



# More inclusive and cleaner cities with waste management co-production: Insights from participatory epistemologies and methods

Jutta Gutberlet\*

University of São Paulo (USP), Av. da Universidade, 308, CEP 05508-040 São Paulo – SP, Brazil



## ARTICLE INFO

### Article history:

Available online 27 October 2014

### Keywords:

Solid waste  
Informal sector  
Recycling cooperative  
Participatory action research  
Co-production

## ABSTRACT

With over half of the world's population living in cities, and with rising consumption, the generation of solid waste has become a ubiquitous and serious problem in urban agglomerations. City administrations are facing social, cultural, environmental, and economic challenges when planning solid waste solutions. The paper discusses the participatory epistemology and methodology experience resulting from inclusive solid waste management in Brazil. In the global South countless informal and organized solid waste collectors are engaged in resource recovery, classification of discarded waste, and redirection of recyclables towards the recycling sector. Their work is mostly unrecognized and the service is not remunerated. Governmental support to include recycling cooperatives in selective waste collection varies significantly in scope and quality. In theory, the Brazilian solid waste management legislation supports recycling cooperatives and promotes avoidance, reuse, and recycling as a primary solution tackling waste. In praxis, however, many challenges towards inclusive resource recovery and awareness building about waste avoidance and diversion are yet to be overcome. Action-oriented, participatory qualitative research, conducted with recycling cooperatives and local governments in the metropolitan region of São Paulo, has revealed some of the environmental and social contributions, as well as challenges arising in planning, policy design, and implementation of waste management. The research applies a feminist and post-colonial theoretical lens and demonstrates a wealth of knowledge co-generation on waste management. The participatory method underlines important social aspects to consider in planning and policy design for inclusive waste management. The final conclusion of this paper is that selective household waste collection with recycling cooperatives creates unique opportunities to build more inclusive and cleaner cities.

© 2014 Elsevier Ltd. All rights reserved.

## Introduction: cities and waste

In the UN-HABITAT's report, *Solid Waste Management in the World's Cities*, Bharati Chaturvedi refers to waste as one of the biggest challenges of the urban world (UN-HABITAT, 2010). As human populations continue to grow and become urbanized, in tandem with high rates of consumption, there has been a civic and political failure in appropriately managing the massive amount of waste that has been generated as a result of these developments. Although local governments have little power to regulate the quantity, heterogeneity, and material composition of the products consumed and discarded by the citizens, they mostly decide on

which waste management technologies and strategies to implement. The current global waste dilemma also evidences an industry failure, with manufacturers primarily determining the material composition of their products and packaging; therefore making them complicit with the waste problem. The situation in the global South evidences parallels with the main characteristics of the current 'chemical waste regime', outlined by Gille (2007: 207) for Eastern European countries. Wastes are increasingly privatized and there is a lack of a coordinated state effort to regulate waste generation. The dominant politics of waste pursue a hidden agenda to remove the state's intervention in the economy; protecting private property and, in the context of solid waste, promoting the idea of incineration technology as being the ultimate solution. However, most citizens are also failing to minimize their waste generation, to reorient their consumption habits and lifestyles, and to initiate/participate in public discussions on waste and the social, economic, and ecological implications of it.

\* Department of Geography, University of Victoria, PO Box 3060, STN CSC, Victoria – BC, V8W3R4, Canada. Tel.: +1 250 4724537.  
E-mail address: [gutber@uvic.ca](mailto:gutber@uvic.ca).

This paper analyses and discusses qualitative data collected through participant observation and active participation in regular meetings and workshops conducted between 2005 and 2012. As a result, I discuss the methodological, epistemological, and practical implications of this experience with selective solid waste collection and recycling by organized cooperatives and networks. In Brazil, as in many other countries in the global South, a small proportion of the informal recyclers are organized in associations, cooperatives, and sometimes in larger networks to perform the activity of collecting, separating, and selling recyclables, with or without governmental support. The current literature mainly describes informal waste recycling and little has been documented on organized cooperative recycling with co-management experiences tackling solid waste. Thus, the present research is unique in providing insights about the praxis of inclusive waste management.

The concept of co-management goes beyond co-production, which is “the joint production of public services between citizen and state, with any one or more elements of the production process being shared” (Mitlin, 2008: 340). Co-management literature provides insights on how to incorporate a multi-stakeholder approach in resource management and underlines that the collective approach to the process is as important as the expected service outcomes (Carlsson & Berkes, 2005). Solid waste is a resource with multiple stakeholder interests; therefore, the concept of co-management is useful to understand ways in which to integrate recycling cooperatives in selective waste collection and separation. Both approaches are considered a form to improve the delivery of public services.

In the past two centuries, the proportion of urban dwellers worldwide has increased from 5 to 50% as people migrated from the countryside to urban centres (McMichael, 2000). Worldwide, over the past decades, many countries have experienced a dramatic shift from rural to urban livelihoods with the rise of extremely dense and often un- or underserved urban settlements (UN-DESA, 2012). Unprecedented rapid change towards consumption-oriented lifestyles and increasingly widespread planned obsolescence and programmed throwaway from the producers' side has resulted in an unparalleled rise in solid waste generation everywhere. In most cities in the global South, the increase of garbage generation exceeds population growth by 1 or 2% per year. Not implementing adequate solutions to reduce the generation of waste and to recover the materials has created a crisis situation in many cities, particularly visible in poor communities.

This paper focuses on household waste only, recognizing the fact that industry, agriculture, and construction activities are the sectors that most generate discard (Gregson, Metcalfe, & Crewe, 2007a, 2007b; O'Brien, 2008). Waste is defined as being a nuisance, as belonging elsewhere, and as generally having no value. Waste can be extremely toxic and have long-term implications on people and the environment. When inadequately managed, it becomes an environmental problem and interferes with other elements of city infrastructure, generating costs. Uncollected garbage blocks drainages and contaminates rivers, lakes, and the oceans, sometimes producing irreversible impacts, besides affecting environmental health and community wellbeing. In 2009, an estimated 1.7–1.9 billion tonnes of household waste was generated worldwide, of which approximately half a billion tonnes was not collected (Chalmin & Gaillochet, 2009), highlighting the urgency for city administrations to handle waste issues with highest priority.

However, waste is also a resource that maintains livelihoods and it is a lucrative business for the waste management sector. Their logic stipulates more waste, greater profits, and no urgency for strategies to better meet reduction, reuse, and recycling (Bhuiyan, 2010; Davies, 2008; Gregson, 2009; Gutberlet, 2012). The global annual value of the waste industry is estimated at US\$433 billion (ISWA, 2012).

