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## LAND PARCELING AND NEIGHBORHOOD IMPACTS IN BRAZIL

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### Abstract:

The proposal and implementation of parceling real estate into smaller lots in Brazil is done according to legal and technical formalities. However, these instruments have proved inefficient in reducing the resulting environmental impacts. The ambiguities of the federal, state and municipal laws and regulations have limited the effectiveness of the actions of urban administrators. Law 10257/2001 emerged as an alternative to overcome these difficulties, proposing the adoption of neighborhood impact studies as an instrument to evaluate new proposals of urban occupation for purposes of environmental licensing. Thus, the purpose of this law is to provide the foundations for municipal public authorities to establish criteria for the assessment, mitigation and compensation of impacts resulting from new occupations. However, the very vagueness of the generic nature of this federal law and its incorrect application in the municipal sphere has posed the greatest obstacles to the good use of this instrument of urban environmental management. These deficiencies are classified herein in the categories of philosophical, technical and operational problems. The problems of a philosophical nature lead to technical difficulties, which in turn trigger operational deficiencies. This article discusses these deficiencies and points out ways to reduce them.

**Keywords:** Urban engineering; law 10.257/01; environmental management; neighborhood impacts; environmental legislation

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## INTRODUCTION

Parceling real estate into urban lots has been a concern in Brazil since colonial times, when Brazilian towns were urbanized and consolidated into cities with basic urban infrastructure. The Federal Legislation has a long history of laws, decrees and codes aimed at regulating land occupation to favor the improvement of urban conditions. Resolution No. 01 of 1986 passed by Brazil's National Environmental Council, brought real estate lots under legal control.

Brazilian states and municipalities have sought to draw up instruments to regulate this issue through laws and decrees, or in the form of proposals for regulation and analysis by state and municipal departments. However, despite the care and interest of the authorities, some types of impact resulting from the implementation of housing projects have still not been adequately dealt with, either because of the ineffectiveness of the legal instruments or due to the unpreparedness of the technical staff of public bodies and private companies.

With the passing of Law No. 10257/2001, Neighborhood Impact Studies became the legal instrument for urban management. This law gives Brazilian municipalities to right to define the types of enterprises that will require this kind of study. Law No. 10257 also establishes the environmental factors to be evaluated in Neighborhood Impact Pre-studies, and licenses for such activities are subject to its approval (Brazil, 2001).

The factors outlined in this Law indicate the need to expand environmental studies relating to proposals of implementation of urban occupation, considering attributes not traditionally covered and adapting the methods of data gathering and analysis to meet new and changing needs. Therefore, this paper discusses the assessment of environmental impacts in urban areas resulting from the implementation of housing projects, considering the "traditional" legislation and the new reality created with the passing of Law 10257/2001, as well as the way these studies should be conducted considering the attributes, their survey and most appropriate interpretations.

## RELATED LEGISLATION

### Federal Legislation

The law dealing with urban ordering emerged in the early 20th century and can be divided into two categories: legal instruments, which establish restrictions regarding location, and instruments covering the procedures for such proposals.

The oldest restriction for the use of urban land by civil construction is found in the Water Code, Decree No. 24643/34 (Brazil, 1934), which prohibits the construction of any edifice that may prevent or obstruct the free flow of watercourses.

Decree-law 25/37 (Brazil, 1937) forbids the construction of anything that hinders or reduces the visibility of Artistic Heritages.

Law 4771/65 of the Forest Code (Brazil, 1965a) establishes that areas of permanent protection cannot be occupied by human activities that involve the suppression of vegetal species. Law 4778 (Brazil 1965b) determines that the forest authorities must be consulted to obtain permits for parceling land into lots in forested areas.

According to Decree-law 271/67 (Brazil, 1967), municipalities can subordinate the implementation of lots to criteria of destination and use of areas, or prevent the installation of a proposed enterprise that would strongly impact the urban infrastructure.

The most marked characteristic of the oldest legal instruments was their strongly prohibitive tendency against land occupation, which considered geometrical aspects (such as the limit of areas of protection or watercourses) as parameters to authorize or deny occupation, without considering the neighborhood impacts that its existence might imply.

Also with regard to the procedures involving the form in which proposals are implemented, the current legislation concentrates on establishing ways to protect areas of interest, prohibiting the interaction between the parceling proposals and the areas to be protected.

