



The City and the garbage

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ABSTRACT

This paper adopts an evaluation procedure that takes on board six dimensions of the genetic heritage of a city and its waste, how they are intertwined in the landscape. It benefits from the SEA - sustainability environmental assessment approach to integrated social, economic, environmental dimensions of any given project or intention and adds up the morphological dimension that only the municipal scale can allow. Four recurrent functional spatial patterns have been identified and are comparatively graded to characterize how each one of those dimensions relate to each other, what functional spatial links they appear to establish in the urban area. The difference in the DNA of any given urban area is here regarded as the result from establishing the comparative weight of those functional spatial patterns.

PALAVRAS-CHAVE: Urban morphology. Urban solid waste. Recycling.

1 INTRODUCTION: an urban morphology approach to its interactions with landscape configuration, and to what their functional spatial patterns can be

“... We fear death; we fear loss; we fear waste, which is the signal of loss. The worst change is decline, wasting away, growing old. Waste is an impurity to avoid or to wash off. Things should be clean and permanent, or better, should constantly increase in competence and power. But permanence and growth form a dilemma, since permanence is stagnation and growth is instability ...” (Lynch, 1991).

Many approaches to integrated environmental assessment have been developed for a variety of different targets since the nineties in Brazil. Some of them have served the public interest as a tool to formulate new policies whether for economic or environmental purposes. Sustainability, however, has not always been considered in these applications in its multiple dimensions. Nature is treated in contradictory ways. Either exclusively, sacred and untouchable, excluding every other demands and related functions to provide for, or cut off the ‘picture’ as a matter for “preservationists”, not to be considered in the “real world”. Where all trends and functional relations our societies have established through economic, social, cultural, and institutional practices, have found their morphological expressions and spatial distribution – nature is, by its very ‘nature’, “the” real world. When and where these fragmented views have been adopted nature has been, alternatively, both sanctified and revered in shrines, or simply totally neglected. In either case waste has been condemned as undesirable, bad by definition, as if there were a negative moral value to be attributed to it - as if life could go on without it - and life has plod on under the banner of this make belief no longer valid (if it had ever been).

Recent trends during the last three decades of globalization have accelerated both the production of wealth, concentrated in specific places, as well as the production of waste in scale and diversity unknown before. The waste however, unlike the wealth, has been spatially distributed, in many of its diverse forms and shapes, in large (and growing) territories. New industrial production plants have generated unprecedented amount of waste whose contaminating effects on the environment and on its multiple resident species have only later been publicly identified and gradually dealt with. The location of these new plants have benefited from tax reductions and other economic

incentives made available by different cities in the expectation of sharing part of their profits. The competitiveness between places have thus generated multiple fractures in many cityscapes, by means of laying down express ways, and all the required up-to-date infrastructure, to forward corporative ends and speed up communication with the same expectation. Newly designed business districts have drained public resources and made derelict other, and older, areas which would have required public support to keep on productive and alive, even though for different clients. Gentrification processes of ‘pre-existing’ urban areas such as historic city centres, for instance, remade into consumption goods for specific purposes, have also produced, to the same effect, their share of wasted land, wasted people and wasted natural resources.

Different forms of discontinuity have wasted to some extent and to some purpose. Expansion and contraction of land use and city borders have, therefore, both engendered fractures and disruption for some as well as positive changes and continuity for others.

2 WHY CULTURE

Kevin Lynch mapped out different meanings related to the negative connotation of waste in his last book “Wasting Away” where he proclaims and justifies decline, decay and wasting as necessary parts of life and growth to be valued and done well. Not by any coincidence, I believe, this last work of Lynch had to be published in 1990, after his death in 1984, if for no other reason just to reinforce the argument that decay and death need not to be feared nor hidden away – it is a matter of fact, to be faced squarely. His ideas have become even more relevant now. Waste disposal issues have since then made many disasters and media headlines even more now than ever before. These included nuclear plant leaks with Chernobyl, medical waste “including syringes and vials of blood some of which contaminated with aids” that washed the shores of San Francisco coastal area in 1988, the oil tankers that travel around the world which have leaked and wasted the lives of different animal species and the livelihood of many others since then, not to mention the so called agreements between countries for the right to dump contaminated waste ‘far away from my border’ and to “compensate” for it.

