Urban solid waste in southern countries: from a blurred object to common pool resources

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EXECUTIVE SUMMARY

It has been too long that the question of the municipal solid waste management in developing cities has had the replication of Northern operating devices as the only valued answer. Countless failed projects and 'white elephants' have followed. Comprehending the solid waste handling in the South implies reconsidering the proper definition of garbage, through a social, economic and territorial lens. Where does the product end and where does trash begin? The answer to this question is far from being obvious. Garbage appears as a blurred object. Its nature is by no means immanent. It largely depends on local practices as well as on the existing management/recovery devices. This debatable issue is all the more relevant today, when urban solid waste management approaches in the developing world are being reformulated: dumping sites are banned, sanitary landfills are imposed, separate collection and recycling schemes are beginning to be implemented.

Through our two case studies of one-million inhabitants from emerging countries – Coimbatore in India and Vitoria in Brazil – we show that the frontier between garbage and resource is fluctuating, if not untraceable. Appropriation conflicts arise. They do not only oppose (public or private) municipal service operators to actors from the informal sector (wastepickers, itinerant waste buyers, traders). Various huge industrial groups are also starting to target domestic recyclable waste as an alternative for raw materials, which costs are increasing ever more. Industrial ecology, livelihood issues and public service delivery unfold in urban areas.

Our empirical elements lead us to refuse the dichotomy between trash and resource. We demonstrate that there exists an inextricable link between garbage landfilling and resource recovery/valorization. Our thesis is that the whole urban waste deposit should be seen as common pool resources, mobilizing E.Ostrom's concept in urban context in order to acquire a systemic understanding. This unseen approach happens to be particularly fecund in cities from emerging countries. Furthermore, it might well be a much more convenient analytical framework in order to tackle the solid waste issue in Southern countries, which represent the majority of today's urban world.

INTRODUCTION: NEGLIGENCE AND MIMESIS

Although the level of expertise has definitely improved, particularly in Northern countries, since the 1970's, the solid waste management sector remains quite neglected. Such an observation particularly applies to Southern countries, due to an insufficient socio-economic development which

has led deciders to give priority to the "brown agenda". Hence, solid waste management (SWM) has long been ignored and appears today as the least developed urban public policies sector.

Given the little importance attached to the SWM question in developing countries, the policies have for long consisted in applying management methods and technologies, imported from Northern countries, with little or no adaptation what so-ever. The replication of Northern operating devices has been seen for decades as the only valued answer. Countless failed projects and 'white elephants' have followed. Many incinerators were built, disregarding that the SW composition in poorer countries is mostly organic and hence not fit for combustion.

The symptomatic example of the resounding failure of Lucknow's biomethanation unit (India) is even more telling. In 2000, the municipal authorities of this city from Uttar Pradesh have implemented an ambitious and very costly scheme consisting in the energetic valorization of organic waste. The project was settled through a public-private partnership (PPP) with a consortium composed of Austrian and Singapourian companies. This treatment process entails new demands concerning the composition of solid waste. According to the feasibility study, such a technology did correspond to the quantity and quality of the municipal solid waste (MSW) produced in Lucknow. Nonetheless, the "waste-to-energy" plant did not work well, much less electricity was produced than expected and it exploitation ceased after five months only.

In order to justify such a tremendous fiasco, the municipal authorities blamed the expertise and technology from the private consortium; whereas the operator claimed that the data given by the authorities did not correspond to what they eventually had to deal with. However, another explanation seems to have been passed over in silence. According to the local civil society, the municipal scheme would actually have stumbled over informal waste recovery circuits: the municipal collection agents would channel the organic waste as food for their own pigs and chicken raising activity. The new waste processing technology had thus come into competition, for a precise section of the municipal solid waste deposit, with an informal organic waste valorization network.
Such an example is only one among many others of an approach which consists in tacking a technology in use in rich countries, on the basis of a superficial evaluation of the local reality.

As H. Coing and I. Montaño put it, in 1984: "w*e shall never reflect enough on the unbelievable economic efficiency of "informal" recovery systems in front of the repeated failure of heavy investments in sorting units*" (Coing et Montaño 1985).