Informal (autonomous) and organized (associated into cooperatives) recyclers whose livelihoods depend on the recovery of these resources also see value in what most people discard. Historically, they collect for reuse and recycling and help reduce the burden of waste disposal of the city (Anand, 1999). The service that the informal sector provides is usually not accounted for and the social, economic, and environmental contributions remain mostly unrecognized by governments and communities, despite saving local authorities around 20% or more of what they would otherwise spend on the collection and final destination of these materials (Wilson, Velis, & Cheeseman, 2006). In a large metropolis, this represents many millions of dollars every year. Resource recovery helps prolong the lifetime of landfills, provides cheaper secondary raw materials for local markets, and creates jobs along the value chain, thus supporting livelihoods. There are upstream business opportunities for small to large-scale manufacturing in transforming recyclable materials. Often present in everyday life and not to disregard are “second hand” and “hand-me-down/around” divestment practices (Gregson, Metcalfe & Crewe, 2007a, 2007b).

The informal recyclers and those who work in cooperatives or associations reclaim different forms of household and business waste, ranging from many different sorts of plastics, papers, cardboard, and metals. While autonomous recyclers are sometimes specialised, the organized recyclers work with a large variety of materials. In some cases the cooperative also deals with wood, cooking oil and other oils, WEEE products, and other specific packaging materials. The hourly wage for the cooperative recyclers in the region is still extremely low, averaging between US\$0.84 and 1.70, and results in an average monthly income between US\$150 and 290 in the municipalities other than São Paulo, depending on the quality and quantity of the equipment, organization, and logistics of the group. In the city of São Paulo, the average monthly income can be slightly higher. There are critical occupational health and safety questions that need to be addressed at the cooperative level (Binion & Gutberlet, 2012; Gutberlet & Baeder, 2008; Gutberlet, Baeder, Pontuschka, Felipe, & dos Santos, 2013).

Decades ago, authors have already pointed out the reliance of the formal city on the informal urban inhabitants (Bromley, 1979; Bromley & Gerry, 1979; Mangin, 1976; Turner, 1982) and more recently, the crucial role of the informal sector in building global recycling rates has been demonstrated (Velis et al., 2012; Wilson, Araba, Chinwah, & Cheeseman, 2009; Wilson, Rodic, Scheinberg, Velis, & Alabaster, 2012; Wilson, Velis & Cheeseman, 2006). Thousands of informal and organized recyclers make a living from collecting and selling recyclable and reusable materials in the global South. Estimates suggest that there are up to 3.8 million people in informal recycling in Latin America and the Caribbean, most of them working independently (Terraza & Sturzenegger, 2010). In Brazil, the number of recyclers is estimated between 500,000 and 1 million (Gutberlet, Baeder, Pontuschka, Felipe & dos Santos, 2013), while in India alone, approximately 13 million people work in resource recovery (Chintan, 2006). Marginalization and stigmatization of these informal recyclers, along with their low income and unhealthy work conditions, perpetuate social and economic exclusion. Increasingly, NGOs, university partnerships, and international boards, recognize the contribution of this sector and are framing methods and strategies for inclusive waste management. According to the International Solid Waste Association, [t] here is a major opportunity for win–win solutions ... if the informal sector can be included more successfully within an integrated and sustainable waste management system (ISWA, 2012: 27).

Although worldwide landfilling is, on average, still the most widespread form of waste disposal, a growing number of cities are moving away from simply depositing waste. Some opt for resource recovery and others regress towards end-of-pipe incineration

technologies. Waste management is mostly performed by engineers and rarely involves a multi-sectorial, participatory approach, where the organized informal sector is integrated in waste management operations.

To answer the questions that permeate the definition of how cities can become more inclusive and cleaner with participatory sustainable solid waste management, I first introduce my research methodology and supporting theoretical framework. Here I also situate the present study as part of a bilateral university partnership project on participatory sustainable waste management. I explain how the data was collected, organized, and analysed. The following section analyses the participatory epistemology and outcomes related to the understanding of inclusive solid waste management. Finally, the results from this study are linked to larger scale issues of local urban planning and policy design for the development of more inclusive and cleaner cities.

### Theoretical framework and methodology

The present research on informal recycling is inscribed in critical theory, including Feminist (Bruschini, 2007; Einspahr, 2010; England & Lawson, 2005), and Post-Colonial theory (Caldas, 2006). The feminist approach de-constructs patriarchal divisions of space and labour and reveals social and political inequities and segregation based on racism. Post-Colonial theory places the research into a historical perspective. This approach draws attention not only to racial issues, but also on how race interacts with class and gender and creates forms of oppression (Getty, 2010). Both concepts share the goal of revealing oppressed voices to reconstruct both history and knowledge production (Frisby, Maguire, & Reid, 2009).

Most workers in the informal recycling sector suffer from social and economic exclusion. Dealing with garbage further reiterates the widespread perception of social stigma against this population (Moore, 2012). Many of the recyclers are women of African descent, belonging to the part of Brazil's society that has less access to formal education, professional training, formal housing, and is also less paid. Through the lens of Post-Colonial theory, we understand that the colonial past has left historical influences on the Brazilian society, entrenching deeply hierarchical social structures which are reaffirmed and reproduced in everyday life (Caldas, 2006). Demystifying and realizing how historically established hegemony and power structures have maintained the social and economic status quo and how this has framed the life of the recyclers has been crucial within the research process.

Feminists question the gendered nature of work and livelihoods and contribute to the understanding of the numerous forms of inscribing either male or female roles in daily life. To take a feminist stance uncovers the binaries that define the gendered labour roles within the work of recycling cooperatives. In Brazil, more than half of the participants in recycling cooperatives are women, mostly of African descent, and many of which are single mothers. During the process of selective waste collection and separation, these women frequently perform the same activities as men, often to the detriment of their health. A gender-based analysis tackles the specific requirements and challenges of women recyclers.

My research is qualitative (Denzin & Lincoln, 2005) and applies an action-oriented (Kidd & Kral, 2005; Thiollent, 2000) and participatory methodology (Brose, 2001; Frisby, Maguire & Reid, 2009). Qualitative research focuses on the study of “*things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them*” (Denzin & Lincoln, 2005: 3), allowing “... *for the inclusion of many different kinds of data collection and analysis techniques, as well as the diversity of theoretical and epistemological frameworks that are associated with qualitative research*” (Guest, Namey, & Mitchell, 2013: 1).

The benefits of this approach lay in the “*systematic inquiry, with the collaboration of those affected by the issue being studied, for purposes of education and taking action or effecting change*” (Cargo & Mercer, 2008: 327). I understand participation as a means and an end in itself. Enabling participation is to facilitate individuals or groups that are socially excluded to voice themselves. Participation also implies in learning to express and engage in self-determined action and intervention, challenging the existing distribution of power. Participation involves the use of ‘power to’ in order to negotiate and transform those with structural and institutional ‘power over’.