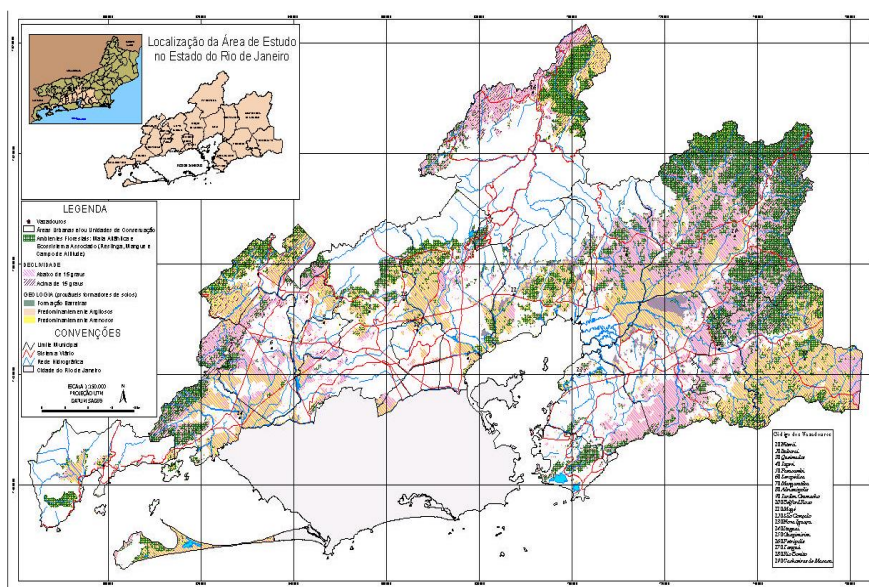
Lynch perceived the self-destructive direction we were all heading towards then and, regretfully though, since then. In order to change this critical pattern the production of waste, its quantity and special quality, would have to be brought to the forefront. This paper proposes waste to be considered as part of the equation of whatever integrated form of analysis is adopted. Strategic environmental assessment studies, made in the planning stage of a given public policy or large-scale enterprise, appeared to be sensitive to the matter. They helped to remind stake-holders not to neglect the ripple effects caused on and around the spatial locations of their economic purposes and associated usages, and the social practices, cultural and spatial patterns they both benefit from and induce, to some extent, due to the specific nature of the outputs, here considering waste as one of them, they produce (CGEE, 2008).

3 THE CASE

Waste put to new usage and to public benefit, perceived as an economic 'public' resource - here meaning by 'public' that you can 'feel free to grab' - has generated some life improvement to a large and still increasing amount of people. The enormous amount of effort made by those who live on waste - the waste pickers in one of the one hundred cooperatives of waste collectors spread around the city of Rio de Janeiro. They sort out the waste manually and make a living out of it, by working 12 hours a day and selling the material thus obtained to those who will do the recycling. In one of these cooperatives, eighty waste pickers work on ten tons of waste a day in a 3.800 square meters area. It is estimated that ten thousand people live exclusively on waste.

The prevailing approach applied to the planning and management of solid waste disposal functionally segregates space and matter on the basis of reducing environmental hazards associated with it. Yet it does not seem to work out as intended. The main hazard still is the risk of contamination. Medical waste has been awarded a specific area, in Gramacho landfill, but other forms of contamination have been reluctantly admitted, or not, in many other circumstances and counties. Survey conducted in 2005, in Brazil, have identified 705 critical contaminated areas due to different chemical products, of which 157 in São Paulo, 84 in the northeastern state of Pernambuco, 80 in the western-central plateau (where the Federal District of Brasília is located), 70 in Rio de Janeiro and 59 in the southern region (Senac, 2008).

Figure 1: Master-plan for new alternative location of landfills



Source: Edital Pensa Rio, FAPERJ/Coppetec, Mahler, 2009

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state of Pernambuco, 80 in the west-central plateau (where the Federal District of Brasília is located), 70 in Rio de Janeiro and 59 in the southern region (Mahler, 2009).

The landfill of Aterro Metropolitano de Jardim Gramacho (Metropolitan Landfill of Gramacho Garden), is the biggest in Latin America, with 1,3 million square metres and a 100 million tons of accumulated waste and environmental hazards.

Figure 2 - Unstable mountain of solid waste in the landfill of Gramacho



Source: Picture Adriana Schueler

Figure 3 - A bird's eye view of the waste peninsula with neighbour settlement of Jardim Gramacho.



