considered to be under control or eradicated, have resurfaced and threaten the health of people, specifically the poor (Kubanza 2006, 2010, Tshishimbi 2006). As a result, the statement of pride "Kinshasa the beautiful" used by the Congolese seems to become a fairy tale for the present generation (Kubanza 2006, Tshishimbi 2006). Furthermore, the uncontrolled urban growth and rapid increase in human activities have exacerbated the SW generation, disposal and management challenges in the city. A senior specialist aged between 30 and 35 years in the department of SWM, for example, commented:

> The city currently generates large amounts of solid waste (13227.79 tons/day), which go beyond the management capabilities of the existing waste management system. We have limited budget and equipment to provide adequate and equitable service to the entire community. (Personal Communication 2015)[2]

From the above comment, it can be argued that since many municipal authorities are struggling to provide the most basic services within their jurisdictions, over 80% of the population does not have home collection services in the city (Din and Cohen 2013, Mangenda *et al.* 2014). Majority of the households store their waste in open containers and plastic bags. Apparently one- to two-thirds of the SW generated remain uncollected (Dougall and McGahey 2003, Nsokimieno 2010). The uncollected waste, often mixed with human and animal excreta, is dumped indiscriminately in the streets. Consequently, the clogged drains and infested streets contribute to flooding, breeding of insects and pathogenic organisms and rodent vectors, which spread infectious diseases (Dougall and MeGahey 2003, Nsokimieno 2010, Din and Cohen 2013). Thus, such poor handling and disposal of the SW pose public health risks and have become major causes of the EP in the city. Also, inadequate provision of SWM facilities has resulted in indiscriminate disposal and unsanitary environments. Thus, two local leaders from the municipalities of Kisenso and Limete aged between 40 and 45 years, for instance, commented:

> We have been living in Kisenso and Limete over the last 30 years and have never seen municipal services pick up the wastes generated in our locality, except some local NGOs that try to keep some main street clean. They work every last Saturday of the month from 7h00am to 10h00am. We also realise that most wastes collected in the city are dumped on available land in low-income urban neighbourhoods in an uncontrolled manner, although majority of solid waste is generated by the rich. Why? (Personal Communication 2015)[3]

In view of the above comments, it can be argued that the poor neighbourhoods in Kinshasa either do not have access to any SW service or receive very little services on an erratic basis if at all offered by the municipalities, although majority of the people of the city live in those areas (Kindornay and Ron 2012, Simatele et, al. 2012b, Ako et, al. 2013). However, another resident of Kisenso aged between 35 and 38 years added:

> We do not understand why the municipal authorities do not provide dustbins to the residents and why they don't collect the wastes generated in the city? Why do most solid waste services available tend to be restricted only to wealthy and rich neighbourhoods (those where groups of individuals with control of either state/or national and economic power reside)? We found ourselves abandoned from solid waste management and suffer from all kind of infectious diseases. (Personal Communication 2015)[4]

The above questions indicate that clear injustice and inequality are observed between the urban rich and poor neighbourhoods in Kinshasa. It is no exaggeration to argue that most of the poor people live in an unhealthy urban environment infested with SW and consequent diseases, which has already been exacerbated by challenges such as poverty, hunger, social exclusion, poor housing conditions, conflicts and civil wars (Kubanza 2006, 2010, Tshishimbi 2006). Figure 2, for example, explicates and demonstrates injustice that exists in SW collection in Kinshasa.

Figure 2. Injustice in SW collection in Kinshasa. Taken by Serge Kubanza, 2015.

As can be seen from Figure 2, the urban poor in most parts of Kinshasa bear the costs of poor SWM as well as the burden of environmental consequences. This situation resulted from poor and harmful living conditions for most of the poor residents in Kinshasa. It is clear from Figure 2 that SWM is a challenge for the poor in Kinshasa. This challenge has further resulted in poor living conditions, lack of water and an accumulation of SW which has engendered many other problems in urban poor areas. The worst affected are the poor communities who receive little or no socio-economic services from the local government in the city of Kinshasa (Kubanza and Simatele 2015). Furthermore, the poor do not have any say or effective involvement in the decision-making processes to alleviate the problems and issues that affect them. Paradoxically, as observed from the above comments, it seems that the rich urban neighbourhoods have a significant say in decision-making processes.[5] They enjoy a cleaner environment and better health and sanitation facilities than those in urban poor neighbourhoods.[6] This situation occurs despite the fact that SW collection and management is a responsibility entrusted to the publicly funded municipal authorities, which should extended the services and facilities to all areas of Kinshasa in a just and equitable manner. However, two local residents of the municipality of Ngaliema aged between 36 and 44 years commented:

> We have been living in Ngaliema over the past 25 years and our municipality has always been considered as the cleanest of all the municipalities of the city. The problem is that we organise ourselves to pay the private service to pick up the garbage in our municipality. We also have some urban authorities and businessmen who live in our municipality. Their presence plays a pivotal role in wastes collection in our area. Some residents of Kinshasa say that the solid waste service favours only our neighbourhood but the truth of the matter is that we use the private sector to collect our wastes for a fee. (Personal Communication 2015)[7]

From the above observations, it can be argued that SWM is a challenge all over the city of Kinshasa. Despite the fact that the urban authorities live in rich urban neighbourhoods and are involved in the decision-making process, they also organise themselves to use the private sector to collect the wastes generated in their neighbourhoods for a fee, something that the urban poor cannot afford due to their social status and lack of financial revenue.

2.2.2. Governance systems for SWM in Kinshasa

Within the city of Kinshasa, the governance of SW rests with the National Sanitation Programme (NSP), the Kinshasa City Council and the 24 municipalities that make up the city of Kinshasa, as well as a number of NGOs and individuals who have arisen due to deficiencies in the formal structures of SWM (see Simatele and Etambakonga 2015). Although SWM activities have been over-centralised by the NSP and the City Council for many years in Kinshasa, these activities have often tended to focus on rich neighbourhoods at the expense of poor urban settlements (Kubanza and Simatele 2015). This state of affairs reflects a SW governance system that is highly influenced by those with the power to influence urban processes and to determine the nature of service delivery in the city. In a way therefore, it can be argued, as

observed by Nzuzi (2008), that the governance structure in SWM in Kinshasa is one that revolves around taking care of the needs of the more powerful people in society.

The current deficiencies in the institutional set-up for SWM, coupled with the non-inclusion of service delivery for waste management in the poorer neighbourhoods, have combined to result in the emergency of new actors within waste management. Simatele and Etambakong (2015) observe that the gap that has been created by institutional weakness in SWM has given rise to increased participation in SWM by a number of NGOs, individuals as well as CBOs. Despite the presence of these actors, Din and Cohen (2013) lament the absence of the physical infrastructure and facilities for efficient management of SW in Kinshasa. They observe that a significant amount of the waste that is collected in some selected municipalities is usually dumped in neighbourhoods where the majority of the poor people reside (Din and Cohen 2013). Mangenda *et al.* (2014) are of the view that only four landfill sites (in the study sites) are gazetted and legalised, which can only absorb about 10% of the generated waste. This state of affairs reveals major challenges in SWM practices in Kinshasa and it would not be an exaggeration to argue that the city of Kinshasa, like many other sub-Saharan African cities, does not have a comprehensive and coherent broad-based-approach to SWM (Misilu *et al.* 2010, Mangenda *et al.* 2014).

