**Introduction**

In the literature of Geography and Development Studies, the rural-urban interface has been generically defined as the transitional geographic spaces where an assortment of rural settlements and multiple urban forms integrate the contradictions and differences between traditional urban and rural features. In developing countries, this combination has given rise to new forms of settlements, economic activities, cultures and patterns of natural resource use, characterized by their inequalities (economic and cultural segregation, lack of control over critical natural resources) as well as by the intense dynamics of societal transformation.

The rural-urban interface and peri-urban interface terms have emerged as a conceptual and applied critique to the city-countryside dichotomy, which is associated with the static ideas about the environmental and social components of a territory. Since the interface metaphor refers to new forms to understand the interactions or communication between two or more elements of different
nature, this term is increasingly used to think about the rural-urban interaction in a more adequate and dynamic way.

The most relevant characteristic of the rural-urban interface is the scale in which it is observable. This refers to the articulation of two different geographical spaces, and consequently, the scale of the underlying processes is regional. Evidently, rural-urban interfaces are closely related to the urban process, but for the very first time, it questions the relevant scales to address the urban phenomena. On the other hand, the idea of interface highlights the rupture between the different scales used to understand territorial problems. It also illustrates how the traditional approaches applied by rural geographers, who investigate agro-economy, livelihoods, local politics or natural resource management is renewed by these new theories and methodologies, since they emphasize causal mechanisms and scales not used before. In this sense, the metaphor of rural-urban and peri-urban interfaces has refreshed the geographers’ view on some traditional issues, from urban expansion to the political control of natural resources, particularly in the Mexican settlements system where mature cities coexist with rural and mixed, increasingly heterogeneous territories, characterized by a new composition and interactions between them.

The objective of this article is to outline the concepts of rural-urban and peri-urban interfaces as regional phenomena that need to be taken into account by geographers and territory planners. It proposes that these interfaces need to be addressed from a regional perspective, both academically and politically, and that these will be crucial for understanding current and future strategic territorial processes, such as urban water supply, urban expansion, greenhouse gas emissions, risk mitigation and adaptation policies, as well as new forms of poverty, social exclusion and vulnerability.

In the first part of the article, the theories and approaches on rural-urban and peri-urban interfaces are outlined and discussed, and a working definition is proposed. The second part briefly discusses the political, legal and institutional structure of Mexico’s political dimension of territorial regulation, arguing that current political cultures, together with the loopholes, gaps and overlaps of urban, environmental and agricultural frameworks, result in territories characterized mostly by the extra-legality of the economy, with direct effects on the occupation of the territory. This section describes the scope of each
territorial regulation instrument (Human Settlements Law, Environmental Law, Agricultural Law) and discusses the assumptions, effects and issues associated to such frameworks. The last section of this work describes two major effects associated with the current socio-economic structure of rural-urban and peri-urban interfaces in Mexico, particularly the limited formal social protection schemes and the deficient public services provided, which are leading to serious sanitation issues and environmental degradation.

TOWARDS A DEFINITION OF THE PERIURBAN AND RURAL-URBAN INTERFACES

In Geography and Development Studies, the term rural-urban interface has been used to explain a wide range of geographical processes, using several types of variables (e.g. population movement, land use, economic exchange). This illustrates the importance of studying the diversity of rural territories, economies and lifestyles; nevertheless, this variability of applications and conceptual origins makes the term vague, resembling a metaphor rather than a concept. Thus, it is necessary to clarify the different meanings of rural-urban interface, integrating measurements used in the literature of rural-urban linkages and spatial models, together with the social, economic and political processes associated with the emergence of these distinctive geographical areas.

The concept of the rural-urban interface has its roots in two big debates about the appropriateness of the rural-urban dichotomy. The first dates back to the 1940s, when terms such as urban fringe, suburbs, rural-urban fringe or urban periphery were indistinctively used to explain the morphology of urbanization, mainly in the United States (Adell, 1999: 5). The second questioning of the country-city relationship came from Development Studies, where the distinction between rural and urban served to support planning programs.