THE INSTITUTIONAL LITERATURE FAILS TO CHARACTERIZE THE SERVICE

This issue is all the more relevant today as urban solid waste management approaches in the developing world are being reformulated. Indeed, as dumping sites are banned and sanitary landfills imposed, separate collections and recycling schemes are beginning to be implemented, in order to avoid simply burying all the waste. These changes are labelled as « the modernization » of the SWM sector. Actually they represent the modalities of the current transformation of the sector.

Most of the studies[1] focus on the fact that the "modernization" of the SWM sector generally entails the privatization of the service and threatens the source of income of many poor informal collectors, the wastepickers. The risk is real and the worrying legitimate. However the modernization of the sector implies changes that affect a whole economic sector, much beyond the wastepickers themselves.

[1] http://www.bbc.co.uk/news/world-asia-17254642 and www.archive.org/details/witness_5640_E007059

In the experts' literature, the type of economic service that municipal solid waste management (MSWM) represents is not clear: Is it a public service? Or is it a market economy activity? Solid waste management would both be « *a demand-driven business, a policy-driven activity and a public good* » (UN-HABITAT 2010, 164). The problem is that SWM is composed of many different tasks, which can be unbundled. Street sweeping may be considered as a public good (Cointreau-Levine 1994). Secondary collection for evacuation may be perceived as a public good as well (Batley 1996). However, the nature of door-to-door collection is not so obvious: it still can be assimilated to a public good, yet it is one of the services « *most easily converted to a private good, being divisible among consumers for services and payments* » (Baud et Post 2003) and is actually most often seen as a club-good.

Besides this ambiguity between secondary collection and door-to-door collection, the question gets thorny with the separate collections service, as it does not come from a strict urban cleanliness imperative. Nonetheless, most of the time it is unfolded as systematically as undifferentiated waste collection. The introduction of separate collections schemes reinforces the blurred economic nature of the SWM service.

As G. Bertolini remarks, as early in 1992, the garbage evacuation does not belong to the same logic as waste recovery: "*recovery traditionally fits in a market economy perspective [whereas] garbage evacuation comes under the public services*" (Bertolini 1992, 133). The heart of the problem lies in *« the lack of combined environmental and public health policy within the sector »* (Baud et Post 2003, 53). What should actually be pondered over today is: what is the impact, on the sector as a whole, of the introduction of separate collections schemes in the municipal SWM service? In order to answer this question we must consider both collection *and* disposal, as well as undifferentiated collection *and* recovery.

THE TWO CASE-STUDIES: CONFLICTING METABOLIC FLOWS

The two cities chosen for this study are cities characterized by an important industrial activity, located in emerging countries:

- Vitória is situated in the South-Eastern coast of Brazil, North of the Rio de Janeiro state and South of the Bahia state. The city, with 300,000 inhabitants, lies in the heart of a large urban conurbation composed of almost 1,500,000 inhabitants.
- Coimbatore is located in the Tamil Nadu state, in South India. The municipality hosts more than one million inhabitants and the urban agglomeration as a whole also roughly counts 1,500,000 inhabitants.

Formal comparison of the two agglomerations	**Population**	**Waste production**	
		tons per day	*Kg / capita / year*
Vitória [2]	1 484 800	1 111	271
Coimbatore	1 482 000	882	217

As the table shows, the quantity of MSW produced is not the same in both cities: on average the inhabitants of Vitória produce 25% more garbage. Such a difference may be attributed to the GDP/capita difference between both countries: this indicator is seven times as high in Brazil as in India. The composition of MSW produced varies too. Nevertheless, in both cities, the section of the

[2] i.e. the 4 main municipalities of the *Região Metropolitana Grande Vitória* : Vitória, Cariacica, Vila Velha and Serra.