This is the case of several legal instruments, to wit: areas of [environmental] preservation Law 6766 (Brazil, 1979); tourist areas – Decree 86176/81 (Brazil, 1981); privately owned areas of natural heritage – Decree 1922/96 (Brazil, 1996); water resources – Law 9433 (Brazil, 1997); and areas of social interest – Law 9785/99 (Brazil, 1999).

Also noteworthy is that the evolution introduced by decree for proposing feasibility studies is Decree 99274/90 (Brazil, 1990), which requires the drawing up of Environmental Impact Studies for proposals of potentially polluting occupation to be evaluated by agencies of the National Environmental System.

However, it should be noted that, despite its broader scope concerning the relation between proposals of occupation and the environment, Decree 99274 is limited to potentially polluting activities, which does not usually apply to urban land lots and housing projects.

### Resolutions of the National Environmental Council – CONAMA

In addition to the legal restrictions and studies to be considered under the resolutions of the National Environmental Council – CONAMA, these resolutions include legal mechanisms involving the forms of recovery of environmental damage caused by occupation.

From the standpoint of natural resources, CONAMA's resolutions do little to change the original

idea of forbidding the parceling of land in areas of protection interest, such as conservation units – Resolution 011/87 (Conama, 1987b); areas of relevant ecological interest – Resolution 12/89 (Conama, 1989); and areas of permanent preservation – Resolution 302/02 (Conama, 2002a), and Resolution 303/02 (Conama, 2002b).

With regard to environmental studies, the major landmark in Brazilian legislation is Resolution 01/86 (Conama, 1986), which establishes the type of enterprises subject to Environmental Impact Studies, including urban projects involving areas exceeding 100 ha or projects in areas of relevant environmental interest.

As for the studies to be conducted to underpin implementation proposals, CONAMA's subsequent resolutions establish analytical rules for proposals of occupation under specific conditions, such as the implementation of waterworks – Resolution 05/88 (Conama, 1988); potentially polluting activities in the surroundings of environmental conservation units – Resolution 13/90 (Conama, 1990); areas of coastal sandy plains – Resolution 04/93 (Conama, 1993); areas of dunes – Resolution 341/03 (Conama, 2003); and protection of caves and their surroundings – Resolution 347/04 (Conama, 2004).

Another important aspect to highlight is that the resolutions concerning the protection of areas of interest, such as the aforementioned ones, define basic rules for such studies but leave their detailing to state or municipal legislation, which fails to properly carry out this function.

Based on the Environmental Impact Study, Resolution 02/96 (Conama, 1996) states that any enterprise considered by the corresponding environmental agency to cause a relevant environmental impact should install a Conservation Unit as a way of repairing such environmental damage.

The amount of resources invested in the Conservation Unit must be proportional to the environmental damage, and cannot be less than 0.5% of the total cost of implementation of the enterprise.

This proposal had already been covered in Resolution 10/87 (Conama, 1987a), which, however, defined enterprises as “large size enterprises”, thus severely limiting the application of the resolution, unlike Resolution 02/96, which adopts the description “enterprise of relevant environmental impact”, without considering its size.

Despite the limitations of these proposals, such as the exaggerated importance given to the definition of penalties, these resolutions represent a major advance since they strengthen the culture of adopting compensatory measures to solve environmental conflicts.

However, with regard to proposals of urban parceling, such initiatives are still rare and have been

adopted only in very particular cases, in situations characterized by changes in land usage.

### **Brazilian State and Municipal Legislation**

In order to define environmental quality defense and conservation criteria, the States of the Federation have been creating legislation to deal with this issue since the 1980s. This legislation, which was initially based essentially on laws and decrees, has evolved and become consolidated into Municipal Director Plans, which seek to cover the factors of interest in the environmental defense of the municipality.

In the majority of cases, the State Legislation in principle determines general criteria and bureaus, preserving the municipalities' power to legislate in defense of their own specific interests. In view of the vastness of this subject due to the number of states Brazil has, and because of the particularities the theme may present, we have chosen here to describe only its common characteristics and to give a few examples.

The common characteristic of Brazilian state legislation dealing with the parceling of urban land is the disciplinary character of its processes and procedures. Basically, the legislation is limited to specifying the documents to be presented and the legal channels they must follow through the state administration.

