

Urban solid waste are commons? A case study in Rio de Janeiro region, Brazil.

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Abstract

May the solid urban waste can be considered a common, such as others previously studied by AID? This is the central question we propose to answer in this work, as an introductory part of the doctoral research from the author on the governance of waste management .

Recovered by individuals and communities living in precarious conditions while it became feedstock for power generation, solid waste became a secondary resource of great value. At the same time, emerged in the last two decades a strong discourse around urban ecology guiding the action public in the metropolis, intermediate cities and also sectoral policies for waste management .

Describing and analyzing the actors, the rules ,the control system and arrangements around the solid wastes from Rio de Janeiro region , Brazil, we propose in this paper an introductory analysis in the IAD Framework, in the complex network of actors and disputes that unfolds behind human waste .

Resumo

Podem os resíduos sólidos urbanos serem considerados um recurso institucional, tais como outros já estudados pela AID? Essa é a pergunta que propomos responder no presente trabalho, como parte introdutória das pesquisas de doutorado do autor sobre a governança da gestão de resíduos.

Recuperado por indivíduos e comunidades vivendo na precariedade ao mesmo tempo em que tornou-se insumo para geração de energia, os resíduos sólidos tornaram-se um recurso secundário de grande valor . Ao mesmo tempo emergiu nas ultimas duas décadas um forte discurso em torno da ecologia urbana guiando a ação publica das metrópoles, cidades intermediarias e também das politicas setoriais de gestão dos resíduos.

Descrevendo e analisando os atores, as regras, o sistema de controle e os arranjos em torno dos resíduos sólidos do Rio de Janeiro, Brasil, propomos neste artigo uma analise institucional na complexa trama de atores e disputas que se desdobra por trás do refugio humano.

Abbreviations and acronyms (translated from Portuguese)

IPEA - National Institute of Economic and Applied Research

BNDES - National Bank of Economic and Social Development

MNCR – National social movement of waste pickers

FEBRACOM - Waste Pickers Cooperatives Federation of Recyclable Materials / Rio de Janeiro

CTRS-BM - Treatment Center for Solid Waste of Barra Mansa

SEA-RJ - Department of the environment from the Rio de Janeiro State

ICMS - Circulation Tax on goods and services

PNRS - Brazilian National Solid Waste Policy

PNSM - Brazilian National Plan for Basic Sanitation

OECD - The Organization for Economic Co-operation and Development

1. Introduction

An article from the Brazilian newspaper “O Globo”, of April 3, 2014, announces the new table for portioning the Green ICMS among the municipalities of the state of Rio de Janeiro. This tax is distributed proportionally to the investment made by local governments in favor of the environment and sustainability. In addition to the preservation of areas with forest coverage, an important component in defining the sharing of the resource is the correct disposal of the municipal waste, either by neutralizing or adding value to it. In 2003, approximately US\$ 75 million from the Green ICMS were passed on to municipalities in the state of Rio de Janeiro.

This measure is part of an extensive program of territorial coordination for modernizing the management of solid waste, conducted by the Secretariat of Environment of the State of Rio de Janeiro, together with the municipalities, due to recent changes in the law promoted at the national level, among which the most important are the Brazilian National Plan for Basic Sanitation (2007) and the Brazilian National Solid Waste Policy (2010).

The central objective of this paper is to verify the possibility of categorizing municipal waste as an IAD institutional resource (OSTROM 1986, 2005, 2007b, 2011, Mc GINNIS, 2010) and making it possible to analyze all situations involving urban waste management. For this, we shall first present the elements that characterize the ongoing change begun in the 1970's, on a worldwide scale, which we shall call the transition of waste management. Next, we shall present the repercussions of these changes, as well as the characterization of the action-situation and the elements that comprise it. Finally, we shall attempt to begin an interpretation of these waste-related changes, proposing questions to be deepened in light of the IAD Framework .

It is, therefore, an introductory and non-exhaustive work, part of ongoing doctoral research. In the future, in a timely fashion, we intend to widen it to compare waste governance in different areas. Therefore, our focus is limited to the IAD Framework and the analysis of key issues, without developing *theories and models* apt for methodological deepening and compatible with IAD (idem, 2011).

2. The Transition

The concept of transition in modernity includes the idea of gaining complexity in different scales, causing changes and restructuring in spaces and regions. “A transition constitutes the interpretation of long processes which undergo variable phases and speeds” (PIRES DO RIO, 2013). These changes and restructuring lead to an institutional change supported by the territory, which is, itself, an institution stable in time (idem, POLANYI, 1983).

We shall then assume this transition is the passage from an old system of values and actions to a new, more complex, system, whose slow process of changes does not take place in a stable and linear manner in time and space; and which has, as other effects, the emergence of new actors and the dispute for new and old positions at different levels.

A few recent works already discuss the possibility of categorizing waste as an institutional resource (CAVE, 2012, CARRE, 2013). Our effort is towards giving it a yet unexplored methodological categorization.

2.1 Transition in waste management: paradigms and scales of territory management

The transition of waste management towards added value, recycling and neutralization can be seen in most metropolises and medium sized towns in the world. It does not replace basic management, but adds to it, causing a duplication of the service.

Sanitarian policies have taken on different shapes in the Western world since the appearance of *public health*. An almost inexhaustible number of works and approaches created different categories. In Brazil, Campaigner or Developmental *Sanitarianism*, associated to the decentralization of the Sanitarian Reform on the turn from the XIX to the XX century, deeply marked the Brazilian State: from urban management to the productive and exports industry, to welfare policy.

It was not different with the *invention of waste* (BARLES, 2005) and the influence of the preventive perspective in the formulation of waste related policies, explaining the concentration of resources and activities especially in the separation between man and waste, due to the increasing amount of waste produced and the consequent propagation of diseases. Urban cleaning and the removal of waste away from urban centers marked the two first centuries of waste management. In certain temperate climate countries, incineration in order to remove matter becomes an alternative, always within the same sanitarian spirit.