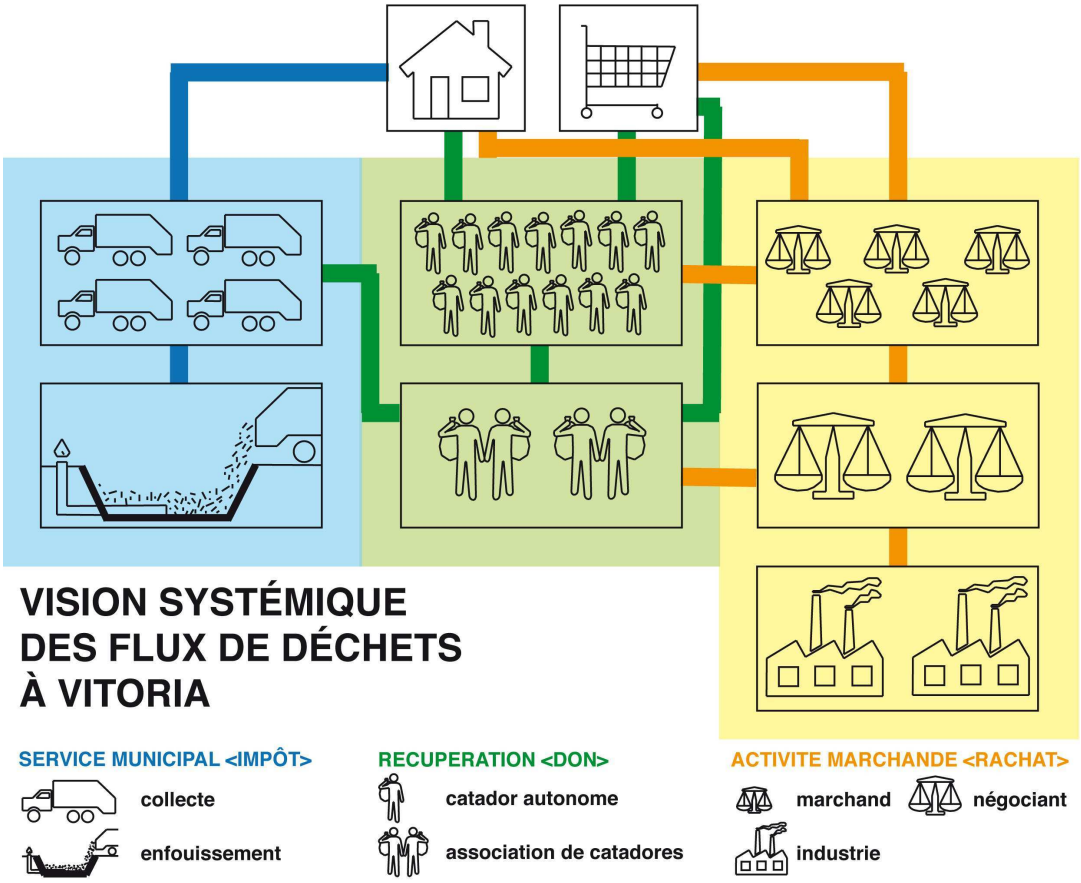
MSW deposit which is the most coveted by different kinds of actors corresponds to the dry items: metals, paper and cardboard, plastics.

Vitória: Municipality, Recycling Chains And *Catadores*[3] Organizations

In Vitória, various devices unfold around the garbage heap:

1) The Municipal government has delegated the MSWM to a Brazilian private company, Vital. Vital operates collection throughout the city and transports the SW up to a private sanitary landfill, operated by Marca Ambiental. The private operator is paid according to weight. The service is partially financed through a tax, paid by the users.
2) The *catadores* pick up dry items freely from domestic garbage and sell them to sedentary merchants. These merchants also get items directly from local people who come and sell them. The merchants then sell their stock to various middlemen for eventual recycling.
3) Some *catadores* have formed associations. The Vitória municipal authorities give them the dry waste that they have collected selectively for free. The associations also get materials from their own furnishers' network. They then sell the dry waste to bigger merchants, and at a better price than what independent catadores get.

The whole picture of SW flows in Vitória is summed up below.



(source: realization by the author, 2012)

Thus, 3 areas of MSWM appear: one is driven by a tax (the municipal service), another is regulated through market transactions (recovery) and, in the middle, lies a sector driven by gift and abandon, occupied by the catadores. These three fields coexist on the agglomeration scale and maintain mutual exchanges; none is completely autonomous from the others.

