

Environmental Impacts by Low-Income Settlements in Rio de Janeiro

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Abstract

Due to the lack of an effective housing policy for low-income families (*the working class*), during the last decades, an intensive unplanned expansion of many cities in Brazil has resulted in many informal settlements with no sanitation infrastructure that need and should be re-ordained. This kind of land occupation causes several environmental impacts, mainly on the water resources. At the same time, a large segment (*portion*) of the population living without proper sanitation conditions poses a health hazard to the local community. This paper analyses the legislation concerning land use and occupation in the city of Rio de Janeiro, as well as the fundamentals for the use of urban redesign, as a strategy to mitigate the above mentioned impacts. The study focuses on the *water basin* of Jacarepaguá lowland, an area of city growth (Figure 1). A settlement that represents and typifies the peripheral urban occupation in the basin has been selected as case study. The methodological approach was based on the assessment of the living conditions of the target population, including detailed description of the sanitation conditions of the dwellings and the level of the existing urban infrastructure. A Causal Chain Analysis (CCA) was constructed to enable the analysis of the links between the environmental impacts and the failures in the mechanisms of social organization affecting different institutions. The results indicate how the environmental impacts were triggered. The main existing gaps in the municipal and state policies and programmes for the redesign of slums were identified. Based on the results of the fieldwork, the CCA and the gaps in the governmental programmes, some proposals are presented for the re-ordainment (*adequacy*) of low-income settlements in the city of Rio de Janeiro, mainly on the outskirts. It is believed that, bearing in mind the specifics of the case studied, the conclusions drawn can be applied to other cities facing the same process of unplanned low-income settlements.

Introduction

In many cities all over the world and in Latin America in particular, there has been a growing expansion of slums enclosing/engulfing the cities. Low-income families lacking the means to pay the high prices charged for legal property, resort to living in slums, as an alternative to their housing problems. Housing policy in Brazil for low-income families has not been effective so far. Systematic efforts made by the Federal Government in this area involved the setting up of the National Housing System and the National Housing Bank in 1964. However, these institutions were not only concerned with the housing problems of working class families, but also with those of middle class families. This system was phased out in 1986 and since then Caixa Econômica Federal¹ (BIENENSTEIN, 2001) has been playing the role of financing the housing acquisition programme, but again not specifically focused on low-income population.

The fast growing occupation of urban areas, as low-income informal settlements (slums), coupled with the lack of effective public policies, makes it difficult the implementation of urban infrastructure services, such as access to drinking water, sewerage system, garbage collection and urban drainage. The absence of such services causes serious impacts on the water resources, on social welfare and consequently on living standards (Pimentel da Silva et al., 2005). Such impacts affect the society as a whole, including the population of the “formal” urban areas, (Cerqueira, 2006). The main aim of the studies in this area is to contribute to the understanding and assessment of the impact of the fast growing occupation of urban areas, as low-income informal settlements (slums), on the environment and the living conditions of the population. Also, to put forward proposals to mitigate those impacts and to improve the living standards in the cities.

This study focuses on the low-income informal settlements situated in the water basin of Jacarepaguá lowland, a rapidly growing area in the city of Rio de Janeiro, a metropolis of about 6 million inhabitants (IBGE, 2000). These studies involved a peri-urban community called Cascatinha, with characteristics of both rural and urban areas and typical of the slums situated in the districts of Vargem Grande and Vargem Pequena. The implications of this way of living in the community were studied so as to provide the government authorities with the necessary information to improve these areas. Life quality and sanitation conditions were checked, as well as the level of existing infrastructure. A survey was carried out aiming to identify local residents, their personal history, their perception of their own living conditions and their yearnings. Moreover, “Favela Bairro” and “Bairrinho”, local government programmes, that focus on improving urban and peri-urban settlements were analysed revealing a series of gaps. Due to the complexity and interrelation of problems, a Causal Chain Analysis (e.g. Marques, 2004) was also developed. Finally, based

¹ Brazilian Governmental Bank.

on the above mentioned, a set of proposals is presented aiming ultimately to contribute to the urban re-design of these settlements, as well as to their adequacy to the “formal/legal” city.