Some examples of this type of legislation are the state of Rio de Janeiro's Decree 3910/81 (which establishes norms stipulating the legal channels through which projects for lots and divisions must pass); Santa Catarina's Law 6063/82 (which defines the conditions for the prohibition of land parceling); Rio de Janeiro's Law 1130/87 (which defines areas of special interest); and São Paulo's Decree 47817/2003 (that establishes which office of the Housing Department should examine parceling proposals).

In the implementation of these regulation proposals, the Brazilian states have defined a series of documents and procedures, sometimes of a wide scope and complexity, required for new urban lot permits.

In the case of the state of Rio de Janeiro, for instance, the instrument utilized to enforce the definitions of Decree 3910/81 is the Term of Reference for the Presentation of Simplified Environmental Control Reports (SECR).

These reports must contain the following information: situation and location; articulation of the proposal with neighboring conservation units; urban proposal, including relief, geological and geotechnical conditions; alterations of the vegetation; proposal for tree planting and vegetal restoration; soil loan area and construction debris disposal site; urban infrastructure and services; water supply and drainage; solid and liquid wastes. The report must include a forecast of impacts and mitigation and compensatory measures.

Another Brazilian state with a vast body of regulations on the subject is São Paulo. The strategy adopted was the creation of a group called GRAPROHAB (Group for the Analysis and Approval of Housing Projects in the State of São Paulo); to centralize and speed up the procedures for the state's pre-approval of urban land parceling enterprises (Graprohab, 2003).

GRAPROHAB established a set of documents to be presented for analysis in order to meet the legal and operational requirements of the following agencies: the Environmental Sanitation Technology Company (prevention and control of environmental pollution); Housing Bureau (approval of projects); Office of the State Attorney-General (property documentation); Environmental Bureau (environmental legislation); Electricity, Water and Gas Utility Companies (adaptation to the infrastructure); Fire Department (safety and fire protection systems); and the Paulista Metropolitan Planning Company (adaptation to urban planning). A positive aspect of this proposal is the wide scope of the legislation under consideration.

With regard to the drawing up of the Municipality's Director Plan, Brazil reveals three realities: Small municipalities do not prepare director plans; Medium-sized municipalities develop very limited director plans for lack of a technical team; and Large municipalities have the technical teams and resources needed to develop director plans that can represent advances in environmental legislation.

According to data of the Ministry of Cities (Ministério das Cidades, 2004), 1700 of Brazil's 2353 municipalities had until October 2006 to draw up their director plans. More recent information (Agência Estado, 2006) indicates that 67% of them met this due date.

In the medium-sized municipalities, the director plans are limited to dealing with impacts resulting from the implementation of new lots, reproducing the existing restrictions of the Federal Legislation. This can be observed in the director plans of Torres (Prefeitura Municipal de Torres, 1996), Londrina (Prefeitura Municipal de Londrina, 1998), Sorocaba (Prefeitura Municipal de Sorocaba, 2004) and Viçosa (Prefeitura Municipal de Viçosa, 2004).

In the large municipalities, especially capitals and metropolitan regions, the greater qualification of technical teams and the higher complexity of the environmental problems lead to more complete and sophisticated legal instruments. In some cases, these director plans already called for neighborhood impact studies prior to the passing of Law 10257; in other cases, the director plans call for another form of evaluating impacts in urban areas.

The Fortaleza Director Plan (Prefeitura Municipal de Fortaleza, 1992) foresees that enterprises that may represent an exceptional overload of the municipality's

infrastructural capacity must be subject to specific analyses before being authorized.

In João Pessoa, the Director Plan (Prefeitura Municipal de João Pessoa, 1993) requires that proposals for land use which are expected to overload the capacity of the urban infrastructure, the road system and transportation network, must present studies proving their adaptation to the existing conditions, and indicates the Neighborhood Impact Study as the tool for this purpose.

The municipality of Rio de Janeiro adopts the Neighborhood Impact Study, distinguishing it from Environmental Impact Studies without, however, establishing clear criteria of differentiation between them (Prefeitura Municipal do Rio de Janeiro, 2001).