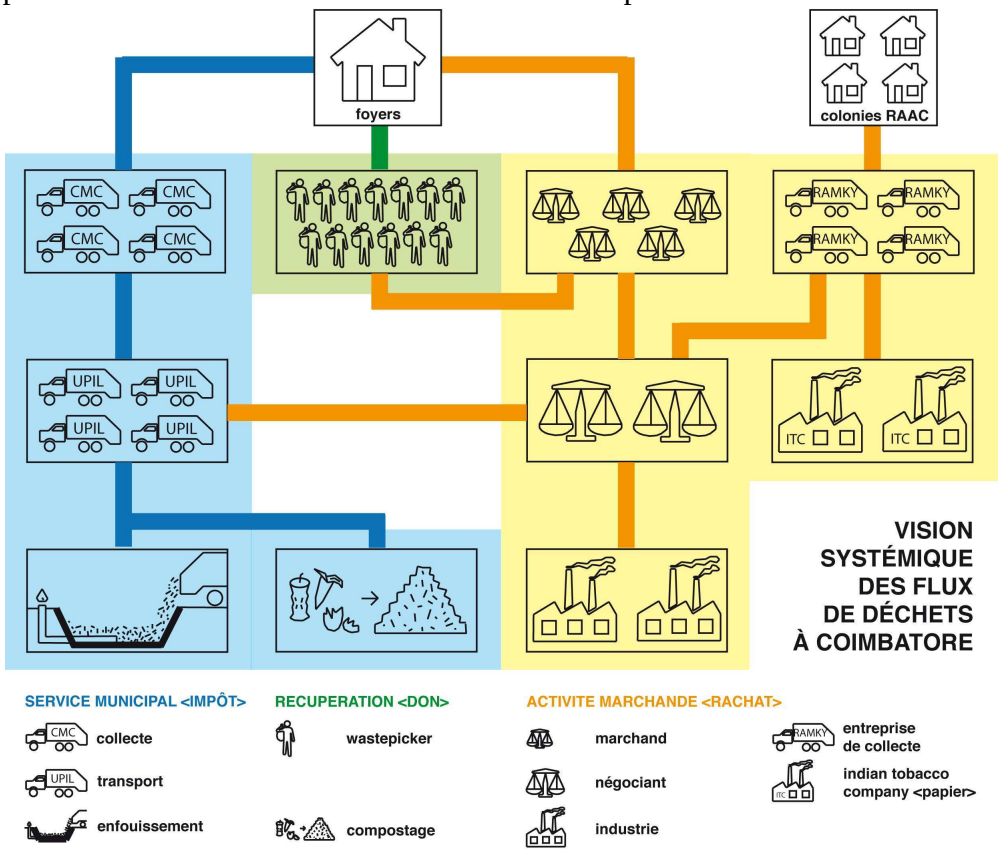
[3] Brazilian name for wastepickers

Coimbatore: Municipality, Informal Sector And ITC' WOW programme

In Coimbatore, the implementation of a new municipal SWM scheme, in 2008, has revealed the coexistence of several WM devices:

1) Through a PPP contracted with a private Indian consortium, the municipal authorities have brought about a transfer and treatment service: organic waste composting and final waste landfilling. The private operator gets part of its revenues through dry waste resale.
2) The informal sector exists in the city and is highly structured. The wastepickers, now banned from the old dumping sites, recover dry waste in the streets for nothing and resell it. Many merchants, be they sedentary or itinerant, buy dry items (metals, old newspapers, plastic bottles, etc) that inhabitants have segregated.
3) The Indian Tobacco Company (ITC), a huge Indian industrial group, has started to implement an innovative scheme called "Waste Out of Waste". With the support of a federation of residents' associations and the cooperation of a specialized Indian private company, they distribute big bags inside the houses and then frequently come door-to-door and buy the dry items specially sorted by inhabitants or maids.

The whole picture of SW flows in Coimbatore is summed up below.



(source: realization by the author, 2012)

Here again we find again the three fields identified in Vitória and governed by different logics: tax, gift, purchase. The gift field is smaller in Coimbatore, given that the wastepickers are neither supported nor organized. And the purchase area is reinforced by the ITC intervention, which carries out a scheme that is conceived to provide source-recovery.

Appropriation Conflicts Arise

In Coimbatore as in Vitória, different kinds of interactions coexist around the waste deposit

- in some cases, people sell their dry items and get an income from the sale;
- in other cases, the recovery agents go straight into the garbage bins and no transaction takes place;

- in other cases, people must pay a tax in order to get rid of their residues.

The sense of the exchange is not clear. Does solid waste constitute private commodities, which have an exchange value? Or are they null or negative value goods, for which an evacuation service must be paid?