Source: Google Earth Image in May 2003

The Centre for Recycling Rio (CRR), one of the biggest private enterprise dedicated to paper recycling, is adjacent to the site. It employs 550 workers and recycles

20.000 tons every month. According to the Local Authority in charge of solid waste management (COMLURB) almost 50% of the dry waste generated in Rio is recycled - 95% of the aluminium tins wasted are recycled. In this regard, aluminium tins, Brazil would be, apparently, the country which recycles the most followed by the United States. These records, however, are not due to local environmental conscience but to the amazing manual selection work of the “catadores” (the name given to those who select manually the waste).

The detailed job of sorting out 4 different types of paper, 130 types of plastic, during the above mentioned 12 hours a day involves different kinds of labour. Study carried out by the State University (UERJ) indicates an estimated figure of 30.000 people living, directly or indirectly, on jobs related to recycling the waste collected by 900 trucks employed by the Local Authority to bring everyday to Gramacho.

Figure 4 – Long roads and distant open areas



Source: Pictures Adriana Schueler

Figure 5 – Adventures and nightmares



Source: Pictures Adriana Schueler

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The number of residents in the borough of Jardim Gramacho, in the Municipality of Duque de Caxias, in the Metropolitan Region of Rio de Janeiro, has grown to the estimated size of 20.000 residents due to the job opportunity of dry waste selection in the landfill. After 25 years of service a closure date has been, apparently already re-defined for this landfill by COMLURB, December, this year of 2009. Already the residents labour related to solid waste selection have been called “orphans” by the media.

A geological flaw was suspected right under the landfill. Saturation point has apparently been already achieved, fractures due to constant overloads threatens the stability of the whole lot and all of it put together amplify the risk of a major disaster with its possible sliding down into the Guanabara Bay. At the same time, its closure may lead to the blockage of the estuary of River Iguaçu with possible impact on flooding and possible contamination of the river Guandu, main water provider of the city of Rio de Janeiro. There only appears to be a choice of different nightmares.

Figure 6 - Google map showing the waste peninsula, the Guanabara bay and the estuary.



Source: Google Earth Image in May 2023

Rio de Janeiro spreads a spatially (and functionally) large net of sites and trails of waste distribution and new alternatives for its economic uses and benefits. Recycling matters, rethinking approaches, reducing wasted waste and new sources of livelihood renewing changes to the ripple effects of waste in the lives and livelihood of the related labour.

New self-proclaimed images and accepted identities related to recycling, literally made of scrap and waste, have also, apparently, shown some benefit as far as awareness and environment conscience are concerned. The choice of Rio de Janeiro as case study is supposed to illustrate the point.

Rio de Janeiro (in the State of Rio de Janeiro, Brazil) is the city that recycles the most in the country thanks to these waste pickers. Not by coincidence, it is part of Rio de Janeiro' identity the high level of tolerance particularly towards the odd 'neighbour' and, at the same time, historically rebellious in relation to laws and regs.

Criteria for the selection of new areas for waste disposal and landfill have so far, in Rio, contemplated three aspects: geology, topography and accessibility. The ripple effects that waste disposal areas produce in their neighbourhoods are not considered. These are still often regarded as either “signs of Local Authorities neglect” or “social exclusion”, according to the prevalent ideological trend. The settlement that follows nearby is, for the same reasons, regarded as clandestine and “spontaneous”.

To change this cultural and spatial pattern of land use and abuse, requires a different view with corresponding different economic, environmental and social

approaches and commitments. It might benefit from the rules already identified and analysed on how cities, places and territories are configured (Pannerai, 2007).

Figure 8 – Copy of a photogram showing uncollected residues spread around the beach and the collector of tins for recycling doing his job with the Sugar Loaf, one of the icons of Rio de Janeiro’s natural heritage, in the background



Source: Photogram extracted from the film made by the French cartoonist, Janus, “*Le Rio de Janus*”,

A different view of objectives in the choice of options for the location of new landfill could take into account other dimensions of the area, place-making factors, changing performance indicators, and what is the desired performance? To whom? Another approach to drawing the baseline, generating different alternatives as a matter of consequence, assessment and choice, desired and undesired alternatives, to whom (specific groups) and their morphological an environmental positive (to whom) and negative (to whom) impacts.