The research is inscribed in knowledge co-creation (Cahill, 2007; Hall, 2005; Thiollent, 2000), which means involving project participants in the ‘domains of action’ as described by Cornish (2006), to collectively generate knowledge outcomes. Throughout the research process, my own involvement as an academic was an essential element for the systematization and construction of a collective understanding of the praxis experienced by the recyclers in their daily activity. The popular educator Carlos Brandão (1982) believes that at all times, the collective reflection on reality is present and that people take ownership of knowledge and write his or her own social history. An epistemology of inclusion and demystification applied in this research is aimed at building awareness, in the sense of Paulo Freire’s concept of *conscientização* (Freire, 1970), among the participants, and is grounded in the collective construction of improved working conditions and remuneration for the service the informal and organized recyclers perform.

Participation is subject to scope, or based on what Cornish (2006) terms ‘domains of action’. In order to participate in these domains, individuals require certain levels of empowerment. The domains of actions include planning and definition of project goals and activities, and partaking in the implementation and evaluation of these activities (Cornish, 2006). Kresby (2005) notes that within participatory programs, individuals can reflect on and better understand current systems and are more capable of performing alternative actions to those systems. Spaces and processes need to enable participants to recognize and use their agency, branching into everyday spaces and transforming exclusive spaces into common spaces.

Action research is aimed at revealing the invisible perspectives, some truth that is being hidden, unspoken, or denied by those in power. It is used as a tool to create an alteration of a situation defined as undesirable by the community. The research promotes personal growth to all participants, including myself, by involving the stakeholders in the research process; from identifying the problem, developing the goals and methods, collecting and analysing the data, to implementing the actions. It is a mutual process where I and all other participants were actively involved. The research is reflexive and based on phases of action and reflection. Kidd and Kral locate this kind of participatory research within the critical theory paradigm; *while also constructivist, PAR is dialogical and proactive* (2005: 187). In the following section, I will introduce the participatory sustainable waste management project under which the current research was conducted and outline the specific research methods.

### Participatory action research: the praxis

Being part of the Participatory Sustainable Waste Management (PSWM) project from 2005 to 2012 has allowed me, as one of many members, to be involved in the collective generation and processing of knowledge on cooperative recycling. The PSWM project was a Canadian International Development Agency (CIDA) – Association of Universities and Colleges of Canada (AUCC) funded



collaborative program between the University of Victoria, Canada and the Faculty of Education at the University of São Paulo (USP), Brazil. During this period, I produced field diaries, transcripts of video taped meetings, notes from workshops and field visits and regular progress reports (quarterly and yearly activity reports), among many other documents. The report of an independent evaluation of the PSWM project, conducted in December 2011, was a key resource incorporated in the present analysis (*Instituto Opinião Acessoria e Pesquisa, 2011*). Their research was based on mixed-methods and a multifocal assessment, applying focus groups, in-depth interviews, and a structured questionnaire with the sectors involved in the PSWM project.

The primary aim of the PSWM project was to increase the effectiveness, safety, and income generation of organized waste recycling; applying action-oriented and participatory methodology. Between 2006 and 2012, members from 32 recycling cooperatives that operate in the metropolitan region of São Paulo were involved in the design, planning, and implementation of the PSWM project.

The selection of the municipalities was based on the quality of their waste management programs to form a pool of ‘strong’ and ‘weak’ experiences in the same region. Initially, the cities of Santo André, Diadema, Ribeirão Pires, parts of São Paulo, and later, São Bernardo do Campo and Mauá were involved (*Fig. 1*). With close to 20 million people, the metropolitan region of São Paulo (composed of 39 municipalities) is considered the main industrial and economic driving force of Brazil. It is the second most populous metropolitan region in the Americas, which also translates into enormous waste management challenges.

The generation of solid waste is still on the rise in Brazil, although on a slower pace recently, with an increase of 7.7% between 2008 and 2009, 6.8% between 2009 and 2010 and 1.3% between 2011 and 2012 (*ABRELPE, 2009, 2010, 2012*). In 2012 the final destination of 42% of solid waste collected in Brazil was considered inadequate, which means almost 24 million tonnes of waste became an environmental hazard during that year (*ABRELPE, 2012: 31*). The new federal waste management legislation requires all



Cartography: Ole Heggen, UVic.

**Fig. 1.** Municipalities involved in the PSWM project.

waste dumps to be eliminated by 1 August 2014, demanding serious efforts of local administrations towards environmental sanitation. The following figure situates the current demographic and waste management context within the municipalities composing the study area (Fig. 2).

One of the particularities of the PSWM project was the deep participatory project management structure and praxis. The Directing Committee (DC) (composed of 2 representatives from the recyclers' movement, 3 university professors – including myself, 1 NGO representative, and 2 project administrators) was responsible for organizing regular management council (MC) meetings (3–4 yearly meetings, usually of two days each) and making sure that project activities got implemented. Most of the DC's participants had already collaborated in previous years and had experiences in working with informal recyclers. Some unifying personal characteristics further strengthened our partnership, such as the unanimous spirit of persistency and a political conviction based on ideals of social–environmental justice. This pre-established condition was favourable to build trustful relationships among the participants and to guarantee continuity of the commitment even after the PSWM project was concluded.

The Management Council (MC), with deliberative power, was composed of leaders from the recycling groups, representatives from the municipal governments, and the members of the DC (Fig. 3). The project relied on many different partners to execute specific topical tasks. For example, FUNDACENTRO, a national research institute on the workers' health, was involved in studies on occupational health. Both university administrations had challenging times with formalizing the partnership and in disbursing the funds in the required time frame.

The management council (MC) was a forum where participants met to discuss priorities, plan and evaluate project activities, and where they could draw on each other's knowledge to solve complex problems and generate mutual learning. From the beginning, the participants were concerned with 'active' participation and conducted a brief phase of project re-design and re-definition, from April to September 2005. This process was essential to create an identity between all participants with the nature of the project. Collectively, the main objectives were reinstated and the key principles guiding the project activities were defined: participation, empowerment, co-management, sustainability, economic viability, gender equity, and knowledge socialization. The interactive communication and planning methods, in some instances, included Venn diagrams, mapping, diagramming techniques, and psychodrama. These tools helped provoke discussions and fostered participatory learning.

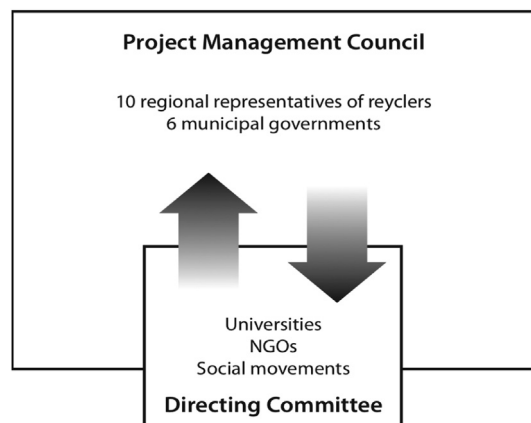


Fig. 3. PSWM project management council.