In Porto Alegre (Prefeitura Municipal de Porto Alegre, 2004), the Director Plan states that every proposal for urban area parceling must include Urban Viability Studies.

The requirement for permits for effectively or potentially polluting activities or that can cause environmental degradation is foreseen in the São Paulo Director Plan (Prefeitura Municipal de São Paulo, 2004: chap. 3), which distinguishes between activities for which Environmental Impact Studies are required and those that require Neighborhood Impact Studies.

The city of Natal (Prefeitura Municipal de Natal, 1995) has specific legislation about the elaboration of Neighborhood Impact Reports (a complementary law to the city's Director Plan), which outlines the principles and minimum content of such studies.

Law 1869/98 (Distrito Federal, 1998) of the Federal District foresees the Neighborhood Impact Study as one of the instruments of environmental impact assessment.

In Anápolis (Prefeitura Municipal de Anápolis, 2002), specific legislation for the protection of the city's historical and cultural heritage foresees Neighborhood Impact Studies aimed at protecting the cityscape and the historical heritage.

In Niterói, Law 2050/2003 (Prefeitura Municipal de Niterói, 2003) defines the activities whose permits depend on Neighborhood Impact Studies and Neighborhood Impact Reports, covering the nature of these activities, their area and workings, analytical parameters to be adopted and the minimum content of the study.

## **LAW 10.257/2001 AND ITS IMPLICATIONS**

All the information presented so far indicates that the municipalities are the most interested parties and, therefore, the main bodies responsible for any legislation on the subject. Although the Neighborhood Impact Study is an instrument of urban environmental management discussed among Brazilian technicians since the early 90s, knowledge about it by municipal agencies only became consolidated with the passing of

### Principles and Regulations of Law 10257

Considering the environment (in the vision of the Brundtland Commission of 1988) as a set of relations of man with nature for the preservation of natural resources (Moreira, 1999), the imbalances occurring in nature characterize environmental impacts.

Based on this approach, the term ‘neighborhood’ can be understood as the parcel of land subject to the impact under analysis. Despite this simple concept, the spatial meaning of the term ‘neighborhood’ should be treated with relative flexibility, since its delimitation depends on the enterprise under analysis and on the impact under consideration.

The purpose of Law 10257 was to regulate articles 182 and 183 of the Brazilian Constitution (concerning urban policy). The subjects these articles deal with include the Neighborhood Impact Study as an instrument for the assessment of proposals of urban occupation and activities (articles 36 to 38).

The Neighborhood Impact Study fills gaps in the Brazilian legislation with respect to the evaluation of environmental impacts resulting from urban occupation by enterprises not covered by the CONAMA resolutions, which require Environmental Impact Studies and Environmental Impact Reports (Mata, 2004).

Law 10257 preserves the constitutional principle by stating that it is the responsibility of the union to legislate regarding general regulations, and gives the municipal legislation the lower to define how the instruments are to be applied.

The definition of the municipality as the responsible for urban environmental legislation enables each municipality to deal with environmental issues according to its needs (Guimarães, 2004).

According to Law 10257, Neighborhood Impact Studies must include “an analysis of at least the following points: population densification; urban and community equipment; land use and occupation; real estate valuation; generation of traffic and demand for public transportation; ventilation and illumination; urban landscape and natural and cultural heritage”.

One of the deficiencies of this Law is the definition of the environmental components. Such analyses cannot be restricted to the road system, urban characteristics and availability of infrastructure. Impacts upon natural resources, noise emission, emanation of gases and vapors, and the generation of waste must also be considered.

### Proposal for the Expansion of the Evaluated Components

To expand the scope of Law 10257, Lollo (2006) proposed a broader set of environmental components to be evaluated in Neighborhood Impact Studies so as to cover all neighborhood impacts in parceling or housing

project proposals. In order to better structure the identification of these impacts, they were grouped into four categories: impacts on the physical environment; urban impacts; impacts on the urban infrastructure; and impacts on sanitation and quality of life.

The components of the ‘impacts on the physical environment’ category are: air, soils, rocks, relief, surface and underground springs, natural landscape, vegetation, land use and occupation.

The components of the ‘urban impacts’ category are: population density, urban density, real estate market, ventilation, illumination, urban landscape, cultural heritage and urban quality.