4 THE INVISIBLE RISK: EFFLUENTS, RIVERS AND BAYS

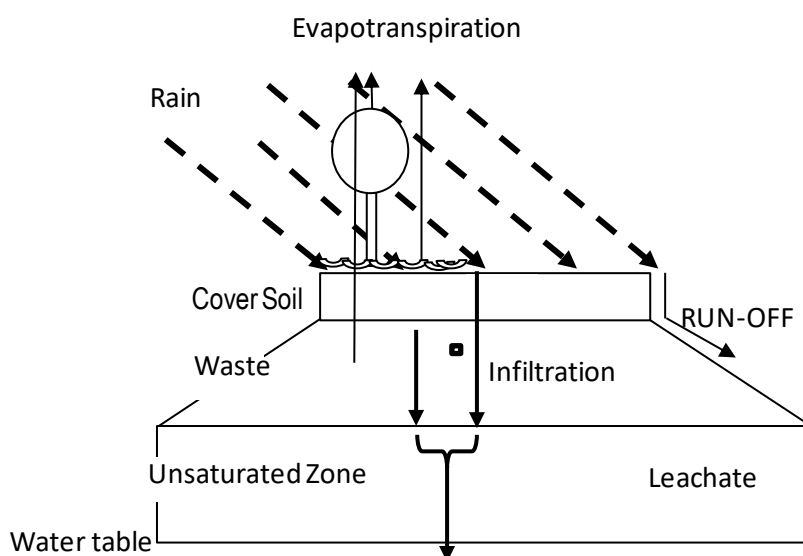
The estimation of the amount of water that effectively infiltrates the garbage mass and is responsible, among others, for the generation of leachate, can also be calculated by means of the local water balance. It is the sum of the amounts of water that enter – infiltrating, incorporating themselves into the mass – and leave – evaporating, running down preferential paths, taking into account precipitation, surface runoff, evapotranspiration and transformations in the moisture content of the cover soil. This sum should be analysed several times during the year to identify the periods in which there is an increase in humidity. Even if landfills are situated in areas with an annual rainfall deficit, they can produce leachate in rainy seasons.

The most important parameters related to the control of effluent drainage are those that hinder the ability of water to infiltrate the waste mass. Among them are the low rainfall in the area; the use of cover systems suitable for vegetation and biomass production; the choice of plant species that optimize the effects of evapotranspiration; the use of surface seal; the diversion and drainage of water at the surface; the high compaction of the residue and measures to prevent the risk of cracking due to differential settlements.

4.1 Water Balance

To calculate the Water Balance, flows that contribute to water gain from the soil and those that contribute to water loss are considered. The first group, incoming water, is made up of water that arrives through rainfall and the initial moisture content of the waste. The second group, water that leaves, is made up of surface runoff or run-off, evapotranspiration, leachate and differences that occur over time in soil moisture content and waste. If the amount of water entering into the soil in a given period of time is greater than the amount leaving, the water balance is considered positive, with the generation of percolate being more likely. When the opposite occurs, there are conditions with a negative water balance and the generation of percolate is lower.

Figure 9 – Schematic of effluents generated in an Urban Solid Waste landfill



Fonte: Schueler, 2005.

Determining the amount of leachate generated in waste landfills consists of a series of processes that involve variables such as: composition, quantity and density of the landfilled waste mass; age of the landfill, which is related to the stabilization phase the material goes through; external environmental conditions, such as temperature, rainfall, sunlight, winds; issues related to the landfill project, such as the type of base and cover protection, presence of vegetation, effluent drainage, topography, soil characteristics, among others; in addition to operational procedures. These factors, for the most part, are variables that vary both seasonally and over time.

The great heterogeneity of waste makes it difficult to identify characteristics such as their moisture retention capacity, mainly because they can undergo transformations over time. When landfilled, the humidity of the residue is usually lower, which results in the absorption of infiltrated water until the material reaches field capacity. Only after this happens, this water is released and percolation occurs.

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5.THE CULPRIT: A SECTORIAL VIEW

New organizational forms are being developed to take hold of the ever increasing in size and weight waste disposal areas. The form of consortium between municipalities has been proposed as an improvement. Where it has been adopted it was based on a political agreement, more often than not between rich and poor municipalities, to dump the waste on the poorer, based on some form of monetary compensation. This apparent trend of resolving the waste question appears to rely on the same debatable assumption that often supports environmental appraisals – that it is possible to estimate adequate compensation for degradation.