In a great diversity of urban contexts, the places chosen for the final disposition of the waste were usually low value places, floodable areas and even islands, which, located on the outskirts of cities, received the untreated remains of human consumption. In the city of Rio de Janeiro, urban evolution contrasts and illustrates the places chosen for disposal of municipal waste in the last 150 years:

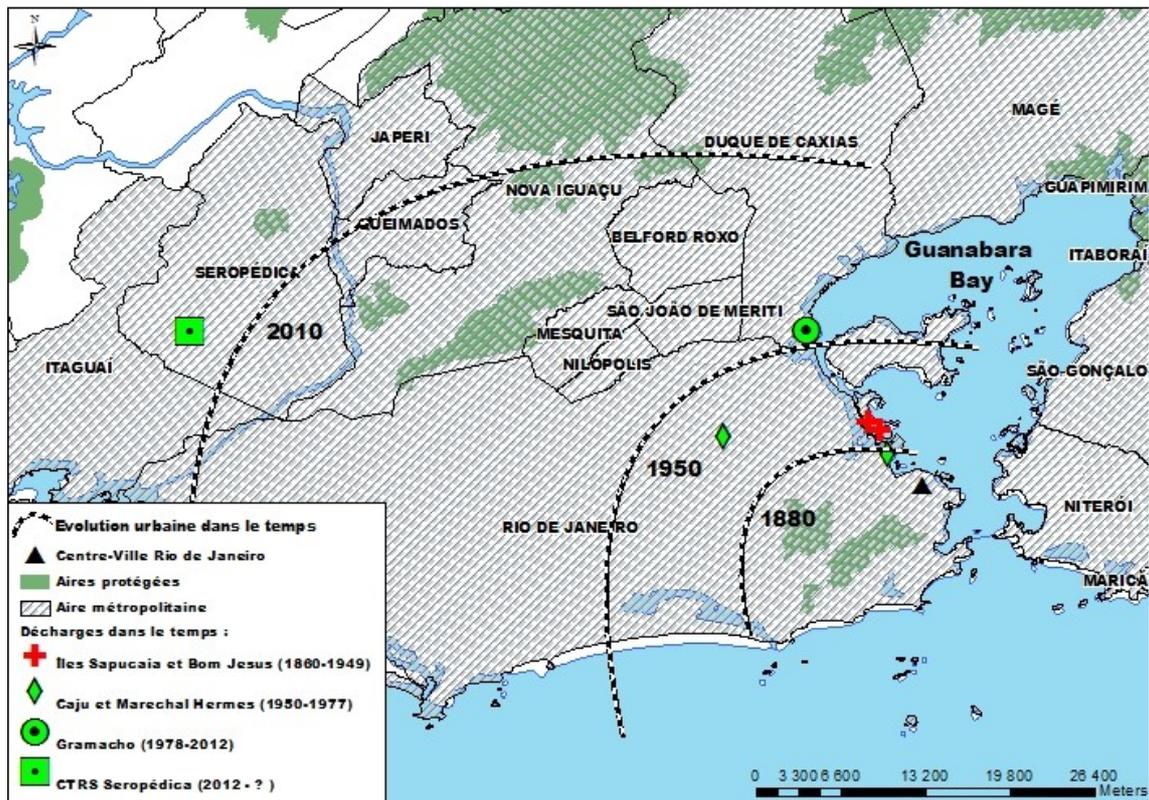


Figure 1: location of structures for waste treatment in Rio de Janeiro city, in the latest 150. Author: Marcelo Negrão

Beginning in the 1970's, the occurrence of two noteworthy facts allows us to rethink policies of public management of solid waste. The first was the founding of the concept of sustainability after the Stockholm Conference (1972) and its progressive incorporation into national and local agendas, particularly into the urban agenda and its repercussions, such as the appearance of the concept of Urban Ecology and, more recently, Green Economy.

Soon after Stockholm, the ideas that had been discussed began influencing territorial policies, promoting significant geo-institutional changes. In 1975, the pyramid of priorities of treatment, which led to the "3R policy", and the concern with waste treatment, appear at the OECD, as well as the concern with waste treatment, enlightened by the concept of sustainability. From then on, neutralizing, adding value and recycling become as central as urban cleaning. It is the beginning of the institutionalizing of practices formerly existing in a marginal or precarious manner.

In the current stage, the sanitarian and sustainability perspectives have been duly incorporated by the large international treaties on the subject. It is the case of the Bale and London Conventions, of Ecological Waste Management (EWM) of the OECD, and the European Directive (ED) 2008/98/CE. In the plain of the conception of ideas at the international level, the directives of governance on solid waste are now stabilized - even if there come to be possible reviews and specific advancements.

The consolidation of this new way of conceiving policies around waste had diverse reactions in different countries, both in the time and space spheres.

For our analysis, we understand that the transition between a sanitarian paradigm and that of sustainability added a new value to waste, making it the object of dispute between different actors, who, by appropriating it, can transform it into labor, income and capital, by adding value or neutralizing. This possibility was not considered by the formal players in the waste chain before the transition towards sustainability, when waste was seen exclusively as an annoyance to be isolated. Only Waste Pickers, working unofficially, recovered waste before the beginning of the transition. It is in this new setting, with new and old actors, that we can ask about the possibility of analyzing waste as an institutional resource.

The second memorable fact taking place in the 1970's was what the urbanist Olivier Courtard called the "end of the dogma of universalism", the notion by which the local government should assure, alone, the public and urban services, with no economic, social, or spatial distinction. This failure of local government to provide public service and urban infrastructure led to decentralizing administrative reforms in several countries, at different paces. New impositions forced citizens to take responsibility for part of the service, following this logic of decentralization, just as claim movements started pressuring the State to perform necessary reforms. In Latin America, the reforms occurred during the period of re-democratization, beginning in the 1980's. In Brazil they began with the 1988 constitution, with three-level federalism and the redefinition of the role of municipalities as entities of the federation. In Europe, the reforms towards continental integration gain depth beginning in the 1970's, such as, for example, the decentralization reform in France, in 1982.

The practices of adding value to and neutralizing waste, observed in the field, operate in the regional and local scales. In the first place, with the launching of integrated waste management policies that make the producer of the waste responsible for the screening right at the time of disposal – whether this producer is an individual or a public establishment, private or associative. But also, allied to the activities of the protagonists in the productive chain, urban cleaning, treatment, or the public sector in its often occurring role as coordinator, financier and executor of actions. This setting leads us to reflect on the deepening of the local government in the governance of solid waste, and that, taken to its last consequences, the local scale represents a sum of the scales and levels of management of the territory materialized. Therefore, using the municipality as the entry door for the study and interpretation of the articulations of the action-situation and the outcomes seems pertinent to us.

2.2 A transition of paradigms with different reactions

While the universalism dogma and the sanitarian perspective persisted, the categories of analysis of waste management were relatively simple and similar among

different arenas: equality, continuity and accessibility of the service. The transition imposed the rethinking of categories for different settings and territories. Metropolitan administrations distinguish themselves from medium-sized towns. The weight and informal and formal recycling becomes an important factor impacting national and local policies, just as the structuring or not of urban and integrated policies with this objective. In these circumstances, it seems central to us to ask what the transition changes in the organization of the service.

Urban growth and the growth of urban networks imposed scalar analysis as a condition for interpreting these ongoing changes. The scale has shown itself to be an important tool for analysis. In practice, the decentralizing and territory reorganizing reforms after 1970 give rise to new levels of competence in waste management. More than a theoretical discussion, scale is the main problem which the local government confronts in the development of new policies for waste management and, consequently, in the behavior of the agents involved. More than that, within one same scale, the interactions between levels of action and tensions between centralization and decentralization can be very different. The intensity of action of the different levels may not be the same in different cases.