Despite the lack of a broad-based management strategy for SW, the city of Kinshasa has developed a legal framework through which effective SWM can be pursued (see Simatele and Etambkonga 2015). The Congolese positive law, for example, provides specific management methods for the administration of different types of wastes (Din and Cohen 2013, Mangenda *et al.* 2014). Mangenda *et al.* (2014), for example, identify four categories of waste management as provided by law and these include the management of liquid waste, SW, organic and gas wastes. The legal framework stipulates the manner and mechanisms through which each of these wastes can effectively and efficiently be managed in order to reduce earth and atmospheric pollution (Mangenda *et al.* 2014). In order to ensure efficiency in the management of waste, the Congolese government has established and entrusted each of the waste category to specialised institutions among which include the Department of Environment, Nature Conservation and Tourism (DENCT); the NSP and the Office of Roads and Drainages (ORD) (Din and Cohen 2013, Mangenda *et al.* 2014). The DENCT, for example, is responsible for promoting and coordinating all activities related to the environment and conservation of nature. The NSP is responsible for all activities related to urban sanitation, and the control of disease vectors, the disposal of SW and cleaning of roads, while the ORD is responsible for erosion control and water drainage (Din and Cohen 2013).

In addition to this institutional framework, Tshishimbi (2006) observes that a number of strategical operations to manage SW in the city of Kinshasa were launched, and they include "l'opération salongo" (i.e. clean-up operation) which was initiated by the fairy President Mobutu Sese Seko; "l'opération Kin-la-belle" (i.e. Kinshasa the beautiful operation) launched under the reign of Governors Théophile Mbemba (August 1997–February 2001) and Christophe Muzungu (March–December 2001); "Operation Coup de Point or Kin Bopeto" initiated by Governor Kimbunda Jean and "l'opération salubrité publique" initiated by Governor Kimbembe Mazunga (2005–2006). Simatele and Etambakonga (2015) observe that despite the effort made through all these strategies, the operations did not work successfully due to the lack of technical know-how, financial resources and comprehensive SWM system. Furthermore, the non-inclusion of local people in participating in decision-making processes on issues that directly affect them contributed to the failure of these operations and institutions to effectively manage SW (Tukahirwa *et al.* 2010, Kubanza and Simatele 2015). In view of these arguments, it can be argued that although the city of Kinshasa seems to have some institutional framework for SWM, there is an urgent need for the city authorities to transfer power, and engage and integrate communities in urban processes rather than sustaining a SWM system over which communities have little control. In order to improve SW services and infrastructure, there is still a need for comprehensive environmental regulations that protect people from undue risk of exposure to environmental threats.

2.3. Two case studies of best practices: Kampala and Yaoundé

SWM is being carried out by using different practices in different cities of the world and across Africa. However, two cities Kampala in Uganda and Yaoundé in Cameroon offer an illustration of best practices to deal with the challenge. These case studies illustrate how context-based best practices in terms of participatory governance system could bring equitable and sustainable solutions in SWM, which could become benchmarks for developing strategies to deal with EJ in SWM in Kinshasa.

2.3.1. Kampala, a case of successful stakeholder partnerships

Kampala is the political capital of Uganda – with an estimated population of about 1,659,600 of inhabitants, which has seen appreciable growth in the last two decades (Tukahirwa *et al.* 2010). About 1500 tonnes of SW is generated daily, and of this, only less than half is collected and taken to the dumping sites (Tukahirwa *et al.* 2010). The SW generated in the city includes 170 tonnes of plastic waste, of which only 2% is collected for recycling (Tukahirwa *et al.* 2010). So, a huge quantity of general and recyclable waste remains uncollected and undisposed. However, the overwhelming quantity of uncollected waste has attracted a number of stakeholders, such as NGOs and CBOs that seek to improve the situation through better collection rates and more recycling. Having recognised the weakness of public authorities in sanitation and SW service delivery, the Kampala City Council resolved to design policy programmes aimed to involve the private sector, CBOs and NGOs in partnerships in SW and sanitation services. Although the partnerships and the forms of collaboration and the level of formalisation vary, it increased the access of the urban poor to basic services such as sanitation and SW management, improved SW and sanitation services as well as created employment for community organisations. The NGOs and CBOs act as new modernising agents, working together with governmental agencies and private companies in upgrading the SWM system. Consequently, an ease in communication among the actors in the decision-making processes and better service delivery in SWM are experienced. This experience proves that one single actor cannot achieve successful SWM, and how local business, NGOs, CBOs and city council together with minimal direct government involvement can successfully meet the challenge. So, there is a need to bring all actors together in the form of partnerships to ensure that adequate and equitable service in SWM is being provided. This partnership paradigm offers a useful framework to understand and study how various actors collaborate and partner in the provisioning of goods in urban areas (Tukahirwa *et al.* 2010).

2.3.2. Yaoundé, a story of Hygiène et Salubrité du Cameroun (hygiene and sanitation in Cameroon)

Yaoundé is the political capital of Cameroon with a population of about 2,440,462 (Parrot *et al.* 2009). Yaoundé's story with regard to SW is no different from that of other cities in Africa (Parrot *et al.* 2009). Population growth is considered as the prime reason for the domestic waste generation rate in Yaoundé (INS 2004) as the SW generation probably follows the same trend. The SW is composed of standard components of domestic waste, garden refuse, commercial waste, dry industrial waste and construction and demolition waste besides the waste generated from farming activities. Garbage bins are considered as the primary infrastructure needed for waste collection and they play a crucial role in the SWM in the city as the wastes collected from the garbage bins were dumped in allotted dump sites in Yaoundé (Parrot *et al.* 2009). Despite the financial, institutional and physical obstacles, the city could be able to achieve significant success in the SWM. It is evident from the fact that the city could be able to achieve 40% collection rate, which is equal to that of Senegal at about twofold less funding (with US $5million). Yaoundé's success is apparently due to the strong presence of public–private partnerships. Several CBOs have been in charge of collection activities in various quarters of the city. The local operator called "Hygiène et Salubrité du Cameroun" (i.e. hygiene and sanitation in Cameroon) played a prime role in developing partnerships with some NGOs and CBOs, and is instrumental in clarifying the respective responsibilities of each

stakeholder. Complementary tasks, such as pre-collection and recycling, are conducted by informal operators or associations in partnership with Hygiène et Salubrité du Cameroun. Local municipalities being aware of the challenges facing the city in terms of SWM work closely with Hygiène et Salubrité du Cameroun (Parrot *et al.* 2009). Besides, households are involved in informal waste management, where poor infrastructure hampers regular waste collection. Thus, Yaoundé presents a mature model of using NGOs and CBOs in partnerships with private companies and the public sector to effectively handle their urban SW.