The ‘urban infrastructure’ category comprises the components of services and raw materials: urban streets/roads, urban public transport, water supply and sewage systems, rainwater drainage, electric power supply, telephony, public lighting and public safety.

The category of ‘impacts on sanitation and quality of life’ includes noise and solid, liquid and industrial wastes.

### PROBLEMS IN THE EXISTING LEGISLATION

Despite the plethora of laws, decrees and resolutions cited herein, various deficiencies in the use of these management instruments have been found. In most cases, these deficiencies are more closely related with the legislation itself than with its control.

The problems are vast, but can be divided into three categories, according to their nature, i.e., problems of a philosophical nature, of a technical nature, and of an operational nature (Lollo, 2006).

The problems present a clear relationship of dependence: deficiencies in the principles (philosophical) lead to technical deficiencies, which in turn condition the operational problems. A faulty vision in the legislation leads to the adoption of deficient technical criteria or criteria that are difficult to apply, which may give rise to operational difficulties.

### Problems of a Philosophical Nature

In the opinion of Azevedo Neto (1999), one of the main problems is the incorrect assumptions adopted in planning. The author points out the assumption that the city is built lot by lot. In fact, however, the current trend is to build large enterprises (shopping centers, business centers, residential housing complexes, industrial condominiums) upon a collection of small preexisting lots.

On the other hand, the classical sequence of real estate parceling projects appearing first, followed by individual constructions, is also changing through the construction of large occupations that do not involve passing through the land parceling phase.

Costa & Braga (2002) cite the lack of a link between environmental policies and other public policies, with the action of the environmental agency, usually

restricted to the management of green spaces and the control of fixed sources of pollution. This lack causes issues of environmental policy, such as sanitation, transportation systems, and land use and occupation, to be dealt with by other agencies, without any integration and through punctual or one-shot action.

Maricato (2003) states that although Brazil's urbanization process took place in the 20th century, it was contaminated by characteristics of the colonial and imperial periods, such as the concentration of lands, income and power, and the arbitrary application of the law.

This author points out that urban legislation emerged only when it became necessary to structure the real estate market, and that historically, the Code of Municipal Orders [a set of laws and decrees regulating life in society within the ambit of the municipality] played a role in subordinating certain areas of the city to real estate capital, leading to the expulsion of the low-income working mass from the center of the city.

In his evaluation of urban drainage projects, Tucci (2003) points out that the projects normally implemented do not treat basins as a whole, are not integrated with the Director Plan, and fail to consider the control of effluents integrated with drainage.

### **Problems of a Technical Nature**

Freitas (2001) gives examples of environmental alterations resulting from the implementation of housing enterprises, which are not always foreseen by legislation, such as mass movements (erosion, silting, landslides), flooding and overflows, and soil and water contamination.

With regard to protection of the vegetation, Araújo (2002) states that, for urban areas, the legislation refers to the definition of criteria for director plans and municipal laws of land use. Due to the lack or deficiency of such legislation, areas of permanent preservation are the constant target of occupations.

In his discussion about how to change the situation of drainage projects from the standpoint of their limited environmental scope, Tucci (2003) suggests that the laws for future enterprises be incorporated into the Director Plan.

Silva (2004) points out that between 1964 and 1986, the [federal] Financial Housing System considered two standards of edifices: one of large and more individualized residences close to the central area, and the other of smaller homes grouped more closely together in the periphery of cities.

This tendency for densely clustered housing projects in the periphery, in addition to creating poverty, led to serious urban problems relating to the road system and urban transportation.

Considering the so-called 'urban condominiums', Araújo (2004) shows that the law of condominiums and incorporations contains a generic permission for the

implementation of these initiatives, without any urban or environmental requirement.

Thus, precisely because the law does not explicitly understand it as a form of urban land parceling, the urban condominium has been used as a formula to sidestep the urban and environmental requirements set forth in Law 6766/79 and CONAMA Resolution 01/86.

### **Problems of an Operational Nature**

For Duarte (2001), the procedures adopted by the public authorities render the process more difficult by requiring that documentation pass through various channels and bodies, with limited control of the process of proposal analysis since there is no integration among the different sectors.

With regard to problems of an operational nature, Costa & Braga (2002) point out that the disconnection of Brazil's environmental policy from its other public policies does not signify a mere lack of integration, but also involves the existence of contradictory objectives and logic among the different policies formulated and implemented by municipal authorities.