Participatory research means involving participants in the inquiry, to identify and shift power relations, and to contribute to building knowledge democracy (Hall, Jackson, & Tandon, 2013; Jones, 2003). The research process unfolded dimensions of power not originally evident and brought up discussions on equity, particularly related to gender and distributive issues. As discussed in participatory action research, community members become the leaders of investigation and through the process, create their own solutions for change. This became evident with the recyclers involved in the PSWM project through diverse activities (workshops, lectures, meetings, etc.) and processes (e.g. collective commercialization).

Cyclic reflections (DC and MC meetings) and actions (capacity building and awareness rising, *conscientização*) have contributed to generate and systematize diverse knowledge on the praxis of selective waste collection, recycling and waste management. Several incidents demonstrated how empowering this learning process was for the participants, building a concept for cooperative selective waste collection and recycling as an integral form of waste management. The DC and the MC meetings were considered a collective process, with all sides being reflexive and analytical in the decision-making; for example, over how resources should be made available, what rules to apply in their use and who should be held responsible. The fact that different stakeholders were participating communicated perspectives that were usually not heard or questioned and it helped to redistribute power. Detailed protocols were kept from all meetings and events. These were

Municipality	Total population	Area (km <sup>2</sup> )	Household solid waste generated (ton/day)	Per capita solid waste generation (kg/day)	Formal selective waste collection (FSWC)	Number of organized <i>catadores</i>
Diadema	386,089	30.8	366.7	0.95	0.8%	93
Mauá	417,064	61.9	399.7	0.96	until 2013 no FSWC	35
Ribeirão Pires	113,068	99.1	106.98	0.95	1.2%	37
Santo André	676,407	175.8	730.84	1.08	2.7%	56
São Bernardo do Campo	765,463	409.5	871.65	1.14	1.3%	122
São Paulo	11,253,503	1,522	12800	1.14	1.6%	1,100

Fig. 2. Total population, municipal area, and household waste generated/recycled.

Sources: CETESB (2014), Prefeitura do Município de Diadema (2010), Prefeitura do Município de Ribeirão Pires (2012), Prefeitura do Município de São Bernardo do Campo (2010), Prefeitura do Município de São Paulo (2014) and Cornieri (2011).

carefully documented using voice and/or videotapes and notes were written by hand or directly onto a laptop. All research interventions followed appropriate ethical procedures, approved by the University of Victoria under the main ethics application protocol (05–129) and subsequent amendments for specific changes and adaptations as required over time. The data contained in the notes ranged from specific technical solid waste management data (quantities of material collected, quality of the materials, infrastructure, policies) to registrations on emotional, personal development, empowerment, political, economic, and overall social/environmental issues. The data has been fundamental in the qualitative content analysis applied to specific inquiries and to the current reflections. Summarized notes from these meetings were always returned to the participants in the following meeting. In addition, bilingual newsletters were edited twice or three times a year to disseminate the stories of the recyclers as well as other information central to PSWM. An overall inductive approach and a theme-based content analysis were performed with the notes and the results from the research conducted by *Instituto Opinião Acessoria e Pesquisa* (2011) to identify and describe naturally emerging topics. According to Bardin (1979: 105) “The theme is the unit of signification that emerges out of an analysed text based on criteria relating to the theory which serves as a guide to reading”.

### Stakeholder participation outcomes in planning and design for inclusive solid waste co-management

The participatory dialogue and brainstorming approach applied in the PSWM project has resulted in personal growth and the empowerment of participants (Tremblay & Gutberlet, 2011). Reflections on gender roles and inequity as well as power structures and hegemony have led to astonishing insights among the recyclers, recognizing their positioning and deconstructing repressive structures (Nunn & Gutberlet, 2013). The collaborative process has further motivated the recyclers to explicitly become part of the knowledge creation process, turning them into an agent of change, as expressed by some recyclers during interviews conducted by the independent research group *Instituto Opinião Acessoria e Pesquisa* (2011) and during one MC meeting.

*The [PSWM] project took the shyness away; I was very shy and didn't open my mouth, for nothing.<sup>1</sup>*

*Cida was the one who talked and I ducked under the table and turned red, then with the dynamics I was improving.*

*What I know today I owe to the project, I have learnt a lot, it [PSWM] has given us training.*

*Before I knew nothing about dealing with politics, I still do not know much, I am still learning. I didn't know about planning projects, operating a cooperative, I knew nothing of that and through the courses I have learnt how to deal with these functions.*

*Wherever we go it makes a difference! We are contributing with our presence and voice. Here I learnt how to speak and fight for my rights and help others to also conquer their rights* (Testimonial during one of the PSWM management council meeting, 2011).

An informal, open and trustful environment has motivated participation. At each MC meeting and also during the many thematic workshops (gender, occupational health, collective commercialization, Participatory Video, Photo-Voice, etc.) ice-breakers, sometimes involving psychodrama, acting, light physical exercise and mainly sharing ideas and feelings has been important to building up an inclusive and trustful environment. Interactive brainstorming and reflecting have shaped the discussions, as well as the planning and resolution finding processes. Sometimes the

discussions went in long spirals and involved strong emotional reactions before reaching a consensus on a final decision.

The technique of expressing ideas and suggestions verbally and then seeing these ideas synthesized in writing on cards and pinned on the wall as part of a larger idea or diagram has helped the learning and empowering process (Fig. 4). The collective work procedure during the meetings and workshops has facilitated the information transfer and the reflection about concepts, strategies and methods. It has further supported the production of written documents, reports, brochures, folders, and other educational materials. Over time, this process has also created a sense of belonging and empowerment of the participants, as confirmed by interview responses (*Instituto Opinião Acessoria e Pesquisa*, 2011).

*[The project] has taught us how to better cope inside the cooperative, we learn to deal with disagreements and have more patience. We are always very much under pressure, so we had this training on cooperativism and our co-workers now better understood what a cooperative is.*

*I have also learnt, that my work is a decent job like any other job, this is very important.*

During the management council meetings, major activities were planned, strategies were designed and decisions were taken. The scope of the agenda covered issues such as:

- Defining workshops for education and capacity building with recyclers on specific themes (computing, administrative skills, gender, environmental education, occupational health, collective selling).
- Promoting on-going dialogue with government (setting up meetings, designing field visits to cooperatives with government representatives, deciding about the participation in seminars and conferences, defining the content of presentations at these events).
- Planning for the application of specific tools to empower recyclers (PV, Photo Voice) and setting up research agendas.
- Outlining document contents (reports, brochures, folders, booklets) and videos.
- Participatory brainstorming on specific problems (conflict resolution amongst coop members, conflicts with different coops, conflicts between different stakeholders (recyclers, government, NGOs, business)).
- Participatory planning of interventions to strengthen organized selective waste collection (discussion of the state-of-art and



Fig. 4. Collective learning during an MC meeting.