2.3.3. Lessons learned from the case studies

The two case studies provide evidence that collaboration and partnerships with different stakeholders can assist to resolve the SW challenges and may produce a distinctive form of innovation as well (Tukahirwa *et al.* 2010). Local authority's capacity to enliven the role of stakeholders, such as local community organisations like NGOs and CBOs, international NGOs, private companies and business, and to develop useful partnerships among them is crucial in urban service delivery in this case in SWM and the achievement of EJ. Such a framework could be of relevance to Kinshasa. For example, collaboration between governmental authorities and other concerned agencies, including the private sector, NGOs and CBOs, and international organisations, could assist in effective SWM in Kinshasa through collaborative decision-making, implementation and sharing of environmental burden as against the adoption of western models of highly centralised, advanced technological, costly, unsustainable and fully privatised systems. Also, such collaborations and partnerships are expected to bring ideas to develop and implement intelligent, context-dependent combinations of western systems and local practices. Consequently, it could lead the city to environmental partnerships among the stakeholders to attain EJ in SWM. However, there are challenges in implementing such a framework in Kinshasa. For example, the involvement of NGOs and CBOs has been hampered by, among others, shortage of resources, donor dependencies, central policies that favour the formal large-scale private companies and lack of government recognition in the country. Therefore, for the stakeholders to successfully become partners in the implementation and development of SW services in Kinshasa, a reform of the policy-making process, policies and policy enforcement is necessary. This, in turn, necessitates a further rethinking, which could effectively create a useful collaboration among the various stakeholders to handle the challenges of SWM and attain EJ. Therefore, a CT-inspired mechanism has been argued to suffice the challenge, which is discussed in the following sections.

3. A CT diagnosis and framing of environmental injustice

CT – or "the theory of plural rationality" – has been well documented in the literature (Douglas and Wildavsky 1982, Schwarz and Thompson 1990, Thompson *et al.* 1990, Verweij and Thompson 2006, Thompson 2008). It offers an approach for understanding and resolving the conflicts and disputes that characterise social and environmental policy. Its fourfold forms of social solidarity are able to elucidate different social constructions of nature, physical and human, on which environmental debate is premised. In here CT is applied to the policy stories around SWM and environmental injustice. In this context, the CT refers to "a series of demands or challenges to power-holders in the name of social category that lacks an established political position" (Strut 1987, p. 39). It makes the case for clumsy institutional arrangements that forgo elegance to accommodate the diversity of social solidarities, harnessing contestation to constructive, may be noisy, argumentation but compromises and trade-offs (Thompson 2003). Furthermore, it has the ability to underpin the fundamental sociocultural nature of the complex problem and can help the poor and vulnerable groups in the DRC to deepen their understanding of their reality. It is argued that changes with regard to the social and environmental challenges can occur through individuals' involvement by means of direct actions, and lobbying of the international community and advocating for the affected communities with less opportunity to voice their concern at local, regional, international and transnational levels (Wignaraja 1993, Thompson 2008). These changes also need the contributions of a wide range of activists (NGOs,

civil society organisations (CSOs)), the private sector, policy-makers and the opposition from both inside and outside the country (Thompson 2008).

The society can be grouped under four solidarities – individuals (market forces), hierarchy (the authorities – government), egalitarian (social organisations) and fatalist (common individuals). With respect to SWM and environmental injustice in Kinshasa, these four solidarities can develop their own storylines independent of each other; however, as we will see from the case studies and best practices, at least three solidarities, leaving the fatalist out, can combine together and develop a storyline of mutual interest without compromising much of their own interests. Besides, each solidarity in creating a context that is shaped by its distinctive premises generates a storyline that inevitably contradicts those that are generated by the other solidarities. Yet, since each distils certain elements of experience and wisdom that are missed by the others, and since each provides a clear expression of the way in which a significant portion of the populace feels we should live with one another and with nature, it is important that they all be taken some sort of account of in the policy process.

3.1. The role of stakeholders in the form of social solidarities

The two case studies of Kampala and Yaoundé explicate how different people came to different perceptions of the SW challenges and how they came together to resolve these issues, which in essence underpins the use of the framework of CT and its social solidarities (Thompson *et al.* 1990). The perceptions of all stakeholders (NGOs, CBOs, private companies, Government, academicians, CSOs, etc.) involved in SW discussions in Kampala and Yaoundé can be explained by what social scientist Thompson et al. (1990) has called the "myths of nature", arguing that one perception veers towards exuberance is that of the market (individualists). It sees nature as a source of rich opportunities. Opposite to this view is the view of egalitarians. They see nature as fragile and suggest that those who see nature as an opportunity must consider their view. In the cases of Kampala and Yaoundé, those who see nature as fragile though vocal in expressing critical views have not come up with any way forward. They maintain that the SW, which is spread out all over Kampala and Yaoundé, will seriously deteriorate the cities. Managerial, hierarchical and governmental sectors have adopted an attitude in between the two extremes. They argue that nature is vulnerable, but only when pushed beyond certain limits and that good planning and expert management can address problems effectively (Table 1).

Summarising these styles of response, Douglas (1999) suggests that they refer to different perceptions, definitions of physical reality; they shift evidence through different sorting processes arguing from different premises, and employing different styles of discourse, which CT maps in terms of a fourfold typology of forms of social solidarity. Two of the forms of solidarity, individualism and

Table 1. Plural perceptions – actors in social solidarities, attributes and contributions of the social solidarities in SWM (as extracted from the case studies).

Social solidarities	Important actors	Attributes	Type of participation
Fatalism	Individual citizens, local community	Apathetic doldrums: lack of trust confidence in the new policy programmes-unchanged institutional landscape, self-focused approach of the past, media focus individual benefit	Passive
Hierarchy	Urban authorities: decision-makers, bureaucracy	Dog in the managers: designed policy programmes and shifted SWM activities to the private sector, CBOs and NGOs	Active
Individualism	Private companies	Limited services only in urban high-income areas. Do not care about urban poor areas and high rate of taxation	Active
Egalitarianism	CSOs, CBOs and NGOs	Hampered by the shortage of resources, donor dependencies and central policies favouring private companies – more SWM is needed	Active

Note: Adapted from Tukahirwa *et al.* (2010) and Parrot *et al.* (2009).

hierarchy, have long been familiar to social scientists (Thompson *et al*. 1990). The theory's novelty lies in its addition of the other two solidarities and in making explicit the different sets of premises – the different myths of nature. The term social solidarity, originally from the sociologist Durkheim, is now defined as the different ways in which we bind ourselves with others and, in doing so, define our relationship with nature (Thompson *et al*. 1990). Similarly, the practice of SWM can be much improved by bringing the important social solidarities – hierarchy (decision-making authorities), individualism (market forces) and egalitarianism (community forces) – together (Gyawali 2001). The arguments and trade-offs among the three solidarities are necessary to produce effective and socially acceptable solutions. However, like the apathetic residents of Kampala and Yaoundé, who sit there waiting to see if SWM can be improved or not, the fatalists will have no or limited voices and responses to resolve the challenges in the contemporary socio-political scenario.

Therefore, on the contested terrain of SWM, basically three solidarities such as hierarchy, individuals and egalitarian have a say in developing the policy measures (three, because the fatalist solidarity has no voice; if it had, it would not be fatalistic). The reason of the exclusion of the fatalists is that they are those who find themselves squeezed out to the margins of all three organisations – live in a world where, if you poke something, you never get a consistent response. Life, for fatalists, is a lottery. There is nothing to learn, but plenty to cope with. They are the great risk-absorbers, enduring with dignity and ignorance whatever comes their way. They are sponges who are active in policy making with a view of improving their own spaces. Therefore, as seen from both Kampala and Yaoundé, the only solution for them was to reduce the number of common people (exclusion of the fatalists in the compromise area) in their efforts to improve SWM (Gyawali 2001). Thus, these three solidarities are considered as active participants and are retained, which develop their own storylines independent of each other and form an integral part of the policy- and decision-making, implementations and management with respect to SWM. However, fatalist solidarity is considered as the passive participants only and has a limited say in the policy-making (Table 1).