At the same time, the assumption that justifies the consortium, that larger scale response to public service demand is always economically efficient has also proved wrong. Social policies and programmes based on concentrated demand and, by the same token, concentrated life expectations, have, sometimes, turned into huge ghettos of civil unrest.

Concentration hastens saturation, leads to increasing environmental complexity and demands larger areas thus increasing distance and CO₂ emissions. Concentration determines longer routes and more energy consumption. At the same time, distant areas from the centre increases difficulties for regulation and control thus allowing more easily than others for clandestine behaviour. The economy of resources obtained in the construction and operation of large landfills has so far justified scale as solution. Urban hierarchy in Brazil, appears to reinforce the point - of the 5.564 municipalities, 440 integrate one of the 111 urban areas where estimated 56% of the urban population of the country live. The two largest urban agglomerations of Rio de Janeiro and São Paulo comprehend 60 municipalities that concentrate approximately 17,3 % of Brazilians (considering the total population, i.e. urban and rural). Thus concentration appears to lead to more concentration and, in this way, to an unavoidable environmental breakdown at some point in the future. Is there no alternative to the suicidal route then?

The approximately 80% of municipalities with less than 20.000 inhabitants appear to lack the resources, both human and economic, to produce different acceptable solutions. Most of them dump their waste in unacceptable ways and areas. If decentralisation and deconcentration are to be regarded as possible alternatives, politically, socially and environmentally healthier, they require a different approach of the local authorities involved, to be adequately supported by state and federal levels policies, and appropriate technology.

The fact that the announced closing of the ‘controlled landfill’ of Gramacho has been seen as a threat, by all those whose lives have increasingly grown to depend on it, appears to indicate that a different approach, not denying and hiding but accepting, may be appropriate. It also reinforces the myth that recycling is a solution, within itself. But is it? Recycling as major source of employment can only be regarded as solution following the same trend that defends slums as solution to housing demand and self-provision as acceptable form of relationship between citizens and the State.

One preliminary question - concentrating the undesired in distant and larger area in a one city region, province and eventually planet, is possible? Exploring this preliminary issue leads to new questions. Nuisance and benefits can come together and be accepted in specific circumstances? Decentralising and deconcentrating waste, thus spreading nuisances and benefits, affects positively both energy consumption and CO2 emission. Can it be politically and socially acceptable? Market values for specific land uses and segments as well as public sector performance, in specific contexts, can support that change?

5.1. Some functional spatial patterns

As part of the genetic heritage, ingrained in the DNA of a given area, waste specific features appear to derive from certain characteristics related to the territory, to the community - their uses of nature resources and practices of survival, and to the accepted patterns of power ‘command and control’, social practices and economic uses, and from the cultural and spatial patterns of behaviour of the subjects related to those practices and uses, from the local nature capacity to dilute and shovel away the residues thus produced, as well as from the prevailing forms of power exercises that regulates those relations and also, at last but certainly not the least in importance, from the morphology thus configured in different cities and towns where it (the waste) is generated and contained. Accessibility to drop out areas where waste would be disposed of was, and still is, by all means determinant of the choice of places made for that purpose.

Three functionally related spatial patterns of repulsion and attraction have been comparatively identified in association to public spaces, here understood as areas with open public access (UTL, 2009), and, by the same token, to waste disposal areas. *Singularity* in any one of the six dimensions here considered, once perceived in a given urban area it does attract people and some of their uses. What is perceived as *singularity*, to whom and how it can be made useful, to what and whose purpose - to respond to these questions - can be regarded as the of ‘the heart of the matter’ in the genetic heritage approach to waste. The second pattern, *appropriation leads to aggregation*, follows as a matter of consequence. To be able to legitimately and freely appropriate, both individually and collectively, the ‘public’ resources made available in specific locations tends to aggregate community around it. The third pattern can only be perceived after a period of time – when *consolidated* forms of legitimate social appropriation of a given public resource tends to be positively recognized by the larger community as added value to the original meaning of the place where it has been

generated. These spatial patterns are related to functional flows of interchange that configure nets of paths and trails. Accessibility and meaningful places are thus morphologically constructed over a period of time.

The perceived social and economic value of waste, in the case of Gramacho, appears to reproduce these ‘functional-spatial patterns in action’ which are recurrent in the evolution of different urban areas.