<sup>1</sup> All translations made by the author.



local difficulties in selective waste collection programs, understanding and acting on waste-to-energy impacts).

These activities have, over time, built up experiences for how to address and advance the agenda of selective waste collection and recycling in the region. Out of the many collective reflections, the following definition has arisen for PSWM: “Solid waste recovery, reuse and recycling practices with organized and empowered recycling co-ops supported with public policies, embedded in solidarity economy and targeting social equity and environmental sustainability” (Gutberlet, 2010, p. 171). PSWM is also referred to as inclusive, integrated solid waste management, where representatives from local recyclers’ organizations are active stakeholders in municipal waste management. Solidarity economy encompasses the work of social and/or community-based enterprises, associations or co-operatives involved in selective material recovery.

Over the years, the management council of the PSWM project has developed into an important instrument facilitating the discussion and negotiation between recyclers and local governments. The meetings helped identify bottlenecks, benefits and prerequisites for inclusive waste management, and formed an important forum to collectively plan for better resource recovery at the local scale.

The collaborative process of generating knowledge engages with the recovery of citizenship, particularly of individuals like the recyclers, who are distant to fundamental citizen rights because they have been in lifelong exclusion, continuously stigmatized, and economically marginalised. Being participatory, the process allows for individuals to collaborate on their own pace and in their own way. The transparent and didactic form of learning is also empowering, since the process visualizes each contribution as a piece of a larger puzzle towards a resolution for a set problem. The approach creates engaging learning environments where reflections and actions walk hand in hand. Nevertheless, the process at times can also be emotional, with situations where tears and anger become apparent; and where patience is required to negotiate a solution. As one of the recyclers puts it:

... one of the features of our relationship with the Brazilian and Canadian technicians, was that it was always very open, very gentle and the disagreements that we had always ended up in great consensus.

The voices expressed so far were from members of the recyclers’ community. Participants from other sectors (government, university professors and students) recorded similar experiences and emotions regarding the fruitfulness of participating in the management council meetings. The recyclers, however, remained the most present and most active segment of the MC, underlining the persisting difficulties in engaging in dialogue with the local government.

### Assessing the benefits and barriers towards participatory epistemologies in waste management

Besides the empowering aspects and the opportunities provided for personal growth and human development, the management council also resulted in a space where political facets and multiple technical aspects of selective waste management were arduously discussed. The participation of representatives from different cities resulted as particularly productive, permitting cross-fertilization, solidarity, and collaboration among the participants. Often, concrete solutions could be found for particular problems or specific committees were created to dedicate time and resources to finding a way. Knowledge sharing characterised the MC, a space where news on innovative appropriate technology, events, and organizations of interest to the rest of the participants was disseminated.

During the MC meetings, the recyclers determined the importance for their groups to work as cooperatives and not as city employees. Although, the daily work in a cooperative means constantly having to improvise, to overcome hurdles, and to manage conflicts. Most of them know about the principles of cooperativism and solidarity economy, under which banner they frame their political struggles. Another significant outcome of the MC meetings was for some government agents and all recyclers to recognize the necessity to establish partnerships between recycling cooperatives and city administrations. Selective waste collection and recycling needs to be anchored in public policy, assuring governmental support and remuneration for the service of recovering resources from garbage and diverting materials from the landfill. This means creating laws and other tools to guarantee participation and fair treatment of the recyclers. Other central aspects for the integration of the informal recycling sector into formal city waste management, identified collectively, consisted of:

I. Necessity for strong networking capacity between recycling groups (associations, cooperatives, networks) for:

1. Collective commercialization.
2. Exchange of experiences and shared information.
3. Communication to strengthen solidarity economy initiatives.
4. Overcome existing barriers to expand mutual support and cooperation amongst the groups.

Organized in cooperatives or associations, the recyclers have a stronger voice to demand participation in local waste management. The Brazilian national recyclers’ movement (*Movimento Nacional dos Catadores de Materiais Recicláveis*), as part of an international recyclers’ network, increasingly participates in shaping public policies on solid waste (see also Samson, 2009). The persistent pressure of this social movement has influenced the recent Brazilian federal law on solid waste management as well as other supporting legislation. The integration of organized recyclers in selective waste collection and separation is anchored in several sections of this legislation (Federal Law No. 12,305, July 2010 and its regulation through Decree No. 7404 of December 2010) due to the participation of these stakeholders.

II. Ability to access governmental support for:

1. Adequate infrastructure at the recycling centre (covered and well ventilated/illuminated work space, kitchen, toilets, change rooms).
2. Investment in appropriate technology (presses, balances, fork lifts, electric carts, trucks, sorting tables) and maintenance.
3. Work safety and efficiency (improving occupational health, adequate and efficient division of space, ergonomic working positions).

A Federal Decree (No. 7,405, 23 December 2010) creates the *Pro-Catador* program, which is an inter-ministerial Committee for social and economic inclusion of the recyclers. Specific funding is available to expand infrastructure needs and capacity building.

III. Ability to access technology, information and know how to:

1. Add value to materials by achieving better material quality (e.g. better compressed and sorted) and by transforming materials; for example the *Varalpet*, the production of clothes line out of PET (Polyethylene terephthalate) plastic bottles (Gutberlet, 2012).
2. Access better prices for materials (through collective commercialization, updated price lists; efficient logistics).

3. Participate in the recovery of Electric and Electronic waste and other forms of discarded materials not yet recovered by the recyclers.

The recyclers in Brazil continue struggling for better access to funding and credit lines to expand the work infrastructure in the cooperative. They demand remuneration by the municipality for the public service of selective waste collection. Another struggle of the national recyclers' movement is the approval of the general solidarity economy legislation, which frames a legal policy instrument of support for cooperatives and other social enterprises at all government levels.

IV. Form partnerships with government, business and civil society to guarantee:

1. Continuous dialogue with the local government (inter-sectorial) in planning (door-to-door selective waste collection, community awareness), and policy design (remuneration of environmental and collection service) to improve service remuneration and expand the generation of work for informal recyclers.
2. Access to continuing education, professional training, and specific capacity building for recyclers.
3. Partnerships for continuous environmental education and awareness building in the community to guarantee high participation rates and best quality source separation. The recyclers can provide these educational services (e.g. during door-to-door collection) and need to be remunerated for it.

Since sectorial planning still prevails in most Brazilian municipalities, local governments rarely involve organized recyclers in the decision making on waste management. Informal recyclers are usually not part of formal waste collection, but sometimes a portion of the recyclable waste is collected by organized recycling cooperatives, and in some cases, the government supports these initiatives by providing infrastructure or space for the workers. In some cases the government remunerates the recyclers for the collection service provided, paying them for the quantity of materials retrieved from the waste stream.