As in the case of Kampala and Yaoundé, many stakeholders believe that the unplanned development to improve municipal SW exacerbates the degradation of the built environment (Parrot *et al*. 2009, Tukahirwa *et al*. 2010); it was argued that the only way for action to be effective is to bring various actors of these three solidarities – government, NGOs, CBOs, CSOs, community members and private companies – together (Parrot *et al*. 2009, Tukahirwa *et al*. 2010). However, the challenge is that since each of the above solidarity's problem is comprised, in large part, by the other two solidarities' solutions, this triangular "policy space" is irreducible (Thompson *et al*. 1990). Notwithstanding, the Kampala and Yaoundé case study revealed that alliances are possible between government, NGOs, CBOs, CSOs and private companies, for instance, to come together to discuss the SW challenges faced by the urban managers and the outcomes can be further improved by exposing them to the criticism from egalitarian actors. Besides, each story sets out a glorious future; one in which, the prevailing SW challenge arrangements are significantly redressed. In the hierarchist's story, it is the public services that deliver the sustainability that neither markets nor grass-roots community can provide; in the individualist's story, it is the expansion and involvement of the private sector services that can resolve and improve SWM in the city; and in the egalitarian's story, it is the rediscovery of the common that, by distancing them from the top-down imposition, brings them back into harmony with the natural world. Thus, in this context, as evident from the case studies, the three solidarities can come together compromising with each other and influence positively for effective SWM in cities.

However, CT has its intrinsic limitations. It would be worrying if CT was not the subject of criticism because this would imply that it was not considered a serious enough contribution to social theory to merit review. Douglas (1982) designed the fourfold (grid-group) "gently to push what is known into an explicit typology that captures the wisdom of a hundred years of sociology, anthropology and psychology" (Douglas 1982, p. 1). Douglas (1982) recognised the limitations of typologies and identified a number of caveats to which we add the cautions of Ostrander (1982). The first is that the typology

makes no claim to understanding the nature of individual free will and hence is not wholly deterministic. Secondly, the typology is static, and so is not designed to illustrate the processes of change. Thirdly, the typology is a relative rather than an absolute analytical tool, and so is primarily of heuristic value. Finally, Ostrander (1982) emphasises that the typology should be applied to social environments rather than to societies and hence is technically incapable of distinguishing whole social systems. CT typology can be used to analyse the building blocks of nations, or spatially more diffuse regimes (Rayner 1993).

In the context of SWM in Kinshasa, although it may be difficult to absolutely demarcate, it is possible to map the four solidarities from the various stakeholders based on their responsibilities, activities, contributions and demands. Besides, the mobility of stakeholders from one solidarity to the other solidarities based on context and change in their aspirations and demands as suggested by Rayner (1992) may not do much harm. The delineation of the four solidarities, flexibility among them and delineation of their individual and combined storylines will be easier to deal with than a plethora of stakeholders having numerous conflicting and contrasting opinions, aspirations and demands. The social solidarities while trying to push their storylines and demands for realisations will be aware and mindful of the demands and constraints of the other solidarities during their engagements. Consequently, the combined scenario that the four social solidarities can come together compromising with each other, they can positively arrived at common consensus.

4. The Kinshasa case study analysis

4.1. CT-induced participation and responsiveness perspectives for SWM

Built upon the arguments of CT and fruitful interaction among the various social solidarities, a CT perspective necessary to attain EJ in the Kinshasa is preferred. As argued by Thompson (2008), Dahl's classic theory of pluralist democracy provides a simplified dualistic scheme involving participation and responsiveness as shown in Figure 3. In a nine-province framework, it ranges between two

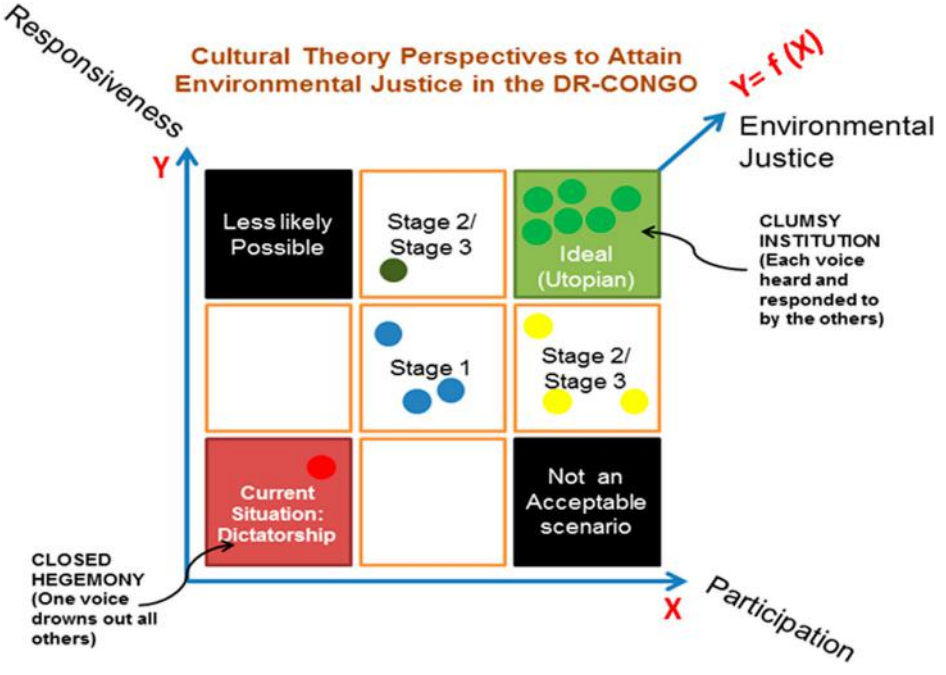

Figure 3. CT in perspective to attain EJ in SWM in Kinshasa. Adapted from Thompson (2008).

extremes of closed hegemony and utopian. With regard to the four social solidarities, closed hegemony means there is neither access nor responsiveness, where one voice (hierarchy)drowns the other three (the egalitarians, individualists and fatalists). Utopian means each voice is heard and responded to by the others. Participation and responsiveness are equitably framed at the highest standards. Each gradation along the two axes of participation and responsiveness (X and Y) marks the addition of another voice to the debate – whether it be a hierarchical, individualist or egalitarian – in any order. What sets apart from the conventional governance or management system is the distinction between these three such voices – as opposed to just the two that are generally acknowledged (Thompson 2008).

EJ (pluralist democracy) means that both access (participation) and responsiveness are facilitated. In this regard, EJ is a function of government responsiveness, individualistic engagement and community participation (egalitarians: NGOs, CBOs and CSOs). Placing EJ in the nine-province framework with its various transitional pathways between from where to set out (closed hegemony) and at where to be (EJ), a "middle ground" may be achieved (Figure 3). For example, the shifting of activities to NGOs, CBOs and CSOs was important for Kampala and Yaoundé in the efforts to improve SWM. As it has happened in both cases, affairs have become more subtler, richer and complex, as they moved away from the closed hegemony along either axis to stage 1 of democracy or EJ (Figure 3) with a little more participation and responsiveness, where more voices have responded to the debate, despite the fact that some may have no access to it.