As H. Coing and I. Montaño put it as early as in 1985: although there exists an abundant literature on SWM, the very problem that technical solutions must clear up has rarely been made explicit. Waste appears as a blurred object. Where does the product end? And where does trash begin? Understanding the solid waste handling in Southern urban contexts implies reconsidering the very definition of garbage. The nature of waste is by no means immanent. It largely depends on local practices as well as on the existing management/recovery devices

In both cities, the different agents and devices are sometimes complementary and sometimes contradictory, but always entangled. They all aim at appropriating the inhabitants' valuable dry waste. No one owns a clear property right on these materials. As a matter of fact, waste is what has been abandoned, i.e. *res derelictae*: a thing on which its former owner has renounced his property right. Consequently, clashes and conflicts arise.

By introducing door-to-door collections and valorization objectives, municipal services start competing with private agents which had been recovering urban residues for ages or which want to penetrate this new market. Such a "*contested management*" shows itself by:

i) economic rivalry among devices;
ii) that unfold spatially in the urban area;
iii) and are determined by globalized factors.

APPROPRIATION DETERMINANTS

An Unquestionable Economic Issue At Stake

The dry waste diversions represent an obstacle for the implementation of separate collection as a municipal service. The dry items contained in the MSW are seen as resources by a diversity of actors. As a matter of fact, the potential economic revenues from their trading are substantial. The economic sums at stake – together with the appropriation claims to which they give rise – favour the multiplication of competitive devices.

The Spatial Dimension Is Crucial In Order To Get "Wealth Out Of Waste"

In terms of SWM, the issue is as much to try and get the waste as close to the source as possible as to reach an important volume. Door-to-door separate collection is costly as it entails circuits, vehicles and bins duplication. For it to be economically optimum: i) flows should be clean (i.e. well segregated); ii) separate collection should only happen in certain urban areas (commercial or upper-class residential); iii) no "creaming off" should intervene upstream.

Unfortunately, the centralized municipal service is always short-cut by market transaction devices which are much more flexible: in space (door-to-door; in certain neighbourhoods only) and time (before collection time). In Vitória as in Coimbatore, non-governmental actors unfold on the neighbourhood scale, with proximity hubs. An intermediation chain then manages to concentrate volumes in each recycling circuit.

The definition of the MSW deposit depends on the spatial degree of access. The closer to the source of production an agent comes, the better he may get the 'clean' and lucrative residues, the more eager he is to pay for them and the less garbage these materials are. The SW deposit is thus reduced.

While trying to collect every kind of SW at source, public authorities complicate the recovery agents' task, as they used to be able to intervene upstream. Nowadays, these agents can only play on both the time and economic dimensions to divert the most valuable part of this "public evil" that MSW constitutes.

A Monopoly Over SW Which Is Almost Impossible To Bring About

The possibility, for every household, to sell dry waste instead of abandoning it freely or getting rid of it through a tax payment maintains this interception risk at a high level. When the dry items sale is lucrative, it becomes almost impossible to suppress short-cut recovery diversions. Municipal collection agents themselves happen to separate dry valuable items in order to complement their monthly wages!

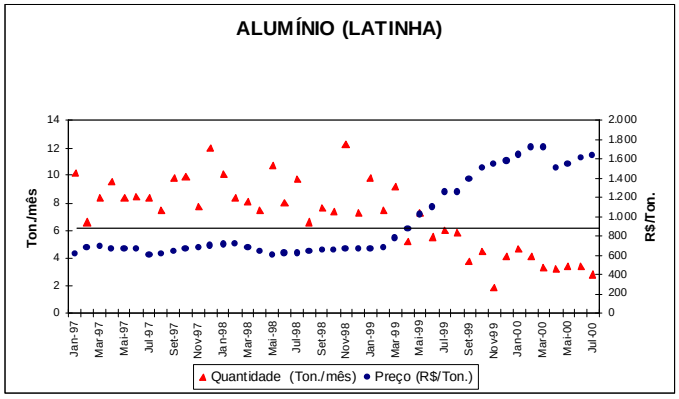
These empirical elements lead us to reject the trash/resource dichotomy. The frontier between both is untraceable. There is no such thing as 'good' residues and 'bad 'residues ': it is the action of discarding together different materials that creates garbage. The SWM sector cannot be left to the economic market actors, as there will always remain a part of the deposit that will be too much mixed to still be coveted by any private agent. And public authorities cannot cope with the whole sector, as they will always be short-cut by more flexible private agents. This is why we argue that, instead of trying to identify an ever-fluctuating frontier, the whole SW deposit should be considered in a systemic perspective. Mobilizing E.Ostrom's common pool resources concept, we may acquire such a systemic understanding.