Some municipalities are aware that including recycling cooperatives in selective waste collection and separation generates employment. In the study region (excluding São Paulo), currently 343 work places are occupied with separating recyclable materials, corresponding to 11.8% of the potential 2903 work places that could be created in waste triage in these five municipalities (Oliveira, 2014). Nevertheless, some city administrations (Mauá and Ribeirão Pires) are recently making increased efforts towards co-managing the waste collection and separation and they further support the creation of new cooperatives, generating more work and income in the municipality.

Finally, the reflections on the implementation of successful selective waste collection programs reiterate the benefits of forming democratic and participatory management councils involving recycling networks and local government, similar to the PSWM. This format:

1. Facilitates the dialogue between recyclers and government agents.
2. Helps with the operation of selective waste collection and recycling.
3. Assists in design and implementation of public policies.
4. Supports actions in other related projects.

Some current follow-up programs to strengthen the recycling cooperative sector in the region have also successfully taken up the format of the MC as decision-making structures.

## Final considerations: inclusive local planning and policy design for better urban development

Practitioners and academics in the global South have raised the attention about inclusive solid waste management addressing environmental sustainability and social inclusion (Besen, 2006; Gutberlet, 2008; Medina, 2005; Velis, Wilson, Rocca, Smith, Mavropoulos & Cheeseman, 2012; Zapata Campos & Zapata, 2012, 2013). The importance of the informal sector to the formal city has also been widely discussed by many authors (Bromley, 1979; Bromley & Gerry, 1979; Hardoy & Satterthwaite, 1989; to mention a few) and there has been a continuous academic production describing the know-how and discussing the struggles of recycling cooperatives and social enterprises involved in material reclamation in different parts of the world (Ahmed & Ali, 2004; Anand, 1999; Fergutz, Dias, & Mitlin, 2011; Furedy, 1992; Puerbo, 1991; among many others). Yet, integrating the cooperative recycling sector into formal waste management remains a major challenge and many of the social, political, environmental, and economic hurdles still have to be overcome in most places. The academic literature has not yet systematically discussed waste management co-production involving recycling cooperatives.

The current article contributes to the literature on co-management and co-production in the solid waste sector, building on community-driven inquiry. It describes an in-depth experience in co-creation of knowledge to overcome some of the difficulties and to learn from the successes of recycling cooperatives involved in selective waste collection. The discussion is based on the thematic content analysis of the research data and focuses on possible strategies and actions for the inclusion of these organized recyclers into local, official solid waste management programs. Thus this article can make a methodological and epistemological contribution to assist governments, communities, and particularly, the recyclers, in the process of improving local selective waste collection programs. Many of the research results have been translated into accessible language and made available to recyclers, government and community in the form of booklets, newspaper articles, folders, posters or videos.

We have learnt that organized cooperative recycling provides opportunities for education and training. Recycling cooperatives recover citizenship and citizens, which due to addictions, physical or mental disabilities, or long-term unemployment, have few other options to be productively included in society; thus, they generate social capital and contribute to building more inclusive cities. Further, the cooperatives nurture the ability for collective organization and action. Participants have a saying in the decision-making processes, not only within their co-ops, but also through networks and other forms of multi stakeholder forums. The participatory approach of the PSWM Management Council has resulted in the strengthening of the voice of participant recycling leaders and in cultivating new leadership. The active participation in public events (conferences, seminars, congresses, workshops, exhibitions) has further added to the collective spirit of the recyclers' movement. These shared practices empower the recyclers and open up new avenues for social development.

The collective learning has generated awareness among the participants about the social contributions of cooperative recycling, e.g. creating social capital and incorporating people into meaningful work. A differentiated look at the recyclers' work highlights the environmental contribution of recyclers acting as disseminators of information on diverse aspects related to waste reduction and resource recovery. The latest discussion of the recyclers' movement is about remunerating the environmental services of selective waste collection and to apply Carbon Crediting to this work.



Many of the activities conducted by the MC have contributed towards higher levels of cooperative organization. Organized recyclers are able to work safer, more efficiently, and get better value for their work when structured in cooperatives, associations or social enterprises. Workshops on collective commercialization have stimulated the creation of networks to facilitate joint approaches to logistics and operations. Several networks have since been established in the region: (1) *Rede ABC: Rede Gerando Renda – Catadores do ABC*, (2) *Rede CataSampa*, (3) *Cata Vida: Rede Solidária de Sorrocaba e região*. The selective waste collection provided by these networks increasingly services larger parts of the city, turning them into 'cleaner' places.

The tenor of this paper reiterates that participation in deliberation and bottom-up politics of resistance, as advocated by Heynen (2009) are important to generate a paradigm shift towards inclusive resource recovery. The experience highlighted in this article confirms the power of spaces and processes, such as those created with the PSWM project, to facilitate and promote participation and deliberation. Continuous capacity development of the cooperative members for effective and efficient resource recovery is a prerequisite to improve this work. An adaptive policy design, representing multi stakeholder views that are sensitive to social and environmental questions, has to include the recycling cooperative sector. The specific knowledge accumulated by the recyclers on selective waste collection and separation adds important facets to the design of waste management policies.

Not only do consumption and discard habits have to change, it is also urgent that current unsustainable forms of production are altered in order to provoke a shift towards not wasting natural resources and life. Public awareness building for efficient source separation is critical to achieve a better and more sustainable way of dealing with consumption and waste. As environmental educators, the recyclers have the potential to raise the awareness towards *not wasting*. Community engagement, environmental stewardship, and social economy can take endless different forms, given the creativity and learning capacity of the people, finally contributing to creating more liveable and cleaner cities. Large challenges still lay ahead. Future research needs to incorporate aspects of power sharing to expand inclusive and integrated waste management and it has to tackle the political and cultural bottlenecks that still prevent most integrated, inclusive solid waste management programs from being economically and environmentally sustainable.

## Acknowledgements

The research and community outreach presented here was funded by the Canadian International Development Agency (CIDA-AUCC), the International Development Research Centre in Canada (IDRC) (Grant No.: 104982-001) and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior in Brazil (CAPES). I also thank my colleagues involved in the PSWM project as well as the reviewers for their comments and suggestions to the previous version of this article.