Focusing on Kinshasa, in the current sociopolitical scenario, only two voices – the hierarchy and the individualist – enjoy access. Apparently, the bureaucracy, the bourgeoisie and elite class have turned the city into a "club good" through the exclusion of the egalitarian (the civil society activists) voice.[8] These people enjoy a cleaner environment and better sanitation facilities than those who are living in poor urban neighbourhoods.[9] However, as seen from the case studies, if the government (hierarchists) could be able to adapt best practices to increase participation by shifting SWM services to NGOs, CBOs and CSOs, one could argue that there will be more responsiveness leading to better and more equitable SWM in Kinshasa. This means that the more the government will be able to grant responsiveness (less likely possibility) and participation (also not likely), the scenario will move away from current closed hegemony to higher equitable participation and responsiveness (stage 1 in Figure 3) and then gradually move towards higher EJ in SWM through stage 2/stage 3 and perhaps to the ultimate acceptable stage (close to utopian), as the case may be depending on the sociopolitical scenario in the governance system of the country and in Kinshasa. There could be arguments and criticism about this form of idealism, abstract philosophy and utopianism; however as Marx (1848) believed, the future belongs to the egalitarians in which all class divisions, exacerbated by the evils of the individualists (capitalists), would eventually disappear through an international egalitarians (socialistic) revolution with time. In fact, the emergence of such scenarios have been evidenced from the recent citizen movement, such as the Arab Spring and the Occupy Movement, which reflect a legitimacy crisis for national governments and the questioning of current models of governance in the contemporary society as people are building new channels to express their voices and demand participation.

Therefore, arguments emerge that increasing collaboration and may be concessions or trade-offs among the three social solidarities proposed in CT may engender distinctive results and will further improve the current plight of SWM in Kinshasa. However, a close cooperation would be required among the egalitarians, individualists and hierarchists to increase the coverage and effectiveness of participation and responsiveness, particularly for the SW collection system and proper disposal of SW in Kinshasa. For this purpose, the hierarchists (government) will have to be in continuous dialogue with the three other solidarities, particularly the two influential ones – the individualist and egalitarian – to introduce appropriate regulations, which can help bring the required improvements in the SWM system in Kinshasa.

4.2. Future perspectives and scenario analysis

The SWM challenge in Kinshasa particularly, which has become a public concern for its huge complexity, engendered several issues, such as uncontrolled population growth, unorganised settlements, improper sanitary and sewage system, low environmental awareness and inappropriate SWM system. It is seen that these variables have causal relations among each other. In other words, the system comprising of these variables work through causal feedback mechanisms and develop a chain of actions. Therefore, there is a need to comprehend the causal feedback relations and the mechanisms they work on, which perhaps would provide avenues for developing plausible policy interventions. The causal loop diagram analysis (CLDA), for example, is a tool for systems analysis, and illustrates the complex relationships in an observable social, economic or environmental event. CLDA is beneficial in understanding and communicating complex systems involving variables of both qualitative and quantitative measurements (Maxwell 2004).

In the context of this paper, CLDA enabled the researchers to gasp and organise the multifarious causal aspects of SWM in Kinshasa. Causal relationships between variables were visualised by monodirectional arrows connecting the variables. The (+ plus) sign at the head of the arrow indicates that the preceding variable is having an "increasing" positive effect on the variable to which the arrows is connected. The (– minus) sign on the contrary indicates the preceding variable is having a "decreasing" effect on the variable to which the arrows are connected. Two or more arrows connecting two or more variables create a loop which has either a reinforcing (R) or a balancing (B) effect on a given variable within the loop. In the middle of the loop, (R) indicates the variables are reinforcing each other over time and (B) indicates the variables are balancing each other over time (Kirkwood 1998, Haraldsson 2004).

In addition to the universal CLDA notations, the researchers developed other cyphers to better fit the contextual realities revealed in the three sites included in the study. Coded colouration of monodirectional causal arrows was used to clearly separate and identify different forms of causal relationships within the complex system of SW in Kinshasa.

To understand the interlinkage among the variables, causal feedback relations were developed by using SD modelling principles (Forrester 1968, Sterman 2000) based on the systems thinking process (Sterman 2000). Although SWM is seen as a subsystem in the city of Kinshasa, it is considered as a system in the context of this study. The causal relationships among the variables within and across the major variables of the system and their positive and negative polarities and consequent influences on the related variables were developed based on the evidences observed from the literature, and discussions and experiences of the stakeholders surveyed. Besides, this information was used to conduct a scenario analysis through the causal loop diagrams, because they are the

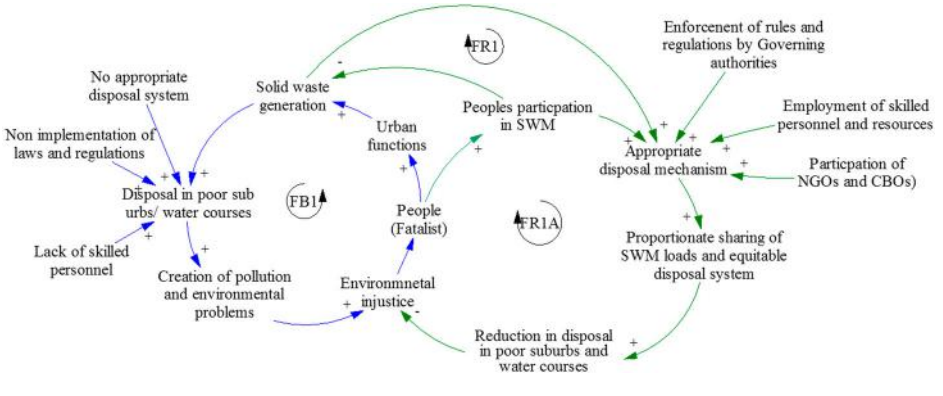

Figure 4. Fatalistic view on the causal feedback mechanism for SWM and EJ. Source: Result of SD analysis (2015) and field-based materials, 2013–2014.

dynamic hypotheses which leverage a system and offer plausible policy interventions or scenarios to attain an efficient and sustainable SWM system. Thus, in the context of SWM in Kinshasa, causal feedback relationships for each of the four solidarities were developed separately based on their individual storylines and responses of other solidarities and then synthesised to evolve the scenarios for policy interventions.

4.2.1. Fatalists' scenario

Figure 4 presents the fatalistic scenario on SWM and EJ in Kinshasa. It is revealed that people and urban activities generate SWs. Due to the lack of an appropriate disposal system, non-implementation of regulations and laws and absence of skilled personnel and resources, most of the SW as seen in the current scenario are disposed off in poor suburbs as landfills or water courses, causing pollution and environmental problems. This situation leads to environmental injustice in the city[10] through a disturbing causal feedback mechanism FB1. This causal feedback relationship is disruptive and disturbs the SWM system in the city. However, as envisaged by the fatalist solidarity, the participation of people in SWM will possibly reduce the SW generation to a certain extent as well as assist in devising an appropriate disposal mechanism in Kinshasa. Furthermore, reduction in SW generation coupled with the enforcement of laws and regulations and employment of skilled personnel by the governance authorities (as expected by people), and the participation of NGOs and CBOs are expected to strengthen the appropriate disposal mechanism in Kinshasa.[11] Consequently, there shall be proportionate sharing of SWM loads and equitable distribution of disposal of SW. This situation would lead to the reduction of SW disposal in poor suburbs and water courses, which in turn will lessen the environmental injustice in the city through the reinforcing mechanism FR1. Similarly, participation of people in devising an appropriate disposal mechanism will enable the reduction in environmental injustice in the city (through proportionate sharing of SWM loads and reduction in the disposal of SWs in poor suburbs and water courses) as shown by the causal feedback sub-loop R1A. Thus, the mechanism developed by Reinforcing Loop will strengthen the mechanism developed by FR1. Thus, mechanism FR1 will be able to balance the disruptive mechanism created by FB1, which eventually will assist to attain EJ in SWM in Kinshasa.