According to Tacoli (1998: 147-149), the question about the supposed rural-urban dichotomy is synthesized by the uncertainty of establishing the rural-urban threshold in terms of population size, which is indistinctively defined as from 2 000–2 500 up to 15 000 or 20 000 inhabitants. Although the rural-urban threshold has also been defined by many other attributes, such as population density, the frequent mixture of land use and the heterogeneity of economic activities, and the intensity of economic interactions between ur-
urban areas and their different peripheries have blurred that boundary more than ever. The issue of defining such areas becomes complex, particularly as regards the mobility of the labor force and the continuous exchange of resources, goods and services between different types of settlements.

The terms rural-urban and peri-urban interface were proposed to denote these emerging territories as a result of a generalized urban expansion; however, it can also refer to specific social, political or environmental processes associated with those territories (Simon et al., 2006: 10), such as governance or natural resources management (Bowyer-Bower, 2006: 154).

Originally, the concept of rural-urban or peri-urban areas (peri-urbanization in the French literature), referred to as ‘an external zone surrounding the city, but separated by some significant discontinuities in the urban tissue resulting from scattering processes of various activities, particularly those for residential purposes’ (Adell, 1999: 6). The adoption of this term in the Anglo-Saxon literature has its origins in contacts with French studies of urban expansion in Africa. From there, the notion of the rural-urban interface (the generic transitional space between cities and rural areas), is applied to a geographical space that:

- is a diffuse territory not corresponding to the political-administrative boundaries;
- shows mixed and diversified land use, namely agricultural, industrial and residential;
- has a constant flow of people, commodities, capital, information, ideas and natural resources;
- has a communications infrastructure allowing different types of flows;
- is bordered by commuting distances;
- hosts dynamic social-change processes related to migration, consumption, inclusion in the market, and intensification of the interaction between different economic activities.

Nevertheless, the definition and application of the rural-urban and peri-urban interface concept varies substantially between authors, either because of the topics they discuss or, in relation to them, the variables they use, the scale of analysis or the discipline of origin. This variability leads to the definition of
various types of peri-urban interface due to the diversity in focus, processes of interest and territorial referents.

In general, recent work relating to the peri-urban interface raises the question of whether the concept refers to a concrete place or territory (a type of intermediate area between the city and its hinterland) or to the socio-economic interaction between these two types of geographical space, and the diverse modalities it can assume (Binns and Lynch, 1999: 778). The former approach (Ginsburg, 1991; Potter and Unwin, 1995; Ford, 1999; Iaquinta and Drescher, 2000; Lin, 2001; Galindo and Delgado, 2006; Simon et al., 2006) assumes that it is possible and necessary to delimit the peri-urban interface as a discrete area, distinct from other clearly rural or urban spaces. The peri-urban interface is defined as a third type of space that fits within the rural-urban continuum, replacing the classic city-countryside dichotomy. It also implies that there are different spaces that can be classified as a peri-urban interface, but all are essentially physical intermediate zones between urban and rural areas.

The second approach refers to the peri-urban interface as a form of interaction between urban and rural zones, and emphasizes the differences between them, highlighting flows and exchanges between each space type. Different factors may be exchanged, including people, natural resources, energy, waste, ideologies and/or financial capital, among others (Rees, 1992; McGranahan, and Satterthwaite, 2004; Lynch, 2005). This approach highlights the demographic, economic, social and political processes that occur in these areas. Defined in these relational terms, the peri-urban interface stresses the rural-urban dichotomy and defines it as a sort of membrane rather than a place. The peri-urban interface has no morphological attributes; its physical dimension is not important.

Additionally, Mbiba and Huchzermeyer (2002: 118-119, 122) contribute to this discussion on the diversity of meanings of the peri-urban interface by addressing the history of this concept as a distinctive field of study within UK and US’ development agency programs of intervention in Africa, which strongly influenced the subjects and programmatic focus of research agendas, specifically as regards their needs of intervention. According to Mbiba

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1 US development agencies used the terms ‘urban fringe’ or ‘recently urbanized areas’ (Mhiba and Huchzermeyer, 2002: 118-119).
and Huchzermeyer (2002: 121ff) the peri-urban interface has been explained from different conceptual frameworks that have responded to such political interests; different definitions derive from system theories (peri-urban as an outcome of the interaction of discrete systems such as urban, agricultural and environmental); from the neo-classical theory (peripheries entail land uses or lower value and different degrees of opportunity costs); and from the Marxist theory (squatter settlements, livelihoods fragility, poverty and other features of the peri-urban interface in developing countries are outcomes of capitalism’s structural inequalities). Mbiba and Huchzermeyer propose a redefinition of the peri-urban interface from the structuring theory and the concept of agency (the peri-urban space emerges as a result of power relations regarding the control of critical resources, stakeholders’ interests, capacity building and governance).