If the efforts towards decentralization and the correlated legislation appear in the 1980's, only after the 1990's does the legal framework relating to waste establish itself more vigorously in the intra-national sphere, in Latin-American countries. It is based on central actions of the States, especially when it comes to legislation and financing, that the transition policies in waste management gain strength and reach the local scale.

In Brazil, the intervention of the Federal Government on this issue took place through the pressure of diverse organized segments of the population – urbanists, social movements of Waste Pickers and environmentalists – and was translated into the action of the Presidency of the Republic, the Ministry of the Environment, IPEA (National Institute of Economic and Applied Research) and BNDES (National Bank of Economic and Social Development), which together were responsible for the initiative of changing the legal framework and the leveraging of local policies relative to the sector. To mention an example that differs in form, in France, the national government determined the responsibilities of ADEME (French National Agency of Energy and the Environment), several ministries, and the *Schémas de cohérence territoriales* (Territorial coherence schemes), around the discussion, regulation and control of waste management. The administrative role of the State is more or less complex according to the country.

As a consequence of this dynamic, actors become more diversified, especially non-governmental. Thus, the articulation between the ideas born at the international level takes shape together with the activities performed at the local level, with a deep reaction in the behavior of the individuals involved.

In Brazil, waste treatment was incipient until the beginning of the 1990's. The changes announced – and more particularly the obligation to extinguish open air dumps, still in 2014 – not only introduced Brazil into the OECD's pyramid of opportunities, but created a new, formerly inexistent, market – that of waste treatment. This led not only to the emergence of new actors, but also placed them in a prominent position in the local agenda. The creation of a new market began moving a significant amount of resources, altered the urban planning by means of a new collection, transportation and treatment logistics, and articulated new actors, adding dynamics to an emerging productive chain.

	2000		2008	
	Ton / day	%	Ton / day	%
Landfills	49614,5	35,4	110044,4	58,3
Monitored dumps	33854,3	24,2	36673,2	19,4
Dumps	45484,7	32,5	37360,8	19,8
Composting	6364,5	4,5	1519,5	0,8
Sorting for recycling	2158,1	1,5	2592	1,4
Incineration	483,1	0,3	64,8	0,1
Dumps in wetlands	228,1	0,2	35	0,1
Not fixed places	877,3	0,6	SI	
Others	1015,1	0,7	525,2	0,3
Total	140080,7	100	188814,9	100

Table 1: Progression of ways to treat waste from 2000 to 2008 in Brazil. Source: IPEA

On the other hand, this multiplication of actors leads to certain tensions around waste governance. It can even be said that these tensions are more accentuated in denser urban fabrics, in metropolises, where finding consensus around a proposal becomes an even more difficult task. Thus, the disputes around the appropriation of waste, access to the market and positions at different levels of the productive chain have become fiercer. The majority of conflicts are in the socio-economical and environmental spheres. The institutional transformations result largely from this game among actors and the intrinsic conflicts. The shock between the National Movement of Waste Pickers of Recyclable Materials and the government is an illustrative example. The Waste Pickers defend that they render a service in the public interest when collecting the recyclable materials, and demand, as a counterpart, that they be formally hired and remunerated by the municipal administration. In January 2007, federal legislation was altered in order to allow such hiring without launching a public notice. However, few municipalities employed Waste Pickers' Cooperatives to render services of selective collection and waste screening. The reason for this, according to the Waste Pickers themselves and public agents interviewed, is the lack of knowledge of the law by the municipal administration or the fact that sometimes the Waste Pickers are deemed incapable of being formally held responsible for this task.

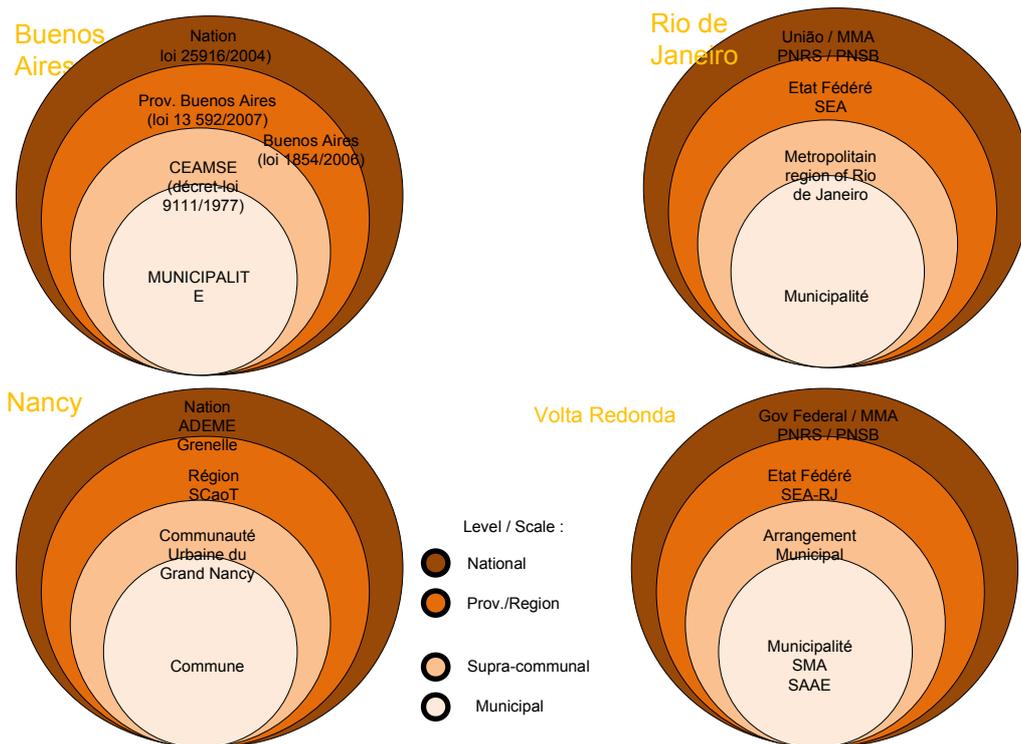


Figure 2: New governance of waste and rescheduling of territorial management in different arenas. Extracted from *Comparer villes moyennes et metropoles: la gestion des déchets*. M-N Carré / M. Negrão, IDA, 06/02/2014.

2.3 Neutralization, adding value and recycling

Looking at the priorities pyramid for waste treatment, it is possible to note a few things that will be subsequently useful.

i) In what refers to the way of treating garbage itself, Brazil was, in general, below the floor of the OECDs pyramid of priorities before the PNRs. The exception to his generalization is in the percentages of recycling reached due to the precarious work of Waste Pickers, who assured the existence of the recycling work.

ii) The PNRs guaranteed, at first, the ascension of Brazil to the floor of the pyramid, via neutralization, which brings with it advancements, especially in limiting the contamination of natural resources. However, the waste continues to be completely destroyed, with little or no use of it as an energy resource. The following priority stage would be energy production from destroyed waste matter, by means o of one of the many possible techniques. Finally, advancing in the priorities, selective collection for recycling creates the necessary conditions for the circulation of the waste matter and increasing the secondary market for this matter, in which waste fully gains its value as a resource, beginning to compete against or complement commodities in the production of durable and non-durable consumption goods. Nesse cenário que se desenha, nosso interesse é por analisar os resíduos em uma perspectiva de competição entre a apropriação para a eliminação x apropriação para reciclagem. In this developing setting,

our interest is in analyzing waste from a perspective of a competition between appropriation for elimination x appropriation for recycling.