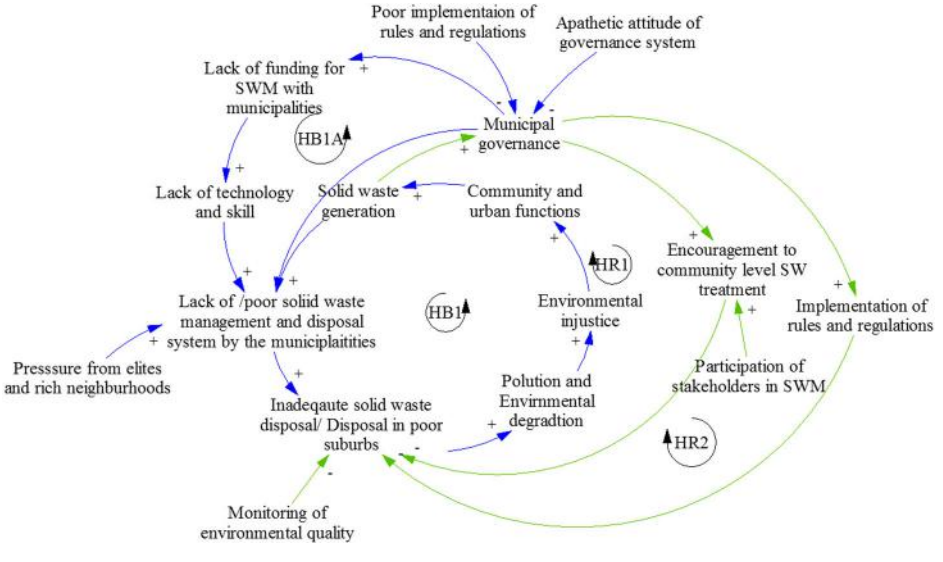

Figure 5. Hierarchists' view on the causal feedback mechanism for SWM and EJ. Source: Result of SD analysis (2015) and field-based materials, 2013–2014.

4.2.2. Hierarchists' scenario

The hierarchical scenario on SWM and EJ in Kinshasa is presented in Figure 5. As discussed in the fatalists' scenario, the lack of or poor SWM and disposal system in the city by the municipalities aided by the pressure from the elite and rich neighbourhoods degenerate the environment, particularly the water courses and poor suburbs, resulting in environmental injustice in the city (causal feedback mechanism HB1). This disruptive mechanism gets strengthened by a poor municipal governance system, which fails to mobilise adequate fund, appropriate technology and skill (through causal feedback meachanism HB1A). Besides, the apathetic attitude of the municpal officials and poor implementation of the rules and regulations add to the distrubing SWM in the city.[12] Howerver, the scenario is expected to be alleviated in terms of reduction in disposal of wastes in poor suburbs and consequent reduction in environmental degradation and injustice if (1) community-level SW treatment and disposal is encouraged through the participation of stakeholders in the SWM augmented by muncipal authorities (through feedback mechanism HR1);[13] and (2) muncipal authorities take strict measures to implement the rules and regulations (through deedback loop HR2).[14] The participation of communities in SWM and the implementation of rules and regulations will assist in the monitoring of the environmental quality of the city and will also strengthen the two reinforcing mechanisms, which is expected to balance the disruptive mechanism to alleviate the envirnmental injustice in the city.

4.2.3. Individualistic scenario

The individualist (market forces) view on the causes of poor disposal/disposal of SW in poor suburbs and water courses is not different from the other solidarities (see Figure 6: IB1). However, they view that the availability of technology and services would allow the reduction in SW and assist in proper disposal, which can be availed from the industry or market or from the partnership between private and public sectors[15] (feedback loop IR1). Besides, they also believe in levying taxes on communities and industry to ease the financial scenario of unavailability of sufficient fund at the disposal municipalities, which would assist in the procurement of technology and services[16] through mechanism IR1A.

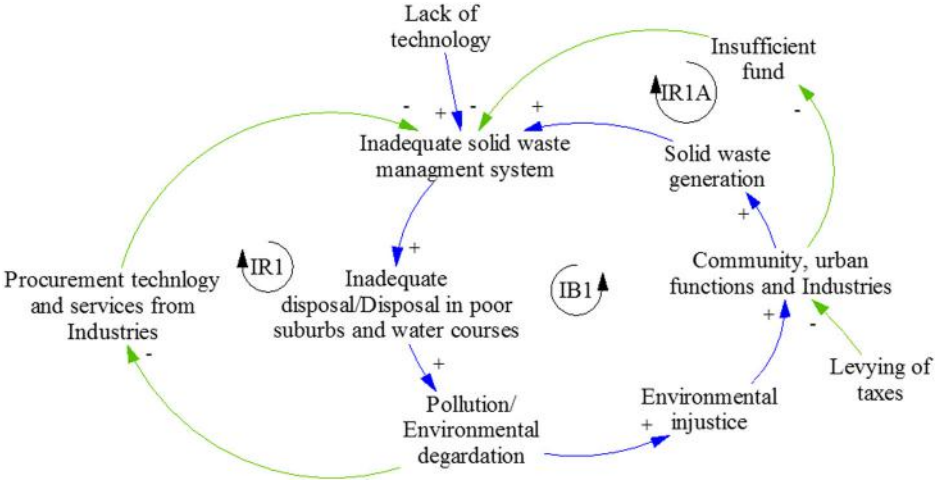

Figure 6. Individualist view on the causal feedback mechanism for SWM and EJ. Source: Result of SD analysis (2015) and field-based materials, 2013–2014.

4.2.4. Egalitarian scenario

As seen in Figure 7, the egalitarian actors, although having similar views on the causes of environmental injustice in the city (EB1), view that the situation is aggravated because of the lack of coordination among the various agencies involved in the process of SWM as well as the lack of stakeholders, particularly NGOs/CBOs' participation, and insufficiency of legislation.[17] However, according to them, public–private and stakeholders participation will lead to the rehabilitation of SWM infrastructure in the city, which may transform the SWs to resources, consequently reducing the disposal of wastes in the water courses and poor suburbs in Kinshasa.[18] Such a mechanism will further reduce the pollution and environmental degradation and is expected to lessen the environmental injustice in the city through mechanism ER1 (Figure 5). Besides, the participation of egalitarian actors would assist in the integration of culture with environment and the creation of awareness about traditions, which will also assist in the transformation of SW to resources[19] that essentially will reinforce mechanism ER1 and balance the disruptive SWM mechanism EB1.