Since the conceptual development and practical use of the peri-urban interface concept is still under construction -it is not yet a consolidated term- the interface is still a metaphor rather than a concept. The peri-urban interface concept requires further discussion in relation to the construction of the scale at which it is relevant, the type of spatial relationship it assumes between urban and rural, and the definitions of urban and rural themselves. However, the phenomena that emerge to the geographer under this category are undeniably challenging. For this reason, I hereby propose a working definition of the peri-urban interface as a discrete, transitional area that emerges within urban systems characterized by its maturity\(^2\) (although the peri-urban space can be located next to large cities or within the active sub-systems of medium-sized and small cities). Additionally, in developing countries, the peri-urban interface is characterized by:

- Sprawled settlements where traditional and new localities coexist, mostly under extra-legal and/or informal land-use mechanisms.
- The social composition is heterogeneous and many social actors are unevenly involved in decision-making processes.
- The economic structure is increasingly occupied by activities that take advantage of cheap land and labor force in addition to the proximity to markets.

\(^2\) Mature urban systems are those in stages V and VI in the model of differential urbanization (Geyer and Kontuly, 1993: 163; see also Tuirán, 2000).
• Households display a pattern of spatial diversification of their livelihoods.
• Environmental issues are particularly intense due to its relationship to urban areas as sources of key goods and services, together with the problems that raise in the peri-urban interface itself as a result of the increasing demand of such goods and services, the lack of regulations and the difficulties of agreement among fragmented institutions and stakeholders.

**Urban dynamics behind rural-urban interfaces in Mexico**

In the case of Mexico, the urban system has been characterized by its highly primate urban hierarchy, the primary urban area being Mexico City, whose growth has been particularly vigorous from the 1950s onwards (Garza, 2004: 155). According to a recent study (Tuirán, 2000: 149), the Mexican urban system has already gone through the primate city stage, in which the three largest cities in the country (Mexico City, Guadalajara and Monterrey) displayed high growth rates associated with rural-urban migration. Mexico City in particular showed a high degree of dominance within the Mexican urban system, reaching peaks of annual growth above five percent between 1940 and 1970, with an increase from 1.9 to 9 million inhabitants over 30 years (Ward, 1998: 48; Ruiz Chiapetto, 1999: 13). However, since the 1970s Mexico City’s dominance started to decline as the relative and absolute importance of intermediate urban centers started to increase (Tuirán, 2000: 147). In 1970 there was one city in this category with a total population of 629,000, while in 2000 there were 19 such cities with a total population of 12,590,000 (Garza, 2004: 157). As a result of this transformation the Mexican urban system is now steadily deconcentrating, a process associated with the advanced intermediate-city stage in Geyer and Kontully’s model of differential urbanization (Pérez, 2006: 139). In the advanced intermediate-city stage, the model predicts that secondary metropolitan areas increase their regional importance, which has effectively happened in the metropolitan zones of the Central Region of Mexico (Negrete, 2008: 202-203). The growing significance of medium cities within the urban system implies that their surrounding area also increases their demographic and economic dynamics, giving rise to diffuse hinterlands around them; this is the most relevant aspect for understanding the emergence of a peri-urban interface within an urban system with these characteristics (Galindo and Del-
That is, according to Geyer and Kontuly’s model, at this stage of the Mexican urban system it is expected that large and medium cities spread over adjacent administrative units embedding separate localities that fall under their influence, becoming peri-urban interfaces. Therefore, part of the explanation of the peri-urban interfaces in central Mexico should be understood within the context of urban system dynamics, which have generated remarkably urbanized regions with large interstices of urban sprawl (Delgado, 2003: 18).