These authors also highlight the frequent occurrence of conflicts between the environmental agency and other municipal bodies responsible for carrying out public works. The municipal administration itself engages in actions of major environmental impact (road works, channeling of streams and rivers, implementation of sanitary landfills and garbage dumps).

## **COMPONENTS AND IMPACTS DO BE ASSESSED**

The list of environmental components that are subject to alteration and degradation by land parceling is vast and the interaction among these components is highly complex. Moreover, the way in which these alterations occur and the environmental components that are affected depend on the phase of the enterprise under consideration.

In the case of lots and housing projects, two important phases must be taken into account – the implementation and the operation phases. To highlight the interventions, predicted impacts and environmental components affected in each phase, this paper discusses each of these phases separately.

Activities of the aforementioned phases may be superposed, since implementation on some of the lots of the enterprise may be concluded and their operational phase started, while occupation on other lots is still in the implementation phase. Listed below are the interventions, impacts, and environmental components affected in the phases of implementation and operation of the enterprise.

In the implementation phase of the proposal, the most expected interventions are: creation and adaptation

of accesses, bulldozing, and installation of construction sites, construction works and implementation of drainage systems. The following impacts are expected to result from these interventions: modification of the area and its surroundings; circulation of vehicles; operation of machines and equipment; alterations of the urban infrastructure system; transportation and storage of materials; and generation of wastes.

The environmental components that may be affected by these impacts are the air, underground springs, surface springs, natural landscapes, urban landscapes, cultural heritage, urban quality, water supply system, sewage system, rainwater drainage system, electric power supply system, telephonic system, public lighting system, topographic relief, urban solid wastes, rocks, noise, soils, urban transportation, land use and occupation, vegetation, and urban streets/roads.

In the operational phase of the enterprise, the most common types of intervention are the demand for supplies and infrastructure, demand for raw materials, the circulation of people, and adaptations or expansions of works or services.

These interventions may give rise to the following impacts: circulation of vehicles and materials, offer and circulation of services, demands on the urban infrastructure and public services, and operation of machines and equipment.

In this case, the environmental components to be taken into account in the evaluation are the air, natural landscape, urban landscape, cultural heritage, urban quality, water supply system, sewage system, rainwater drainage system, electric power supply system, telephonic system, public lighting system, noise, public safety, urban transformations, urban transportation, vegetation, and urban streets/roads.

## **ASSESSMENT                      TECHNIQUES                      AND PROCEDURES**

With regard to neighborhood impact evaluation processes, some care must be taken. This care is justified because of the deficiencies in the legislation and in the most common technical analyses.

The legal deficiencies include imprecision or limitations of Law 10257/2001 or of municipal laws that determine or may determine the components to be evaluated in Neighborhood Impact Studies.

Article 37 of Law 10257/2001 establishes that “the Neighborhood Impact Study shall be executed so as to cover the positive and negative effects of the enterprise or activity with respect to the quality of life of the population residing in the area and proximities, including the analysis of at least the following points...”.

The law uses this type of wording because it plays a wide regulating role and provides for municipal legislation to state the precise definition of such components. However, in the proposition of municipal

laws, the expression “at least” is usually disregarded (for reasons of incompetence or convenience), leaving municipal legislation restricted to the topics set forth in the federal law.

As can be seen, the wording of article 37 of Law 10257/2001 is superficial and vague about several environmental factors, such as urban and community equipment, and especially about the urban landscape and the natural and cultural heritage.

As for “urban and community equipment”, special attention should focus on the diversity of infrastructural devices that can suffer impacts, such as public roads, public services of collection, treatment and disposal of solid and liquid wastes, public water supply and urban drainage systems, public service systems such as electric power, telephony and street lighting, availability of private services, safety-related issues, and demand for parking space.

This is not always the case. What usually occurs is that only parts of these factors are considered, especially insofar as it concerns public streets and roads, water supply and urban drainage systems, and parking lots.

With regard to the urban landscape and the natural and cultural heritage, it is common for municipal laws, and hence, for studies deriving from them, to take into account only the historical and artistic heritage and landscaping aspects, without giving due importance to the protection of components of the physical environment.