4.2.5. Scenario of plausible collaboration, compromise and trade-offs

A plausible scenario is devised by considering the constructive engagement and trade-off among the various solidarities and synthesis of their individual storylines. Figure 8(a) presents the interlinkage and causal feedback relationships among the various socio-economic, environmental governance variables influencing SWM, and the influence of the three important social solidarities in the city. There are clear causal feedback relations among the variables (as seen from the different scenarios discussed above), which contribute to the current plight of SWM. However, an inappropriate SW disposal system on account of the lack of an appropriate and equitable disposal system leads to dumping of the generated SWs in the poor suburbs through a balancing or disruptive feedback loop B1. As a result, the quality of environment in the poor suburbs is degraded, which creates environmental injustice in the city through the balancing feedback loop B1A. Thus, it is apparent that the mechanism being in operation by feedback mechanism B1 strengthens the feedback mechanism B1A, and consequently creates environmental injustice in the city with regard to SWM. However, as discussed above (Sections 3. 1 and 4.2.1–4.2.4), if all the three influential solidarities, that is, municipal authorities (hierarchist), private companies (individualist) and NGOs/CBOs/CSOs/ other community and social organisations (egalitarian), come together through productive engagement, there is a possibility of participatory governance for SWM, which would lead to evolve an appropriate SWM system and environmental policy. The constructive engagement, trade-offs and

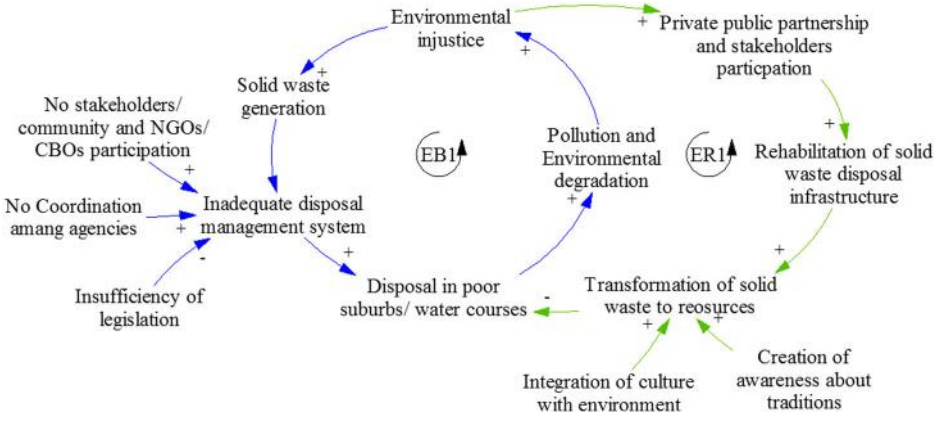

Figure 7. Egalitarians' view on the causal feedback mechanism for SWM and EJ. Source: Result of SD analysis (2015) and field-based materials, 2013–2014.

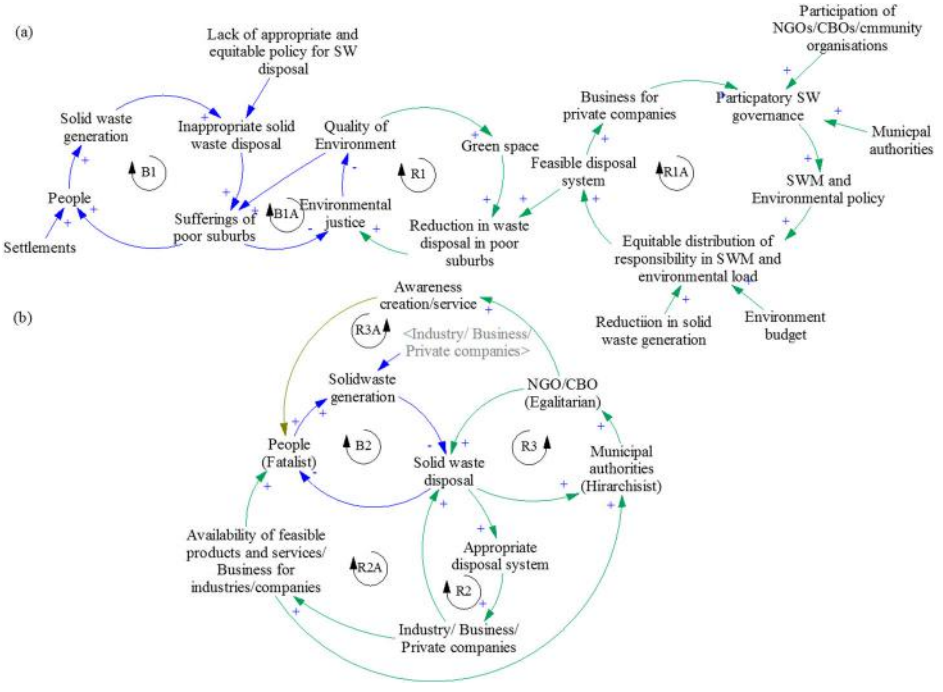

Figure 8. (a and b) Causal feedback mechanisms showing the current status of SWM and EJ in Kinshasa and collaboration and trade-offs among social solidarities and attainment of EJ in SWM by participatory governance approach. Source: Result of SD analysis (2015) and field-based materials, 2013–2014.

collaboration will work in the ways shown in Figure 8(b). People and industry in general are responsible for SW generation (B2), which requires an appropriate disposal system. The industry or private companies will enable the availability of feasible products and services, which people and municipality (hierarchist actors) will buy and use (R2A). In return, the industry or individualist actors will gain business for their companies and will make profits or benefits. The municipalities with the aid of appropriate products and services, together with the help of NGOs/CBOs (egalitarian actors), will assist in developing an appropriate and efficient SWM system in the city (R3). Besides, the egalitarian actors with the assistance of municipalities will create awareness among the people, which in turn will reduce waste generation and also assist in their disposal at the source (R3A). In other words, people, municipal authorities, industry and NGOs/CBOs, that is, all the stakeholders, will become responsible for SW disposal directly or in collaboration. Municipal authorities will collaborate with NGOs/CBOs for disposal and creation of awareness among people, and industry will develop appropriate products/services and make it available for the disposal of the wastes. As a consequence, SW will be appropriately disposed off and it will also reduce environmental load in the city, particularly in the poor suburbs. Sharing of responsibilities among all the solidarities, that is, participatory governance in the SWM system, will be attained. The relationship between municipalities (hierarchist), NGOs (egalitarian) and people (fatalist) indirectly through egalitarian actors, and the interaction between industry (individualist), municipalities (hierarchist) and people will be enhanced. The egalitarians will have a pivotal role to play in the governance of SW, which will also benefit common people (fatalists). Moreover, industry (individualist) will receive economic benefits through the creation of new businesses such as the demand for products and services required for SWM.

Such a collaboration or concessions will enable the development of a locally suitable environmental policy, which with the assistance of availability of budget (possibly from the contributions from government and private companies) will engender reduction in the generation of SWs

because of the awareness created by community and social organisations, encourage disposal at the source with the acceptance of the people and also prompt appropriate and justifiable disposal systems with all the stakeholders sharing the responsibility and burden. Consequently, a most feasible disposal system as against the current system is expected to be developed, with two consequences: (1) it will reduce the waste disposal in the poor suburbs and (2) it will provide business opportunities to the private companies/businessmen. The whole process will work through a reinforcing feedback mechanism (R1A) as shown in Figure 8(a). Further, reduction in the disposal of SWs in poor suburbs because of mechanism R1A will be able to restrict the misuse or wastage of green and open spaces and make them available in the suburbs. This process will contribute to enhance the quality of environment, which consequently will augment EJ in the city through a reinforcing feedback mechanism R1. Thus, R1A reinforces the feedback mechanism R1, which in turn will negate or balance the outcomes of the feedback mechanism B1currently in place (Figure 8(a)).