Methodology

The methodology applied to this study meant investigating the issues that involve land occupation in urban areas, focusing on the process as far as low-income informal settlements are concerned and their impact on the environment. For this case study, the Community of Cascatinha was selected because it typifies the process of land occupation in an important area of urban expansion in the city of Rio de Janeiro, Jacarepaguá lowland. Besides that, as this is a less populated area, there is greater possibility of intervention and re-ordination. To this purpose, in the bibliographic review we included several programmes implemented by the Municipality of Rio de Janeiro, over the past years, aiming to mitigate the impacts and improve the living conditions of the slum dwellers. This bibliographic review has enabled to assess the initiatives taken by the Municipality for the re-urbanization of the slums and to pinpoint the gaps in those initiatives. After defining the area under study and reviewing the bibliography, we carried out field work to investigate the dwellers’ living conditions, including a survey on the sanitation and structural conditions of the dwellings, the existence of urban infrastructure services and their operating conditions, besides the history of the land occupation. Forty-five interviews were made with the local residents in June 2006. At that time there were 800 inhabitants living in 200 dwellings in the Community of Cascatinha. In the interviews several topics were discussed, ranging from personal hygiene habits, health, schooling, and migration flows to socio-economic conditions, leisure time activities, work and urban infrastructure. Due to the complex relation between the existence of environmental impacts and the anthropic actions causing them, a Causal Chain Analysis ², was done to demonstrate, in graphic terms, the different social and environmental impacts observed in Cascatinha Village. The Causal Chain Analysis, coupled with data resulting from the analysis of specific pieces of related legislation, government plans and field work contributed to the formulation of proposals for urban re-design aiming to better adequate these communities to the “formal city” and improve the quality of life in the major urban centres.

Results

Figure 1 presents the localization of the studied area. The visual observation and the opinion survey carried out with the community dwellers of Cascatinha revealed, among other aspects, the sanitation conditions of the dwellings in the Village, how they dispose sewage, how they got water for their use, as well as all the negative aspects and factors that contributed in a negative way to the living conditions in the Community, as seen from the dwellers’ point of view. Their yearnings towards improving their living conditions were also identified. Important data relating sanitation, personal hygiene habits and environmental health was collected. As for this data, it is worth mentioning that while the dwellers dispose untreated sewage either in gutters, or in rudimentary pits, or in the drainage ditch that crosses the community, about 40% of the population resort to wells for their water supply. **Table 1** shows the sanitation conditions observed in the dwellings in the Cascatinha Community.