In this perspective, the productive chain and the flows of waste matter comprise a subsystem of governance, which, in turn, will have a strong effect on the results, divided into the elimination and the circulation of waste matter and, consequently, the function of garbage as a resource.

Lastly, other pertinent aspects related to the rearrangement of the territory will not be approached in this paper, which, as said before, does not intend to be conclusive. The notion, sometimes contested, that waste management is categorized as a hybrid service, which a strong territorial anchorage, at the same time as it participates in global circuits and flows (waste is like a “mark of globalization”) will purposely remain unexplored, for, due to the heterogeneity of situations, it would demand that we discuss models in a space we do not have here, in addition, possibly, to other methodological choices.

3. Action-situation: Rio de Janeiro, Brazil

We shall use in the present article the case examples of the state of Rio de Janeiro for the regional scale. And for the action-situation, we shall work with the actors invested in the various sectors of waste management in the municipalities of Volta Redonda and Barra Mansa, which comprise the “Sul Fluminense I” region of the zoning proposed by SEA-RJ.

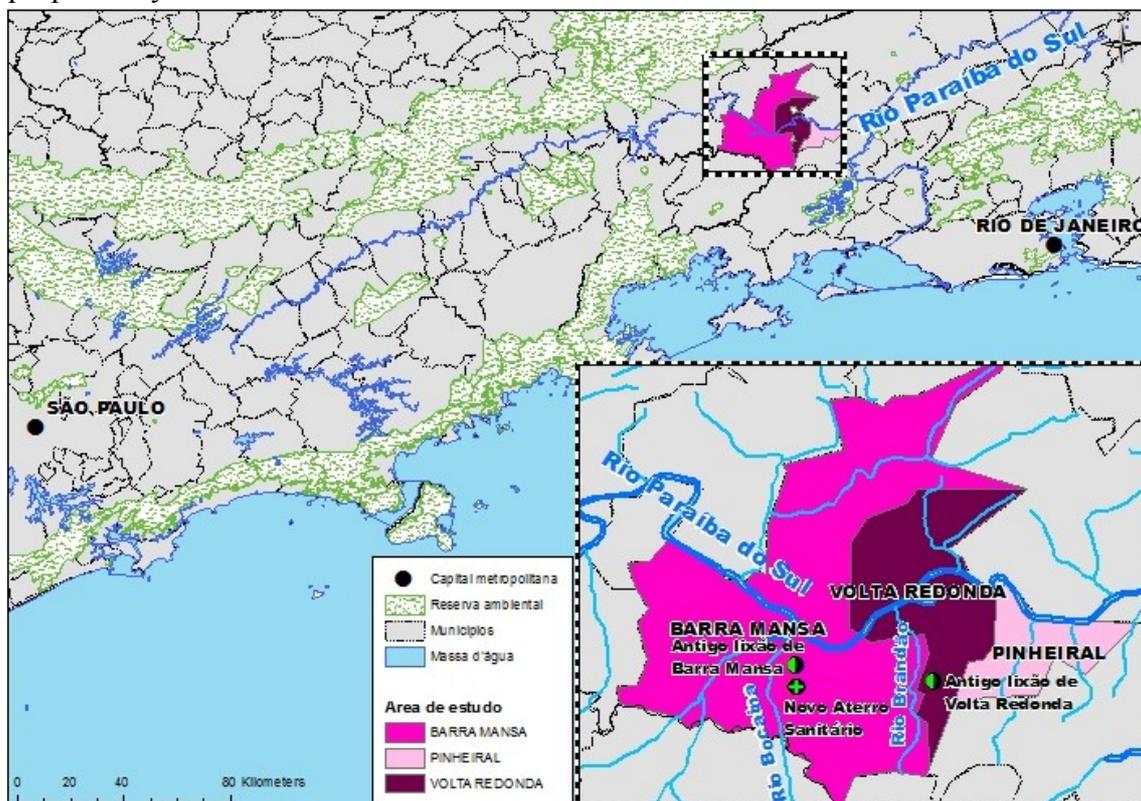


Figure 3: Study area between two metropolises. And the zoom, the position of the s untreated dumps, the new landfill and the region rivers. Author: Marcelo Negrão

The towns of Volta Redonda (270 thousand inhabitants) and Barra Mansa (180 thousand inhabitants) are on the highway axis that connects the two largest cities in the country, Rio de Janeiro and São Paulo. The micro region of Vale do Paraíba is one of the most industrialized in Brazil, especially in the steel, automotive and nuclear industries. Commerce and services are also quite relevant in these two municipalities, which aim at consolidating and deepening their central role in the region between those two metropolises.

The two other towns comprising the Southern Region of Rio de Janeiro are Pinheiral - RJ and Rio Claro – RJ, which, together, have 38 thousand inhabitants and produce approximately 500 tons of garbage a month. However, Pinheiral is still sending its waste to the town of Piraí-RJ, and Rio Claro has not deactivated its dump yet.

In Rio de Janeiro, before the PNRS, the level of integration and coordination between the different actors in waste management was quite heterogeneous at the local scale, and relatively low at the regional scale. The state's municipalities were often subjected to suits for environmental crimes, for contaminating the natural resources near their dumps. The municipalities claimed there was a lack of technical and financial resources. The State Office of the Public Prosecutor constantly spoke up against the environmental crimes. The municipal administration of Volta Redonda took approximately 20 years to find a satisfactory solution and saw some of its managers threatened with arrest for crimes against the environment.

The two large, confluent basins of the state of Rio de Janeiro are that of the Paraíba do Sul River and of the Guanabara Bay. The untreated dumps have become one of the most important factors in polluting these waters. The metropolitan region of Rio once had up to 16 municipal dumps and landfills, which, not having been made impermeable, spilled their leachate in the waters of the Guanabara Bay, including the Gramacho landfill, considered, until its closing, the largest in Latin America, with more than 10 tons of waste on a daily basis. In the municipalities of the interior, more than 30 municipal dumps spilled leachate into the Waters of the Paraíba do Sul. In Volta Redonda, the waters of the Brandão River cross the recently deactivated dump, before spilling into the Paraíba do Sul. In Barra Mansa, the Bocaína River, also an affluent of the Paraíba, crosses the area of the deactivated dump. The CTRS-BM is on the margin of the Carioca River, an affluent of the Bocaína, in three points of which there are plans for contamination control.