## References

- Ahmed, S. A., & Ali, M. (2004). Partnerships for solid waste management in developing countries: linking theories to realities. *Habitat International*, 28(3), 467–479.
- Anand, P. B. (1999). Waste management in Madras revisited. *Environment and Urbanization*, 11(2), 161–176.
- Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais – ABRELPE. (2009). *Panorama de Resíduos Sólidos no Brasil 2009*. Governo Federal do Brasil and Caixa [Online] Accessed 08.08.13 at: [http://www.abrelpe.org.br/panorama\\_edicoes.cfm](http://www.abrelpe.org.br/panorama_edicoes.cfm).
- Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais – ABRELPE. (2010). *Panorama de Resíduos Sólidos no Brasil 2010*. Governo Federal do Brasil and Caixa [Online] Accessed 08.08.13 at: [http://www.abrelpe.org.br/panorama\\_edicoes.cfm](http://www.abrelpe.org.br/panorama_edicoes.cfm).
- Bardin, L. (1979). *Análise de conteúdo*. Lisboa: Edições 70.
- Besen, R. (2006). Programa de coleta seletiva de Londrina – caminhos inovadores rumo à sustentabilidade. In P. Jacobi (Ed.), *Gestão Compartilhada dos Resíduos Sólidos no Brasil*. São Paulo: Anna Blume.
- Bhuiyan, S. H. (2010). A crisis in governance: urban solid waste management in Bangladesh. *Habitat International*, 34(1), 125–133.
- Binion, E., & Gutberlet, J. (2012). The effects of handling solid waste on the well-being of informal and organized recyclers: a review of the literature. *Journal of Occupational and Environmental Health*, 18(1), 43–52.
- Brandão, C. R. (Ed.). (1982). *Pesquisa Participante* (2nd ed.). São Paulo: Brasiliense.
- Bromley, R. (1979). *Urban informal Sector: Critical perspectives*. Elsevier.
- Bromley, R., & Gerry, C. (1979). *Casual work and poverty in third world cities*. UK: David Fulton Publishers.
- Brose, M. (2001). *Metodologia participativa. Uma introdução a 29 instrumentos*. Porto Alegre: Tomo Editorial.
- Bruschini, M. C. A. (April 2007). Work and gender in Brazil in the last ten years. Paper presented at the International Seminar on Work and Gender, at Fundação Carlos Chagas. [Online] Accessed 08.08.13 at: [http://www.scielo.br/pdf/cp/v37n132/en\\_a0337132.pdf](http://www.scielo.br/pdf/cp/v37n132/en_a0337132.pdf).
- Cahill, C. (2007). Including excluded perspectives in participatory action research. *Design Studies*, 28, 325–340.
- Caldas, M. P. (2006). Conceptualizing Brazilian multiple and fluid cultural profiles. *Management Research*, 4(3), 169–180.
- Cargo, M., & Mercer, S. L. (2008). The value and challenges of participatory research: strengthening its practice. *Annual Review of Public Health*, 29, 325–350.
- Carlsson, L., & Berkes, F. (2005). Co-management: concepts and methodological implications. *Journal of Environmental Management*, 75(1), 65–76.
- CETESB (São Paulo). (2014). *Inventário estadual de resíduos sólidos urbanos 2013*. São Paulo: CETESB.
- Chalmin, P., & Gaillochet, C. (2009). *From waste to resource: An abstract of world waste survey 2009*. Cyclope Veolia Environmental Services [Online] Accessed 08.08.13 at: [http://www.uncred.or.jp/env/spc/docs/plenary3/PS3-F-Veolia\\_Hierso-Print%20abstract.pdf](http://www.uncred.or.jp/env/spc/docs/plenary3/PS3-F-Veolia_Hierso-Print%20abstract.pdf).
- Chintan. (2006). *Privatising waste services: Clearing waste or people?*. Jahan-E-Kabadi, Issue 1, July 2006. New Delhi: Chintan Environment Research and Action Group [Online] Accessed 08.08.13 at: [http://www.chintan-india.org/others/Jahan-e-Kabadi\\_jul06.pdf](http://www.chintan-india.org/others/Jahan-e-Kabadi_jul06.pdf).
- Cornieri, M. G. (2011). Coleta seletiva de resíduos sólidos urbanos em Santo André – S. P.: A visão dos catadores. 3º Seminário da região sudeste sobre resíduos sólidos. IX Seminário Estadual sobre Saneamento e Meio Ambiente. ABES – Associação Brasileira de Engenharia Sanitária e Ambiental. São Paulo, 18–20.05.2011.
- Cornish, F. (2006). Empowerment to participate: a case study of participation by Indian sex workers in HIV prevention. *Journal of Community & Applied Social Psychology*, 16, 301–315.
- Davies, A. R. (2008). *The geographies of garbage governance: Interventions, interactions and outcomes*. Aldershot: Ashgate.
- Denzin, N., & Lincoln, Y. (Eds.). (2005). *Handbook of qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.
- Einspahr, J. (2010). Structural domination and structural freedom: a feminist perspective. *Feminist Review*, 94(1), 1–19.
- England, K., & Lawson, V. (2005). Feminist analyses of work: rethinking the boundaries, gendering, and spatiality of work. In L. Nelson, & J. Seager (Eds.), *A companion to feminist geography* (pp. 77–92). Malden: Blackwell.
- Fergutz, O., Dias, S., & Mitlin, D. (2011). Developing urban waste management in Brazil with waste picker organizations. *Environment and Urbanization*, 23(2), 597–608.
- Freire, P. (1970). *Pedagogy of the oppressed*. New York: Herder and Herder.
- Frisby, W., Maguire, P., & Reid, C. (2009). The “F” word has everything to do with it: how feminist theories inform action research. *Action Research*, 7(1), 13–29.
- Furedy, C. (1992). Garbage: exploring non-conventional options in Asian cities. *Environment and Urbanization*, 4(2), 42–61.
- Getty, G. (2010). The journey between Western and indigenous research paradigms. *Journal of Transcultural Nursing*, 21(1), 5–14.
- Gille, Z. (2007). *From the cult of waste to the trash heap of history: The politics of waste in socialist and postsocialist Hungary*. Bloomington: Indiana University Press.
- Gregson, N. (2009). Recycling as policy and assemblage. *Geography*, 94, 61–65.
- Gregson, N., Metcalfe, A., & Crewe, L. (2007a). Identity, mobility, and the throwaway society. *Environment and Planning D: Society and Space*, 25, 682–700.
- Gregson, N., Metcalfe, A., & Crewe, L. (2007b). Moving things along: the conduits and practices of divestment. *Transactions Institute of British Geographers*, 32, 187–200.
- Guest, G. S., Namey, E. E., & Mitchell, M. L. (2013). *Collecting qualitative data: A field manual for applied research*. London: Sage Publications, Inc.
- Gutberlet, J. (2008). *Recovering resources – recycling citizenship: Urban poverty reduction in Latin America*. Aldershot: Ashgate.
- Gutberlet, J. (2010). Waste, poverty and recycling. *Waste Management*, 30(2), 171–173.