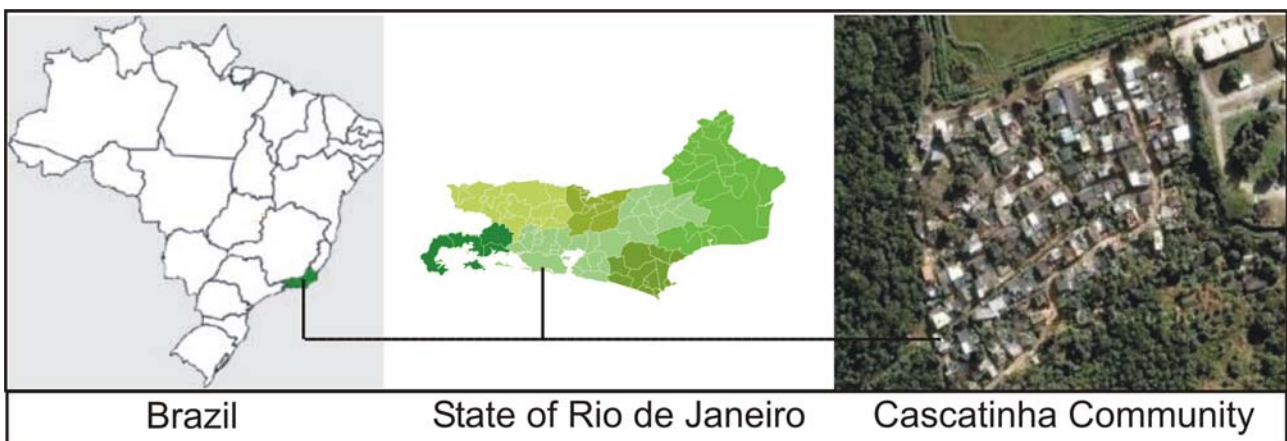


Figure 1 – Localization of the Cascatinha Community

² The Causal Chain Analysis consists of a methodology to analyse environmental impacts. This methodology aims to determine the interrelation between environmental impacts and environmental problems, immediate and specific causes, besides taking into account the elements that pertain to natural resources management. As a result of applying this methodology, a graph is produced indicating the relationship between a certain environmental impact or problem and the other impacts, the economic activities or among others, the activities resulting from public intervention. This way, the complexity of the environmental impacts can be more precisely and clearly demonstrated.

Table 1 - Sanitation Conditions in the Cascatinha Community

With toilet facilities at home. (%)	With sink in the kitchen. (%)	With a washtub at home (%)	With a living room/ bedroom (%)
95,56	84,44	75,56	80,00

The use of pits and sinkholes, however, has limitations and is of little efficiency in the treatment of sewage, reducing only 30% of the organic waste material. The rest permeates into the soil, contaminating it and more often than not, contaminating the underground water. It is worth mentioning that there are no (community) concerns about the location of sewage disposal devices (pits) and those to provide access to water (wells). Therefore, there is serious danger of contaminated water being used for human consumption. In the case of the dwellings that dispose of their waste directly in the ditch that crosses the Cascatinha, it could be observed the deterioration of the watercourse, leading to eutrophication. Among the main negative aspects of the village, the recurring floods resulting from the overflow of the ditch, which carries away the waste, and the presence of a large number of rodents were mentioned (**Table 2**). When there is a flood, partly due to unplanned land occupation, there is a synergy between water pollution, the presence of vectors and inadequate disposal of sewage. Under these conditions, there is imminent danger of spreading diseases, such as leptospirosis, connected with poor sanitation conditions. This situation is aggravated when considering the distance of 10 km to the nearest emergency unit, situated in Barra da Tijuca, a middle class district, where most of the Cascatinha residents work/ perform their daily activities. Also, as for the incidence of diseases related to lack of sewerage services, a very high frequency of dengue fever was observed among the residents of Cascatinha. In fact, the incidence of this disease in the urban areas of Rio de Janeiro has been demanding the attention of the authorities and the civil society. The residents of places like the Cascatinha Community, who have intermittent public supply of water, tend to store it inadequately in buckets and cans, thus creating the breeding ground (clean still water) for the mosquito that transmits the disease.

Table 2 - Cascatinha Community Main Problems

Heat (%)	Floods(%)	Rodents (%)	Mosquitoes (%)	Others
4,88	31,71	39,02	14,63	9,76

Another intimate connection can be made between housing conditions deprived of urban infrastructure and the impact on water resources and environmental health is the pollution of the Morto river. All the waste coming from the ditch that crosses Cascatinha flows into this river. The same applies to untreated sewage and solid waste coming from other low-income settlements or even from middle class condominiums. At present, the Morto river is in a serious process of eutrophication. Its polluted water flows into Praia da Macumba, a beach area in the Atlantic Ocean largely used for leisure time activities, at the weekends. Based on these results, the Causal Chain Analysis was applied aiming to detect the existing interrelations between environmental impacts and the anthropogenic actions related to the housing conditions in the settlement as well as the residents' health problems. This methodology besides favouring the graphic representation, in the form of a flowchart, of the problems and the environmental impacts, it also showed their relationship with socio-economic issues and the policies implicit in the problem of housing low-income families, such as the limited initiative taken by the government to provide housing conditions for the working class and to intervene in the process of urban deterioration/spoliation that has been affecting major Brazilian cities.