The Scavengers of recyclable materials, organized into two large fronts, FEBRACOM and MNCR, reached relative success in regards to specific training and funding programs, but, in general, precarious work and isolation from other local areas of activity were their daily reality.

Preventive measures, on the other hand, meant a better structured public service in waste, despite discontinuities of the urban fabric, commonly observed in a movement

from the center towards the peripheries in the *medium-sized and metropolitan region towns*. The only attractive market for the private sector was urban cleaning. Only the public sector and the Waste Pickers' Cooperatives, usually precarious and immobilized, worked in waste treatment.

Coming into force in 2010 and establishing 2014 as the limit for the eradication of open air dumps, the National Policy of Solid Waste forced the states and municipalities to take measures and own responsibilities in territory and waste management. The SEA-RJ immediately took on the coordination of the state's sectoral policy, as determined by the new law. It created a zoning to centralize and modernize treatment structures and aided the local government in deepening its role in urban cleaning and selective collection, as well as in funding new expenditures.

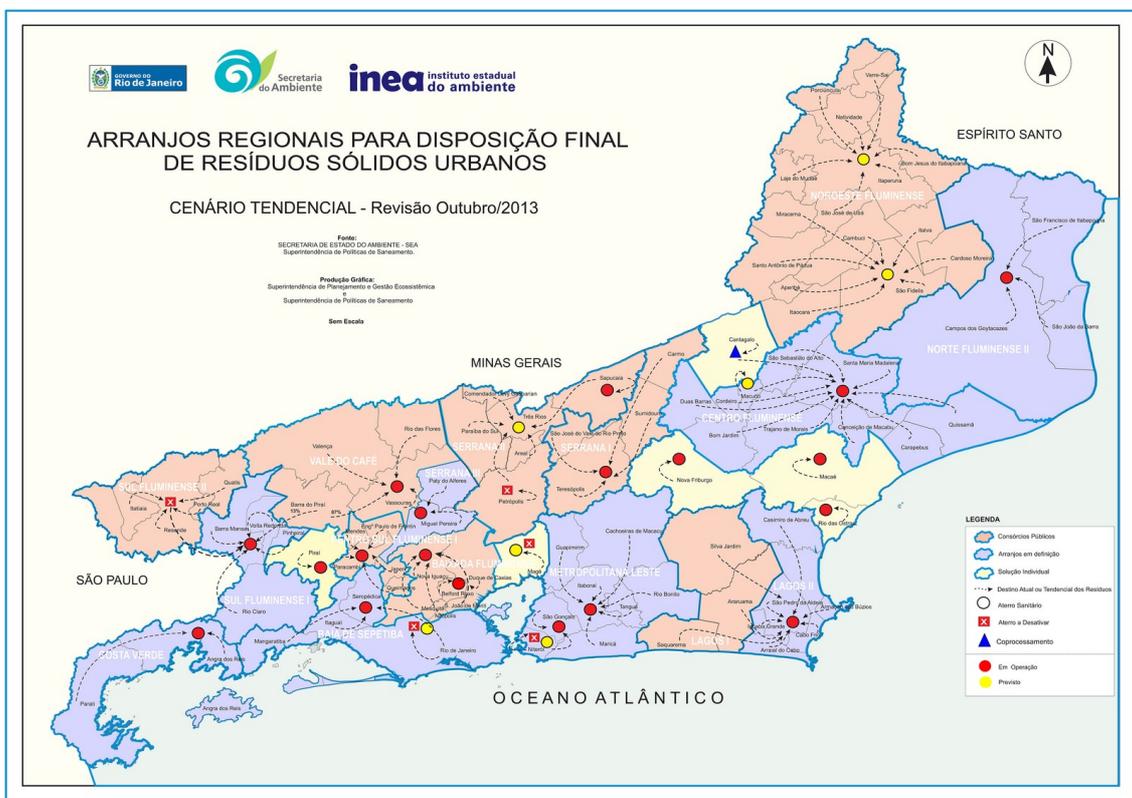


Figure 4: SEA-RJ management of solid waste zoning and municipal arrangements. Author: Superintendência de Políticas de Saneamento e Superintendência de Planejamento de Gestão Ecológica do Estado do Rio de Janeiro. Extracted from: <http://www.rj.gov.br/web/sea/exibeconteudo?article-id=926885> (April 30th)

The opening of the new Treatment Center for Solid Waste of Barra Mansa (CTRS-BM, a private company belonging to the Haztec group), in April 2011, corresponded to the closing of the activities of the dumps of Volta Redonda and Barra Mansa, and the beginning of the transition phase in the Southern Rio de Janeiro region. It is foreseen that other municipalities in the Southern Region I and II of the SEA-RJ zoning (according to Figure 4) will begin sending their waste to the CTRS-BM.

	2007	2010	2012	2014
	%	%	%	%
Dumps	41	27	10	3
Monitored Dumps	36	50	26	15
Sanitary landfills	9	22	64	82

Table 2: Status of disposal of solid waste in Rio de Janeiro State. Source SEA-RJ

1990	2000	2007	2010	2014
1,00%	3,00%	3,00%	7,00%	9,00%

Table 3: Evolution of recycling in Rio de Janeiro State. Source SEA-RJ

The territorial incoordination among municipalities was one of the commonly reported causes, in interviews, that prevented the modernizing and integration of the treatment structures. An adequate sanitary landfill, in compliance with all regulations, has a relatively high cost of creation and operation for most municipalities, especially small and medium ones. On the other hand, it can serve several municipalities, with an average life of 20 to 40 years. Municipality Consortia were then the obvious alternative, which was materializing in practice. Field interviews with municipal managers led us to conclude that the main obstacle was the fact the Brazilian Federative Law is discretionary and not prescriptive. Many mayors were not willing to take a portion of their municipal budget to place in a neighboring town. And even if they did, the legal fragility to which the terms of these contracts are submitted did not oblige them to remain engaged over the years. The election of a new mayor opposed to the project could mean the municipality would leave the consortium. Realizing this we sought information about consortia in other matters. In fact, municipalities tend to form consortia when there is a financial counterpart, such as in the health area, where the SUS (Unified Health System) makes disbursements. For public services whose budgets are their own or are not subjected to conditions for the release of funds, consortium formation is weakened. The Brazilian consortium law differs from certain other countries as it is sectoral, which means the consortia have a specific objective: health, or education, or transportation, etc. In France, for example, the so-called “inter communing” (the forming of communes) is conducted aiming at territorial development, bringing together all subject areas under the same management.

When taking on the coordination of the activities, offering a financial counterpart (in addition to the Green ICMS, the state now pays for up to 50% of the costs of treatment in the new landfills), the state government created conditions for the continuity of the projects. Additionally, the zoning divided the municipalities into two categories: Municipal consortia and “independent” institutional arrangements. In the first case, the costs and governmental conditions tend to be similar for the set of

municipalities joined around the consortium. In the second case, the negotiations occur of a case by case basis, with advantages for the municipalities that produce more waste or that host the Private Sanitary Landfill. These advantages relate to the cost of treatment and logistic facilities.