- Gutberlet, J. (2012). Informal and cooperative recycling as a poverty eradication strategy. *Geography Compass*, 6(1), 19–34.
- Gutberlet, J., & Baeder, A. (2008). Informal recycling and occupational health in Santo André, Brazil. *International Journal of Environmental Health Research*, 18(1), 1–15.
- Gutberlet, J., Baeder, A. M., Pontuschka, N. N., Felipone, S. M. N., & dos Santos, T. L. F. (2013). Participatory research revealing the work and occupational health hazards of cooperative recyclers in Brazil. *International Journal of Environmental Research Public Health*, 10, 4607–4627. <http://dx.doi.org/10.3390/ijerph10104607>.
- Hall, B. (2005). In from the cold? Reflections on participatory research from 1970–2005. *Convergence*, 38, 5–24.
- Hall, B., Jackson, T., & Tandon, R. (2013). *Knowledge, democracy and action: Community–university research partnerships in global perspectives*. Manchester: Manchester University Press.
- Hardoy, J. E., & Satterthwaite, D. (1989). *Squatter citizen: Life in the urban third world*. London, UK: Earthscan Publications.
- Heynen, N. (2009). Bending the bars of empire from every ghetto for survival: the Black Panther Party's radical antihunger politics of social reproduction and scale. *Annals of the Association of American Geographers*, 99, 406–422.
- Instituto Opinião Acessoria e Pesquisa. (2011). *Projeto Coleta Seletiva Brasil – Canadá: Gestores, Parceiros e Administrativo*. Relatório de pesquisa. Responsável Rachel Moreno. São Paulo: Instituto Opinião Acessoria e Pesquisa (report).
- International Solid Waste Association (ISWA). (2012). *Globalization and waste management. Phase 1: Concepts and facts*. Florence: International Solid Waste Management Association Congress (report).
- Jones, P. S. (2003). Urban regeneration's poisoned chalice: is there an impasse in (community) participation-based policy? *Urban Studies*, 40(3), 581–601.
- Kidd, S., & Kral, M. J. (2005). Practicing participatory action research. *Journal of Counseling Psychology*, 52(2), 187–195.
- Kresby, M. (2005). Rethorizing empowerment-through-participation as a performance in space: beyond tyranny to transformation. *Signs: Journal of Women in Culture and Society*, 30(4), 2037–2065.
- Mangin, W. (1976). Latin American squatter settlements: a problem and a solution. *Latin American Research Review*, 2, 65–98.
- McMichael, A. (2000). The urban environment and health in a world of increasing globalization: issues for developing countries. *Bulletin of the World Health Organization*, 78(9), 1117–1123.
- Medina, M. (2005). Serving the unserved: informal refuse collection in Mexican cities. *Waste Management & Research*, 23, 390–397.
- Mitlin, D. (2008). With and beyond the state: co-production as a route to political influence, power and transformation for grassroots organizations. *Environment and Urbanization*, 20(2), 339–360.
- Moore, S. (2012). Garbage matters: concepts in new geographies of waste. *Progress in Human Geography*, 36(6), 780–799.
- Nunn, N., & Gutberlet, J. (2013). Cooperative recycling in São Paulo, Brazil: towards an emotional consideration of empowerment. *Area*, 45(4), 452–458.
- O'Brien, M. (2008). *A crisis of waste: Understanding the rubbish society*. London: Routledge.
- Oliveira, C. H. (2014). Diagnóstico da Coleta Seletiva no Grande ABC e as perspectivas quanto às ações do PPA Regional Participativo Implantação e Fortalecimento da Coleta Seletiva no ABCDMRR. Presentation at the: Conferência Temática Regional: Saúde Mental – Coleta Seletiva/Catadores e Economia Solidária III Conaes. Mauá, 14.03.2014.
- Prefeitura do Município de Diadema. (2010). *Plano municipal de gestão integrada de resíduos sólidos de Diadema*. São Paulo: INCORP.
- Prefeitura do Município de Ribeirão Pires. (2012). *Plano municipal de gestão integrada de resíduos sólidos do município de Ribeirão Pires*. Prefeitura de Ribeirão Pires.
- Prefeitura do Município de São Bernardo do Campo. (2010). *Plano municipal de gestão integrada de resíduos sólidos do município de São Bernardo do Campo*. Fundação Escola de Sociologia e Política de São Paulo e Prefeitura de São Bernardo do Campo.
- Prefeitura do Município de São Paulo. (2014). *Plano de gestão integrada de resíduos sólidos da cidade de São Paulo*. Comitê Intersecretarial para a política municipal de resíduos sólidos, Prefeitura de São Paulo, 312 pp.
- Puerbo, H. (1991). Urban solid waste management in Bandung: towards an integrated resource recovery system. *Environment and Urbanization*, 3(1), 60–69.
- Samson, M. (Ed.) (2009). *Refusing to be cast aside: Waste pickers organising around the world, Women in Informal Employment: Globalizing and organizing (WIEGO)*. Cambridge USA, 95 pp.
- Terraza, H., & Sturzenegger, G. (2010). Dinámicas de Organización de los recicladores informales. Tres casos de estudio en América Latina. Banco Interamericano de Desarrollo, Sector de Infraestructura y Medio Ambiente. Nota Técnica, No. 117.
- Thiollent, M. (2000). *Metodologia da pesquisa-ação*. São Paulo: Cortez.
- Tremblay, C., & Gutberlet, J. (2011). Empowerment through participation: assessing the voices of leaders from recycling cooperatives in São Paulo, Brazil. *Community Development Journal*, 46(3), 282–302.
- Turner, J. F. C. (1982). Issues in self-help and self-managed housing. In P. M. Ward (Ed.), *Self-help housing: A critique* (pp. 99–113). London: Mansell.
- United Nations Department of Economic and Social Affairs (UN-DESA). (2012). *World urbanization prospects, the 2011 revision*. New York: United Nations, Department of Economic and Social Affairs, Population Division.
- United Nations Human Settlements Programme (UN-HABITAT). (2010). *Solid waste management in the world's cities*. London, UK: Gutenberg Press. UN Secretariat, World Population Prospects: The 2000 Revision and World.
- Velis, C. A., Wilson, D. C., Rocca, O., Smith, S. R., Mavropoulos, S., & Cheeseman, C. R. (2012). An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries. *Waste Management & Research*, 30(9), 43–66.
- Wilson, D., Araba, A., Chinwah, K., & Cheeseman, C. (2009). Building recycling rates through the informal sector. *Waste Management*, 29, 629–635.
- Wilson, D., Rodic, L., Scheinberg, A., Velis, C., & Alabaster, G. (2012). Comparative analysis of solid waste management in 20 cities. *Waste Management & Research*, 30(3), 237–254.
- Wilson, D., Velis, C., & Cheeseman, C. (2006). Role of informal sector recycling in waste management in developing countries. *Habitat International*, 30, 797–808.
- Zapata Campos, M. J., & Zapata, P. (2013). Switching Managua on! Connecting informal settlements to the city through household waste collection. *Environment and Urbanization*, 25(1), 1–18.
- Zapata Campos, M. J., & Zapata, P. (2012). Changing La Chureca. Organising city resilience through action nets. *Journal of Change Management*, 12(3), 323–337.