THE STOCK EXCHANGE PRICE FLUCTUATIONS, OR GLOBAL SCALE IRRUPTION

In Vitória, The Resale Prices Faithfully Follow The Raw Material Prices

Over the 2001-2010 period, the rarefying raw materials make recycling a more and more profitable activity. The secondary materials values follow the same variations as the corresponding raw materials, which are often negotiated at a global level. In particular, the prices at which aluminium waste is negotiated in South-Eastern Brazil are partly dictated by the London stock market exchange price of raw aluminium.

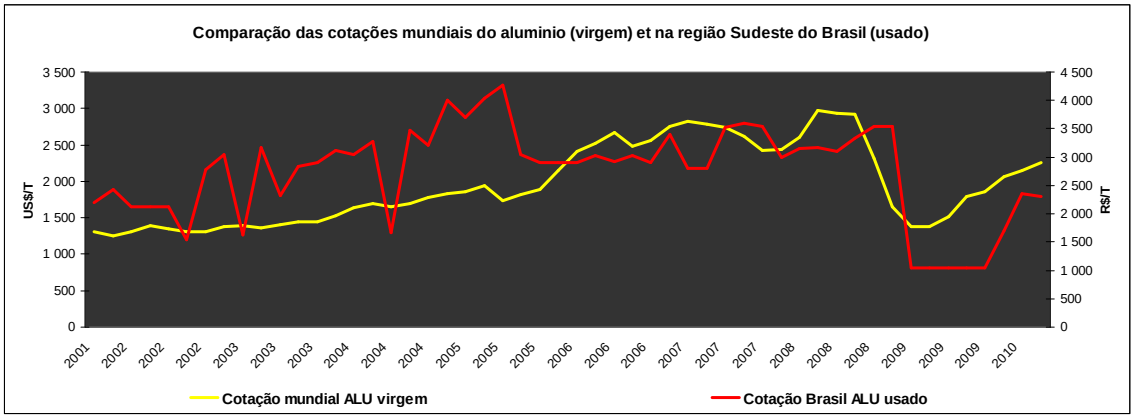
The 2008-2009 world financial crisis has provoked an intensification of the appropriation conflicts over MSW in Vitória. The financial crisis primarily affects the huge industrial companies. Yet, its impact is only insuperable for the actors who are at the bottom of the recovery-recycling chain. This economic sector is indeed characterized by the absence of State intervention and the direct exposition to global market fluctuations.



Comparison of the quantity of aluminium cans collected by Vitória municipal service with the market exchange price of used aluminium (1997-2000)

Source : Rodrigues da Matta Baptista, 2001, p.44.

As the graph above shows, as soon as the market price of used aluminium started to increase, the Vitória municipal collection service started to get fewer and fewer aluminium cans. This shows that the informal recovery agents are directly influenced by the market price of any material.



Comparing the global market price for raw aluminium with the selling price of used aluminium in South-Eastern Brazil, over the 2001-2010 period

Source: data from CEMPRE (Brazil) and the London Stock Market Exchange. Realized by the author, 2011

As the above graph shows, the raw materials prices –negotiated on a global scale– has a very obvious impact on the dry waste recovery activity, through the definition of resale tariffs, including on a very local scale.

In Coimbatore, "Urban Solid Waste Mining" Industrial Strategies

The "Wealth Out of Waste" (WOW) programme, initiated by ITC in Coimbatore comes under a national industrial strategy. Beyond the Corporate Social Responsibility (CSR) labelling, ITC declines an economic logic: instead of importing used paper from abroad (Australia, USA, UK), ITC officials have decided to start recovering the paper waste which otherwise goes to dumping yards. Indeed, importing secondary materials is costly and MSW does not have a clear owner. ITC claims to be lightening the public authorities' burden. At first, the WOW programme has been implemented in every major city of South India: Hyderabad, Chennai, Trichy, Kochi, Madurai, and Bangalore. The focus on big cities is obvious: the population density rate as well as the urban consumption patterns (packaging) lead to forecast greater efficiency. ITC has targeted south Indian cities for a start, as its two most important paper plants are located in this area. However, according to the techno-economics results and the CSR campaign, the industrial group is considering extending this programme to the entire country.