In this context, the municipalities have left their position of isolation and of being the single manager of urban cleaning services, moving into a situation of coordination of a network of emerging actors, highlighting the entrance of the private sector into the until then incipient market of waste treatment. Companies from the engineering and earthworks industry are designated by public contract to offer the service of neutralizing the waste in a sanitary landfill compliant with regulations.

Recycling, although it is present in this new model of territorial coordination, has not evolved as fast as neutralization. The regional coordination created specific programs for the metropolitan region of Rio de Janeiro, related to closing the saturated old controlled sanitary landfills, where a significant part of the precarious work of recycling took place. In the rest of the state, the activities were placed under the responsibility of municipalities, with a timid regional incentive. The role of the municipality becomes coordinating collection, preventive and selective at the same time, assuring that the recyclable waste reaches the actors that will take ownership of it in the productive chain, whether individual, private, or associated. This lack of clarity and relative lack of coordination of the actions for adding value imply difficulties in the evolution of the numbers in recycling, and particularly the numbers connected to the formalization of this industry. The percentages of recycled garbage are still significantly dependent on informal workers in precarious conditions, and the formalized Waste Pickers' Cooperatives are still dependent on manual labor, with a very low degree of mechanization, preventing efficiency gains in comparison to the recycling chains of other industrialized countries, or with neutralizing activities in new Brazilian landfills.

	Recycled waste (x1.000 ton/ano)	By officials programs	Participation of official programs (%)
Metals	9817,8	72,3	0,70%
Paper / Carton	3827,9	285,7	7,50%
Plastic	962	170,3	17,70%
Glass	489	50,9	10,40%

Table 4: Share of formal programs in total waste recycling. Source IPEA, 2008

On the other hand, the main focus is the importance given to the system by the local government. The creation of a new market opened a window of opportunity that tends, at least for now, to reduce the conflicts between different actors. This window of opportunity will close gradually as the actors in the waste treatment market become more consolidated and stable. One of the main causes of this picture is the fact that, contrary to what is observed in other arenas, the revenue of urban cleaning services in Brazil, and particularly in Rio de Janeiro, is calculated according to market estimations and not the actual collected weight. Additionally, the actors in collection usually do not participate in the treatment (with the exception of the Waste Pickers). The consequence

is that the immediate gain of a new actor, when appropriating the waste, does not imply an immediate loss of revenue for the other, as we shall see further ahead. It can also be observed that, in certain arenas, the fact that the same actor collects and treats the waste, and that the payment for the service is calculated according to the real weight, impose difficulties upon the evolution or percentages in waste recycling. This is the case particularly of large French cities and especially Paris, where, despite recent advances in legislation and funding mechanisms, the numbers in recycling have not evolved satisfactorily.

Finally, another emerging malfunction with the recent zoning of SEA-RJ is that of the logistics of transportation of municipal waste to the new sanitary landfills. The creation of treatment hubs, with transfer stations, in addition to the choice of low value areas on the limits of the urban fringe, causes the garbage to travel up to 80km from its disposal to its final place of treatment.

All of these qualitative and quantitative changes, produced in different intensities, bring to the discussion the limitations that may appear over time, inviting us to project outcomes based on the elements and analysis available, and imagine what the post-transition, stabilization time in waste management would be like.

4. A Frame of an action-situation

The formerly announced transformations, ongoing in the scope of the SEA-RJ zoning, require care in the characterizing of our action-situation, precisely due to their transitory character. On the other hand, and for the same reason, they awaken a real and practical interest in the analysis of the possible outcomes.

4.1 The Set of Actors

The town of Volta Redonda today produces an average of 5,600 tons of municipal waste per month. This means an average of a little more than 700 grams of garbage per person/day. Of this total, approximately 500 tons (9%) are recycled, and the rest, formerly sent to the municipal dump, goes to CTRS-BM. Approximately 50% of the city is covered by the service of collective selection, which collects 15% of all the recyclable garbage. According to our interlocutors at the municipal administration, the goal is to reach up to 2 thousand tons of recycled waste per month, through technical and financial incentives to Cooperatives. In Volta Redonda, the concessionary urban cleaning company guarantees the selective collection and delivers the recyclable garbage directly to the warehouses of the recyclable waste Cooperatives.

The town of Barra Mansa, which is commemorating its 150 years of public urban cleansing services, produces an average of 3,500 tons of waste per month, or 650 grams of garbage per person/day – and recycles approximately 250 tons, 7% of the total. The remaining 3,250 tons, which, until April 2011 went to the municipal dump, are treated at the CTRS-BM.

4.1.1 The operators of public service

The basic service, street sweeping and garbage collection, is assured in Barra Mansa by a partnership between the municipality and the VEGA Ambiental company (a branch of the French *Suez Environment*). The municipality is responsible for street sweeping, with 75 sweepers, and VEJA collects the garbage from homes, public and commercial buildings, with 38 employees. In practice, VEGA does not take appropriate of the garbage, but is responsible for its transportation to the appropriators, CTRS-BM and COOPCAT (Cooperative of Materials Waste Pickers of Barra Mansa). In Volta Redonda, the service is private and delegated by public contract to the Multi-Ambiental company, in charge of the collection and transportation of the 5,600 tons to CTRMS-BM and the three Waste Pickers' Cooperatives of Volta Redonda (Cooperativa Cidade do Aço, Folha Verde and Reciclar).

. CTRS-BM occupies a central position in the new coordination of solid waste management in the Southern Rio de Janeiro Region and, consequently, in the appropriation of the region's waste. Today it receives between 600 and 800 daily tons of garbage per month, for neutralization. The municipalities of Volta Redonda and Barra Mansa send in approximately 5000 to 3200 tons per month, respectively, at a cost varying from R\$ 25.00 and R\$ 35.00 per ton.. There was no conflict with the other actors in order to receive municipal waste from the two towns when they entered the Haztec Group (CTRS-BM). Operating other Sanitary Landfills in the state, the group proposed to SEA-RJ the construction of this private landfill and made bilateral agreements with the municipalities in the region, which had been suffering sanctions from the Public Prosecutors' Office for damage to the environment. The municipality of Barra Mansa also delegated to this group the responsibility to contain the former municipal dump. In addition to municipal waste, the CTRS-BM receives waste from large private corporations, such as the National Steel Company (CSN), the Votorantim Group and the Nova Dutra Highways' Concessionary, whose contracts are under commercial secrecy.

The CTRS-BM has a total area of 240 square meters, but, so far, 48 thousand square meters have been licensed by the environmental body to neutralize waste. This area is sufficient for operating during 20 years with up to 1000 tons of waste per day.