The *singularity* of a specific sort of waste, to recycle into self-provided shelters, as well as the large open area around the site of the landfill, distant from the public eyes - they both attract people. The subsequent *Appropriation* stage indicates the perceived economic value of other types of waste turned into a source of survival for the very poor. The *Aggregation* stage that follows shows the cumulative process which emerges with the recycling business. The *Consolidation* stage of the area thus occupied turns it into a borough with some degree of diversity of land uses and of standards of occupation, production, and consumption. The *Value and identity* of the area and its uses, collectively built and locally accepted, based on waste, with negative and positive aspects established for different “whoms” - the very poor, the artists and different entrepreneurs – finalizes the process.

Figures 10 (a) and (b) – The income generated by solid waste recycling feeds related social practices

(a)



(b)



Source: Pictures Adriana Schueler

The six dimensions of land use which relate to morphology - social practices, cultural standards, economic uses, public sector management (institutional aspects), environmental concerns and accessibility - come together intertwined, in different “sizes”, in different functional-spatial patterns of relationships that configure the landscape.

The social dimension describes how people attracted to the new area relate to each other, and to neighbourhoods, and the spatial patterns they establish.

The cultural dimension appears everywhere in the process of configuring the landscape and relates to image and identity.

The economic dimension relates to how residents put that environment to use to their benefit, their outputs, and the functional relations they establish between their ‘businesses’, in whatever scale and shape they produce, and the clients and patrons, wherever they are in the urban area, thus configuring different spatial patterns.

The environmental dimension relates to the landscape and its natural resources, the inherited standards of use related to production and consumption of these resources, their additional sources and drop outs, all together added up into a ‘natural heritage’.

The regulatory or institutional dimension indicates how residents relate to different organizational forms and public sector management (local authorities and other normative bodies) of waste and other services. One more land attribute was considered – accessibility, as a major asset of a given area which impacts the performance of all the other dimensions.

The morphological dimension adds the whole lot into specific shapes and forms of that built environment in Gramacho and leads to what it synthesizes in terms of its historic evolution and process of configuration. The table that follows shows the items related to morphology in each dimension

Morphology	Social & Cultural	Accessibility	Economy	Institutional aspects	Environment
Public spaces: squares, streets, historic singularities	Public buildings: schools, churches and health centres	Public transportation parking areas	Diversity of businesses and jobs	Centralization concentration	Geology geomorphology
Urban grid building typologies	Public markets, sport courts & fairs	Street grid with links to different urbanizations	Shopping centres, office centres	Slums, squatted buildings clandestine uses	Natural landscape built landscape erosion
Diversity architectural features	Landscape (built & nature) related image	Public telephones, wireless zones post offices	Financial agencies and cashpoints	Decentralization deconcentration	Drainage, waste disposal areas landfill
Diversity Functional features	Valued identity	Airport terminals	Hotels and restaurants	Presence of public sector	Water supply sewerage forms

Source: Thereza Carvalho (Carvalho Santos) (2010)

The proposed 24 items listed above aim to relate each dimension to morphology through means of its physical presence on the territory. Once comparatively graded, between 0 and 4, based on a qualitative approach, for each dimension, for each district or borough considered in a given urban area, they, together, highlight its corresponding urban quality. Genetic heritage is here regarded as the ‘cumulative result’ of the formerly listed dimensions in different time periods.

The evaluation results are expected to collaborate with the effort of project certification and urban district quality certification.

The existing IDHM, Municipal Human Development Index, is adopted in Brazil to comparatively grade cities and borough with obvious impacts on estate developments and market values. The IDHM, however, relies on social and economic achievements disregarding all physical elements in its effort to evaluate human development as if it took place in a placeless world. Several studies on urban morphology have, however, offered enough evidence to clarify the matter of how humans both create and are created by meaningful places.

“First we build our homes ... than our homes build us” Winston Churchill (quoted by Milton SANTOS, 2007)

Concentrating in larger areas distant from one centre and on to the ‘far-far-away kingdom of others’ is hardly a solution. Is there a carpet big enough to hide in another city, conurbation, region, province, planet?

Figure 11 - Headlines of a Brazilian newspaper says that Brazil will give back 1.600 tons of waste ‘exported’ by the UK. The photo beneath shows the Brazilian Minister of Environment indicating the evidence.



Source: Newspaper O Globo, 18 de julho de 2009

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