In addition to ITC's WOW, the enormous Indian cement industrial manufacturer, ACC, has come up with the following proposal: recovering the mixed plastic waste in order to use it for co-incineration in its Madukarai industrial plant, 20km south of Coimbatore. Once again, this CSR stance comes under an industrial strategy which consists in replacing coal importation (coal market prices have been rising for years) by plastic waste, which can be favourably used as fuel. A specific branch has been created to develop this strategy: « *Alternative Fuels and Raw Materials* » (AFR). The ACC-Holcim group unfolds this proposal within the Geocycle program, in partnerships with another major cement group named Ambuja Cement. This program, launched in late 2008, is implemented with the cooperation of: the Indian industries confederation (IIC), the Federation of Indian Chambers of Commerce and Industry (FICCI), the TERI Institute, the federal and state pollution control boards (PCB), and the German technical cooperation agency (GIZ). The potential market identified by Geocycle India is considerable: 40 million tons of « *municipal sorted solid waste* » per year. As for now, ACC only receives 400 to 500 tons per year of such materials.

CONCLUSION

An Analytical Framework Enabling One To Overcome Dichotomies

In Coimbatore and Vitória, as in many ordinary cities today, appropriation conflicts around the urban solid waste deposit do not only oppose (public or private) municipal service operators to actors from the informal sector (wastepickers, itinerant waste buyers, merchants). Various huge industrial groups are also beginning to target domestic recyclable waste as an alternative for raw materials, the costs of which are ever rising. Therefore, industrial ecology, livelihood and public service delivery issues unfold in urban areas. Is it more convenient to focus on waste reduction and social integration through recycling or to favour industrial ecology strategies, as they are being developed in China under the "circular economy" label?

Instead of looking for an untraceable and fluctuating frontier between private goods and public evil, we should consider the whole deposit as common pool resources. Valorization cannot happen without a proper disposal facility. And garbage burying must be compensated for and mitigated by valorization alternatives. Both strategies go hand in hand and any monopoly over solid waste will be extremely difficult to impose as this service lacks a physical network infrastructure (that can be found in other basic urban services: water distribution, sanitation, electricity, etc.). Taking into account the common good characteristics of this strange object might well be a much more convenient analytical stance in order to tackle the solid waste issue in Southern countries, which represent the majority of today's urban world.

An Emerging Global Urban SW Mining Market

The income heterogeneity in urban areas from developing countries constitutes a decisive key to understanding. Indeed, several studies hold that the informal waste recovery activities spring from a high poverty level (Wilson, Velis, et Cheeseman 2006; Medina 2005; Nas et Jaffe 2004). We reject this explanation and argue that inequalities, rather than poverty, do determine the degree of resource recovery from the garbage heap. We further argue that socio-economic inequalities are not bound to disappear in a near future. Therefore, informal separate collections will definitely go on.

This leads us to assert that the present situation of recovery in Southern countries is fundamentally different from the historical context of ragpicking in European cities in the late XIXth century. When Northern societies started to 'modernize' their SWM (from the 1970's), their informal economic sector was marginal. Furthermore, the beginning of the XXth century is characterized by the industrial revolution and the discovery of important deposits of raw materials all over the planet (rubber, cellulose, coal, oil, gas, etc.). At the eve of the XXIst century, the situation is radically distinct: the raw materials mobilized by industry are nearing exhaustion. The costs for exploiting deposits are rising and, at the same time, the world demand for such materials is increasing. This soaring of raw materials prices, combined with the ecological consciousness and the historical –and still critical– social issue make of the SW valorization a highly strategic sector. Solid waste is the only material deposit which is expanding today. Moreover, property rights over garbage are still blurred.

The sector's fundamental question –the fusion between the 'modernized' municipal service and the recovery and recycling private devices- is too often reduced to a dichotomy between big private operators and vulnerable wastepickers. Although this confrontation does exist and does matter; the reality is more complex. This issue is not limited to an opposition between the formal service and the informal actors, nor can it be reduced to an opposition between the formal and informal private sector agents. Appropriation conflicts arise, beyond simplistic dichotomies, because the recovery sector, while becoming strategic, is being invaded by industrial actors and forces. A global urban secondary material mining market is emerging.

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