Thus, the protection of natural resources such as underground and surface springs, rocks and vegetation is normally disregarded, both from the standpoint of their physical degradation and from that of their contamination and pollution. Nonetheless, these resources are crucial to the quality of the environment and must not be neglected in neighborhood impact studies.

With regard to the analytical process, it is essential that there be a precise definition of the factors to be evaluated and of the characteristics of the enterprise and the neighborhood. Even with the proper assumptions, the analytical process is the determining factor for obtaining reliable results.

The collection of data determines the quality of the information to be treated, and certainty in the analysis defines the reliability of the results for alternative purposes and mitigation and compensatory measures. The enterprise to be assessed must be well characterized in terms of its nature, its size, and the peculiarities of the proposed occupation.

The description of the neighborhood must include its current environmental conditions (the basis for the prediction of impacts) and the definition of its dimensions must be compatible with the area of influence of the enterprise. The dimensions of the neighborhood (area of influence) must be adapted according to characteristics of the enterprise and the environmental component in question.



In the construction of a shopping center, for example, the impacts on the physical environment may be limited to the construction site (smaller than the area of influence), but the impacts on urban traffic may extend beyond the streets or roads surrounding the enterprise, encompassing access roads up to its link with the main road system (significantly increasing the area of influence).

Neighborhood Impact Studies that do not properly describe or evaluate the conditions of the enterprise, the neighborhood, or the environmental components generate negative consequences on four fronts, namely: the environment, the neighboring population, the general population, and the public authorities.

These damaging consequences include every form of degradation, contamination or pollution that may harm the quality of the environmental components. These effects may be felt locally (in the neighborhood in question) or, if not adequately monitored or treated, extend beyond those limits, jeopardizing the environmental quality of other areas.

This is particularly true insofar as air and water (underground and surface) contamination or pollution are concerned, since these fluid media circulate, transporting harmful substances to areas beyond the neighborhood from the point where they originate.

For the neighboring population, the lack of early detection of impacts prevents the adoption of measures of control, mitigation or even compensation, exposing the population to the effects of the interventions caused by the enterprise.

In addition to the obvious disturbances, this situation may lead to feeling of animosity by the neighboring population for the enterprise and the public authorities, making the subsequent management of the problems more difficult and possibly leading to legal claims that further erode the relations among the actors of the process.

By degrading a parcel of the municipality's urban land, neighborhood impacts are already, indirectly, a problem for the entire population. By exceeding the boundaries of the area of influence of the enterprise, these impacts directly reach other parts of the municipality. By demanding that the public authorities prioritize resources for corrective actions, these effects affect the municipality's budget, making other investments unfeasible.

For the public authorities, in addition to the degradation and devaluation of parcels of the municipality and the need for investments to correct the impacts, the lack of previous identification of neighborhood impacts means to lose the opportunity to negotiate investments in compensatory measures.

The problems deriving from faulty legislation can be reduced through greater detailing, by municipal legislators, of two aspects of the legal requirements: with regard to the types of enterprises subject to Neighborhood Impact Studies prior to obtaining a

permit for their installation, and with regard to the factors to be mandatorily considered in the preparation of such studies.

This initiative would prevent enterprises that represent a potential source of neighborhood impacts from remaining outside the legal requirements, and oblige these studies to consider factors currently neglected or treated inadequately.

As for the process of analysis of neighborhood impacts, the careful assessment of the peculiarities of each enterprise and of the neighborhood in question, as well as its boundaries, may render the process more effective.

Based on more detailed laws or on the initiative of those responsible for these studies, the consideration of factors that are still currently neglected or disregarded would also greatly benefit neighborhood impact studies, enriching them and facilitating the subsequent decision-making process.

## CONCLUSIONS

In order to effectively defend the urban environment of Brazil's municipalities, Neighborhood Impact Studies must be underpinned by clearly expressed and encompassing municipal legislation.

Preferentially, such principles could be adopted in the municipality's Director Plan or in laws subordinate to it, thereby enabling municipal authorities to manage the problem responsibly and effectively, and ensure the constitutional right of the population as a whole to a balanced environment.

Neighborhood Impact Studies offering more reliable diagnoses will allow public authorities to safely impose corrective and compensatory measures, as well as to require the adoption of impact monitoring techniques.

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