There are four Waste Pickers' Cooperatives, as previously said, working in the two cities. In Barra Mansa, COOPCAT has 48 permanent Waste Pickers and 12 occasional ones, who recycle 200 tons per month, with an average revenue of 1.5 minimum wage (R\$900, 00) per worker. In Volta Redonda, the Cidade do Aço, Folha Verde and Reciclar Cooperatives have a total of 59 Waste Pickers, recycling close to 400 tons. The materials screened by the Cooperatives go to a great variety of buyers, in a very fragmented way, according to the price offered by each one. In general, however, there are two types of buyers: the *intermediaries* and the transformation industry, both of which will return the waste to the productive circuit, transforming the already used

matter into new matter, adequate for consumption. The remuneration of the Waste Pickers comes exclusively from the sales of this waste for recycling.

One of the activities most difficult to quantify is that of the isolated Waste Pickers, who don't participate in recycling Cooperatives or Associations, due to the instability and precariousness they are submitted to. However, there are two types of Waste Pickers according to their place of work. The first is that of those who work directly in the dumps. In Barra Mansa, there were approximately 30 Waste Pickers, who sold the product of the Scavenging right there to an intermediary. With the closing of the municipal dump, some of these were hired by the CTRS-BM (initially ten, today only three remain in the company), 15 others went to the Cooperative in the town, and as to the remainder there are no precise records. According to information from the local Cooperative and from public managers, some went to do Scavenging in the towns' streets and other abandoned the activity. The intermediary continues his work away from the dump area, and is an occasional partner of the Cooperative. There has been no recent census of these other isolated Waste Pickers in the town, but it is estimated that they are responsible for the recycling of at least 50 other tons of waste per month¹.

In Volta Redonda, the number of Waste Pickers working autonomously is also unknown, although their presence can easily be noticed in the town's streets. It is estimated the 20% to 25% of the total of recycled waste in the municipality is attributed to these isolated workers, or approximately 100 tons per month. Although Scavenging is not a Constant activity for many of those who practice it, some Waste Pickers, isolated or in Cooperatives, keep very lasting bonds with neighborhoods and residences in the town. They have fixed times of collection and engage many citizens in separating the recyclable waste, instead of leaving this service to official collection. The estimated income of individual Waste Pickers, according to interviews, is less than one local minimum wage.

4.2 The actors in positions

The role of the government in respect to waste is perhaps more accentuated in comparison with other types of institutional resources, since it is a resource and, at the same time, an object of continuous public service. Based on this, one can distinguish two ways of designing positions. The first is in relation to rules and arrangements, encompassing the government, citizens, and certainly the appropriators. The second, in terms of the productive chain, is that which gives it a true character of a resource in the economic and productive sense.

As to rules and arrangements, the design of institutional relations can be presented following **Figure #2** from this article.

In regards to the productive subsystem, resulting from institutional coordination, the productive chain can be designed in two possible ways – one related to the circuit of neutralization and the other to that of recycling:

1 Estimation based on interviews at the Cooperatives at SAAE-BM.

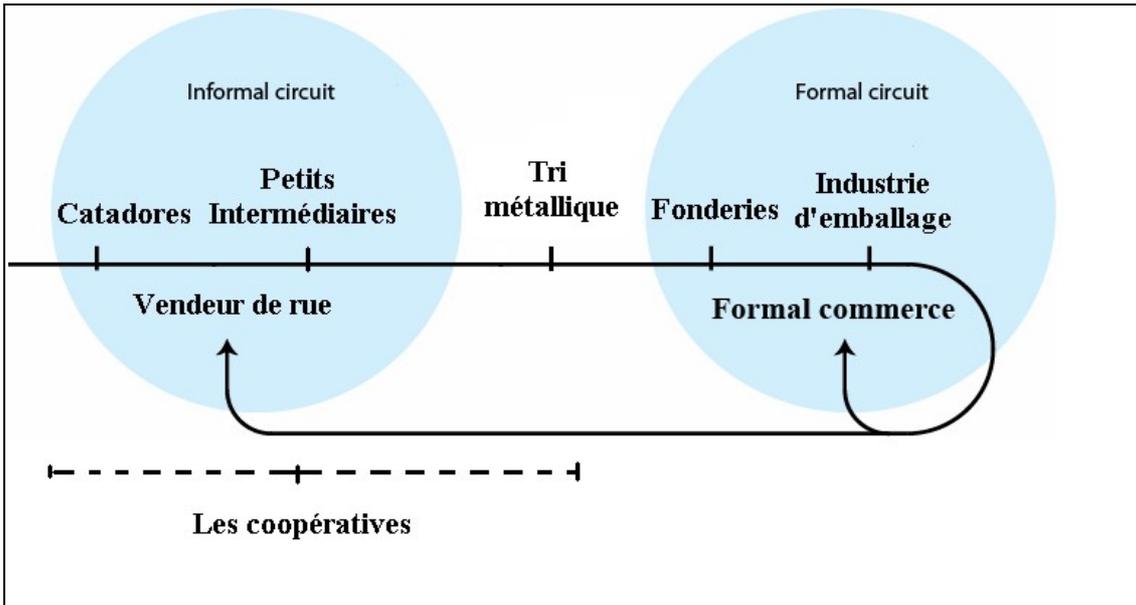
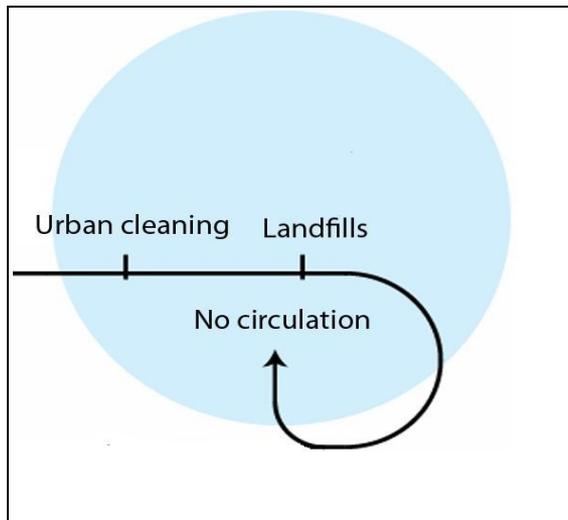


Figure 5: Recycling productive chain, based on the Waste Pickers (*Catadores*) work.

Figure 6: Neutralization Chain



4.3 The set of allowable actions and used technologies

The position of the actors is very revealing of the rules in play. The service operators commonly report to the government, which defines the rules at the time of contracting. The window of opportunity provoked by the transition and emergency of a new market has as a consequence the structuring of a new public space.

Essentially, the urban cleaning service has a low level of mechanization, if compared to other resources, and even other public services. It is a plural activity that mobilizes *garis* along with vehicles for collecting waste and street sweepers. This service is conducted in the eyes of citizens, who will lose sight of it when the waste is delivered to the agents responsible for treatment.