The analysis of the main programmes implemented by the Municipality of Rio de Janeiro for the slums, such as "Favela-Bairro" (Turning Slums into Districts) and "Bairrinho" (Small Districts) as well as the initiatives taken by the State Government, mentioned in the reports prepared by the Municipality, detected some gaps. One of the major criticisms towards the "Favela-Bairro" Programme is that the communities in the slums in Rio de Janeiro are growing at high rates despite the reurbanization works carried out. Another reason for criticism, also raised by Bienenstein (2001), is the fact that all the efforts made are directed towards the public spaces in the settlements, with the implementation of urban infrastructure and public equipment, neglecting the residents' housing conditions and their relationship with the new infrastructure. In fact, the new infrastructure contributes to increasing the commercial value of the dwellings, favouring the "high rising" of buildings and stimulating, though in an informal way, property negotiations. The resident, who sells his dwelling, ends up occupying other empty areas in the city, thus making of this cycle a source of income. Integrating the analysis of these gaps into the results of the field work and those of the Causal Chain Analysis, it was possible to present a range of proposals aiming at the re-ordainment and urban re-design of

the low-income settlements situated in the Jacarepaguá lowland. These proposals suggest the importance of adopting alternative methodologies required for the implementation of the urban infrastructure network, stressing the fact that the slum areas in the city have peculiar characteristics and design, making the use of conventional methodologies extremely difficult and expensive, demanding major engineering works and involving in many cases the pulling down of dwellings. Besides that, this study recommends that the state policies for the re-ordainment of the slums in Rio de Janeiro should focus on the sanitation conditions of the dwellings, so as to avoid perpetuating poor health and hygiene conditions. Additionally, the public policies and management strategies adopted should integrate the three government levels (local, state and federal) and the civil society representatives to ensure harmonisation of policy approaches. The implementation of programmes to re-urbanize the slums was in itself an important advance, mainly in the city of Rio de Janeiro, where in the 1960's, the official policy consisted in pulling down these dwellings, what not only reinforced social exclusion, but also failed to contribute to an effective re-ordainment of the urban areas. However, it is necessary to further the discussions in this issue that (is so crucial and) affects the city in its formal and informal areas.

Conclusion

The fast growing process of slum expansion in the main cities in Brazil, mainly in Rio de Janeiro, is one of the factors contributing to the deterioration of urban rivers, lakes and lagoons. Besides the impact on the water resources, there is a close link between the existence of a large contingent of citizens living without proper sanitation conditions and the proliferation of diseases, in particular infectious and parasitic diseases. In view of the above mentioned, it can be concluded that it is of paramount importance the re-ordainment of these areas in the city, incorporating quality of life to both formal and informal areas in the city. The slum re-urbanization programmes implemented by the Municipality of Rio de Janeiro have failed to pay due attention to the sanitation conditions of the dwellings and to promote integrated socio-economic measures, thus perpetuating the residents' poor hygiene and health conditions.

In the case of Cascatina Community, it is worth mentioning not only the risk of contaminating the soil and underground water, but also the occurrence of floods and the existence of a large number of vectors of infectious and parasitic diseases. The residents, indicating that they were fully aware of the unsuitable sanitation conditions they are submitted to, also observed these dangers. Furthermore, it was possible to relate the intermittent water supply, to inadequate water storing conditions and to the proliferation of the vector of dengue in the area. The data collected indicates that the state re-urbanization programmes for the slums and the re-ordainment of these areas should consider the sanitation conditions of the dwellings, thus mitigating the effects on the environment, on the water resources and on the slum dwellers' health.

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