The four scenarios portray the storylines of each social solidarity that develops with regard to SWM. However, each of these social solidarities has its demands and responsibilities, although sometimes they overlap to a certain extent. As a consequence, there shall be push and pulls among the various solidarities and, therefore, consensus for SWM may not be an ideal goal; rather, it is largely premised on compromises and trade-offs. Each of these social solidarities while developing its own storyline will be aware and mindful of the demands and constraints of the other solidarities. Consequently, the combined scenario suggests (Figure 8(a,b)) that instead of trying to achieve what is most ideal for each solidarity, they will look for what is most feasible and acceptable so that each solidarity will get what is best possible without eclipsing other solidarities' demands and constraints. Thus, in essence the theoretical framework traverses beyond the normal collaborative and participative planning and ventures more towards compromises and trade-off through an understanding of each other's demands, aspirations and constraints with respect to SWM in Kinshasa. A critical reflection of the storylines developed by each solidarity and combined scenario suggests that municipal authorities would be able to govern SWM in collaboration with other solidarities – particularly NGOs and CBOs; industry and market forces would receive benefits of business in lieu of their support through investment and financing. The egalitarian actors – community organisations, NGOs and CBOs – will force better service delivery for people from the municipal authorities and industry/companies in terms of equitable sharing and distribution of SW disposal burdens. The fatalist-common people would benefit from this collaboration and would strengthen the other three solidarities through their support, indirect participation and consumption of the products and services offered by them.

Therefore, it is envisaged that the participatory governance approach with the participation of three important solidarities of the society, that is, municipal authorities (hierachist), private companies (individualist) and NGOs/CBOs/CSOs/other community and social organisations (egalitarian), in a collaborative way will bring about an appropriate waste management system with feasible disposal systems, which essentially will augment EJ in SWM in Kinshasa. Besides, while it will become mutually beneficial to all the three solidarities, that is, assist in the governance and generation of funds for municipal authorities; create business for private companies and aid in advancing the cause of community for CBOs, it will also save the other solidarity – the fatalist (common people) – from the sufferings of a poor environment in Kinshasa. Although the presence of fatalist is not seen, still they are important and their voices will be heard, perhaps through their indirect representations with egalitarian actors.

5. Summary and conclusion

EJ, particularly in SWM, is a challenge all over the world; however, it is more prominent in the cities of sub-Saharan Africa. The scenario in the cities of the DRC, especially in Kinshasa, is no exception and is likely to become graver if adequate measures are not taken. Many studies have revealed that Kinshasa is grappling with mounting SW with socio-spatial inequalities in the distribution of the

waste burdens. Most of the SWs generated in the city are disposed in the poor neighbourhoods, which has made the urban poor residents in Kinshasa to live closer to such pollution sources susceptible to various health hazards engendering environmental injustice in the city. With narrow revenue bases, increased civil conflict and limited technical capacities, the municipal authorities in Kinshasa have, thus, been unwilling or unable to effectively deliver an appropriate SWM system. Therefore, this investigation was conducted in an attempt to find an apposite solution to attain EJ in SWM suitable to Kinshasa. The paper engages in a critical review of the literature and appraisal of two comparative case studies, as well as an in-depth analysis of archival information and stakeholders' discussion conducted through a field study. It was found that SWM in Kinshasa, like in many sub-Saharan African cities, is a responsibility entrusted to public-funded municipal authorities. However, evidence suggests that SWM in Kinshasa is highly driven by issues relating to the political power, economic and social status of the residents in their respective locations of the city. The rich neighbourhoods seem to enjoy well-formulated systems of service delivery than high-density areas where almost 80% of the population in Kinshasa resides. There is a clear divide in the SWM between the rich and poor neighbourhoods of the city. This state of affairs can be argued as a result of inequalities that exist between the more powerful and poor people of the urban society in Kinshasa.

However, findings of this investigation suggest that increased collaboration among the government, private companies and NGOs, CSOs and CBOs in SWM would facilitate the development of more effective and efficient integrated systems and approaches in SWM as evidenced from the cities such as Kampala and Yaoundé. This development could result in the incorporation of a majority of stakeholders in the decision-making and implementation of a SWM system, and the adoption of technologies and innovative ways of managing SW, which would promote social and EJ in Kinshasa.

Furthermore, the causal feedback mechanism prompted from the current scenario vis-a vis plausible envisaged scenario underpinned by the principles of Cultural Theory prompted that the disruptive mechanisms causing environmental degeneration and injustice will be thwarted by the reinforcing mechanisms that would engender from the constructive engagement, collaboration and in cases compromises among the various social solidarities without significantly undermining the individual storylines to arrive at the solution. This premise encourages effective participation of egalitarian actors in devising solutions against the more widely recognised two most influential solidarities – the markets and hierarchies – both of which have not produced the desired results as evident from the current plight of the city. Significant attention has been given to the egalitarian solution because the solidarity, despite its meaningful presence, is at present being excluded in the development of the city. It is envisaged that the inclusion of an egalitarian approach would decrease the attractiveness of policy options that only favour one group within the community (rich urban neighbourhood) and localise their SW burden onto the poor. However, the purpose of introducing such a paradigm is not to sweep away the market and hierarchy solutions and replace them with the egalitarian one; rather it is to ensure that all three solidarities of the society are granted legitimacy and given due consideration in the policy and decision-making processes, which would influence the common people (the fatalist) directly or indirectly. Moreover, solutions premised on such a paradigm would have the added attraction of comporting with, rather than going directly against, widely held ideas of what is fair and unfair (some happy, others sad). Thus, it is manifested through this investigation that a politico-cultural mechanism for remedying SWM inequities could enable changes that will address EJ in Kinshasa.

Notes

1. Opinions of the residents of Kisenso and Ngaliema, local municipalities of Kinshasa during the semi-structured interviews conducted in summer 2013–2014.
2. Personal communication with research participants in the three research sites and discussions with waste managers and urban authorities in Kinshasa, 10–20 September.

3. Personal communication with research participants in the three research sites and discussions with waste managers and urban authorities in Kinshasa, 10–20 September.
4. Personal communication with research participants in the three research sites and discussions with waste managers and urban authorities in Kinshasa, 10–20 September.
5. Opinion of local leaders, obtained during field survey and the discussion with stakeholders in Kinshasa, 2013–2014.
6. Outcome of the discussions with various stakeholders in SWM during field survey in Kinshasa, 2013–2014.
7. Personal communication with research participants in the three research sites and discussions with waste managers and urban authorities in Kinshasa, 10–20 September.
8. Discussions with the residents of Ngaliema, Kisenso and Limete in Kinshasa through semi-structured interviews conducted in summer 2013.
9. Opinion of local leaders and residents obtained during field survey and the discussion with stakeholders in Kinshasa, 2013–2014.
10. Professional involved in urban development in Kinshasa.
11. Professionals involved in urban development and social activists in Kinshasa.
12. Opinion of NGOs and residents surveyed.
13. Arguments proffered by NGOs and other CBOs.
14. Arguments proffered by NGOs and other CBOs.
15. Opinions of private companies involved in providing services to municipalities in Kinshasa.
16. Opinions of private companies involved in providing services to municipalities in Kinshasa and municipal authorities.
17. Responses from NGOs and CBOs in Kinshasa surveyed.
18. Arguments of NGOs and CBOs in Kinshasa surveyed.
19. View of an NGO official in Kinshasa.

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