The CTRS has been progressing in terms of the amounts of waste appropriated and has adopted, as a strategy, the expansion to other markets of the region (companies and other municipalities). Since the market is assured by public contract, so far it has not been attractive to fight over amounts of resources with Cooperatives and isolated Waste Pickers, which might occur in mature markets, in which there are strong claims over the property of garbage. The CTRS-BM contributes a moderate degree of technology: scales at the entrance of the trucks into the landfill, coverage of the soil with polyethylene blankets, the burying of the waste by means of management of the water basin and backhoes, and the elimination of leachate, which, in this case, is not yet treated *in loco*.

The Waste Pickers, in turn, are very territorial in their actions, and there are formal and informal agreements among groups and with the government. For Scavenging, agreements are necessary among the Waste Pickers themselves. Principles of antiquity, solidarity and belonging are the commonly adopted criteria. At the same time, to receive waste from public services, it is necessary to have the agreement of the local government. The technology employed by the Waste Pickers is all provided by the local government. In Barra Mansa, in addition to the screening warehouse, two trucks and three cars are made available to the Cooperative. In Volta Redonda, in addition to the direct delivery of the garbage to the Cooperatives, the municipality recently made available a warehouse to be shared by three Cooperatives, a conveyor belt and a press for the screened garbage. Partnerships with the public sector have proved strategic for these actors.

4.4 Potential outcomes

Transition, as has been said, suggests a path towards stabilization. In these terms, the entropy that determines the institutional value of waste seems to have been reached. The consolidation of operators of sanitary landfills tends to appear as one of these factors, as they have gained an important weight in the local political agenda and become consolidated as a factor with a great capacity for institutional articulation, possessing significant knowledge and financial resources. But that is not all. Its way of action can vary over time, particularly with the advancements in adding value to waste. This is actually the key point that tends to raise disputes among other actors.

The inclusion of Waste Pickers via organization in Cooperatives and Associations can potentially prosper – however, the competition of private and economically stronger organizations, especially those that operate in neutralizing, appears as a question mark. Another factor which, in the area of generation, can affect the Waste Pickers' work is the macroeconomic conjuncture of the country. If a parallel is drawn with other countries that have completed the industrialization cycle, there this activity practically became extinguished: not due to formal integration into the productive chain, but because of the social improvements that took place in the postwar boom – the *Chiffoniers* in France, for example. Yet we point out that, with the crisis of

the Welfare State and the recent economic crisis, they have come back, now answering to the name of “Biffins” in the streets of the Parisian metropolis.

Anyway, the integration of part of these Waste Pickers, through the Recycling Cooperatives, seems also to have reached a point of no return. More elements are, however, necessary to try to analyze which is the probable point of balance between these correlations of strength.

4.5 Level of control over choice

Formal control over appropriations is conditioned, established by formal rules (laws), largely because it deals, once again, with the object of a public service. It is this control that delegates and determines appropriation, both by the actors in urban cleaning and the final treatment. It is also up to the government to apply sanctions for any deviations and malfunctions of the service. These sanctions may come either from the executive branch, or from the Public Prosecutors’ Office and the Judiciary Branch, in the shape of verbal or written warnings (Terms of Adjustment of Conduct, for example), or through economic sanctions, in the shape of fines or forbiddance from conducting one’s actions temporarily or definitely.

In what refers to the appropriators of the waste, the margin for imposing control is relatively low if the government is not compliant. However, one type of arrangement that captures our attention is that of Scavenging in competition with the public service. The current system of rules and remuneration establishes a symbiosis between the two, in which all the waste informally collected by Waste Pickers implies attenuating the services of the company to which public cleaning is delegated. The Scavenging activity, even if it is not formally recognized, is tolerated by the concessionary and the government because it does not imply losses for either – and has the added benefit of promoting recycling. Thus, one formal actor refrains from exercising its right to claim and to sanction the other, for the benefit of both.

4.6 The information available

Philippe Chalmin, in his work about “Du rare à l’infini, Panorama des déchets 2009”, points out the extreme difficulty of working with information about waste, citing the uncertainty of the basic information, such as the number of workers in the waste chain, in world as a whole. He considers that this challenge extrapolates the academic sphere and reaches the actors themselves, intermediated by the government.

The CTRS-BM, as part of its strategy of occupying all or most of the neutralization market in the state of Rio de Janeiro, coordinates its information strategically at the regional scale, together with the SEA-RJ. The result expected by both, of this sharing of strategic information, is that the state of Rio de Janeiro should become, still in 2014, the first State of the Federation to extinguish all dumps.

In what refers to the operators of the services of urban collection and cleaning, what can be observed, considering the scarcity of information on these actors, is that

they act at the regional and local levels, and there may be information exchanged between the actors in the segment themselves.

As to the Cooperatives, functioning within a fragmented logic and with no aspirations to act regionally or nationally, normally they have information restricted to their local action.

4.7 The costs and benefits

The cost-benefit relationship is revealing of a series of preferences of the actors. According to Gérard Bertolini, sanitary landfills are the form of treatment with the greatest markup, among all forms of treatment. This partly explains the viability of quickly marking large investments in land, management, water basins, earthworks and technology, so as to assure the neutralization of waste, as well as a specialized labor force. Waste Pickers, with their precariousness and low mechanization, in addition to not being remunerated by the government, have, no doubt, the worse relation between the work employed and the results obtained. From the point of view of the government, the relation is inverted: with very little investment, the municipalities recycle almost 10% of the waste, paying the cost of precariousness – a precariousness which results in a limitation of the increase of the percentage of recycled waste, due to lack of efficiency in what refers to investments in capital. The problems recently faced, of discontinuity in the services provided by the local governments in Barra Mansa and Volta Redonda, which have led to successive exchanges of the service providing companies responsible for basic waste collection, also reveal the limitation of the investments in labor and equipments that these companies are willing to make, to cover the service satisfactorily.

5. Final Considerations

The hypothesis that waste constitutes an institutional resource is valid and opens the way for deeper study. However, this validity must respect a few premises. As every other resource, waste only has this status if a set of conditions are present, which define its appropriation and use by several social groups.

As we have demonstrated, the transition that was triggered by the emergence of values around sustainability was decisive for waste to start being recovered and reintroduced into the productive circuit, causing waste to cease to be an annoyance and become a resource. As to the emerging actors that resulted from this transition, they created the necessary conditions for an institutional analysis, as they fostered the emergence of a new productive economic cycle, in addition to producing arrangements and fighting over the appropriation of garbage.

The clues as to the continuation are plural and complementary. They may follow the direction of the studies of the flows of secondary materials, of territorial and urban governance, in addition to deepening the analysis of institutions and actors, which may lead to the forming of theories and models. The next step, however, seems to follow

with the characterization of the design-principles, in order to complete the analysis of the Framework.

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