In addition to the structural features of the urban system that enables the emergence of peri-urban territories, the specific characteristics of rural-urban interfaces that appeared in Mexico in the past years have been strongly shaped by the political dimension of land regulation, particularly land speculation, informal activities and widely accepted clandestine appropriation of land and natural resources with little or no formal institutional control. For example, in the past decades the fragmentation and urbanization of social property land in many parts of the peri-urban interface of Central Mexico has increased due to the ageing of social property landowners (endowed between 1930-1950, during the major land distribution process), who face a strong pressure from their younger relatives to split the plots and urbanize them (Cruz, 2002: 67). Landowners usually prefer to urbanize and sell their plots rather than regularize them through the programs applied to agrarian land, since the payment they would receive is much lower in the second case (Orozco and Sánchez, 2006:29). Furthermore, even if they opt for such regularization, land price in informal settlements grow faster and higher than legally owned land (Eibenschutz and Hartman, 2009: 191) These situations are examples of the extra-legal dwelling mechanisms that Allen (2003a: 137) has identified as typical of the production of the peri-urban interface in developing countries.

In the case of Mexico, this production of the peri-urban interface took place over both small private land and social property land; however, the intensity of the use of social property land is significant in the Mexican context, as it has been the main source of land for formal and informal urban expansion. As many as 15 million urban inhabitants in Mexico have settled on social property land, with annual demand ‘from low income families not served by federal housing agencies’ estimated at 100,000 plots (Jones and Ward, 1998: 77, 81). Social property land located near to urban areas has been ex-
tensively used for industrial development, public infrastructure and territorial reserves via expropriation. These land plots have also been traditional sources of land for low-income settlements, given the lack of government programs to face the intense rural-urban migration characteristic of the 20th Century Mexican urbanization.

On the other hand, the main mechanisms associated with the current urbanization trends has to do with the type of control of the Mexican State over land uses and the role of its paradoxical ‘regulated corruption’ (Serrano, 1996: 5), in which a set of strong formal institutions (political parties, local governments, corporatist institutions) coexist with extra-legal mechanisms which have been used for legitimising authoritarianism, imposing leadership and regulating the economy, such as repression or co-optation. The historical importance of the linkages between the political system and the occupation of peri-urban territories is outstanding, and will be addressed in more detail in the following section.

**Mexico’s political dimension of territorial regulation: gaps and overlaps**

From the decentralization process that has been ongoing since the 1980s, territorial planning and urban policies are legally implemented at the local scale based on Article 115 of the Constitution. Particularly, the legal instruments related to territorial regulation are divided into three different subsets of regulations: urban, environmental and agrarian, whose limits are unclear, blurred and overlapped in specific situations (e.g. management of environmental reserves within urban areas) and territories (e.g. urban frontiers).

In this article I set out that the study of the legal dimension is particularly important in order to understand the processes that regulate the territorial development of such spaces. In the case of Mexico, one of the major issues that territorial regulation faces is that, although social property land is regulated by the Agrarian Law, land under this regime has evidently not been exclusively agrarian; the diversification of land uses throughout the 20th century has led to a complexity that has exceeded the original framework. The peri-urban ejidos and communities suffered the results of the contradictory legal framework in relation to urban growth over social property; specifically, the regulation of urban land use by the Agrarian Law, which has become progressively more
inadequate for land management of peri-urban ejidos. However, the regulation (and the lack of it) of social property contained in the Agrarian Law was extensively used by the 20th century Mexican State for its own convenience, to the point that some authors refer that the urbanization of ejidos ‘was an important arena for the exercise of Mexican statecraft’ (Jones and Ward, 1998: 80); it was also significant to pursue the specific objectives of political control on matters of urban growth and, specifically, on peri-urban settlements.

As a result of this contradictory legal framework there are serious legal gaps in the regulation of urban growth, which were used to justify the 1992 reform to Article 27 of the Constitution and the Agrarian Law; evidently, the peri-urban ejidos were one of the most relevant targets for these reforms, since due to their location, this land is prone to major changes in land use, being appropriated for both formal and informal urban developments. As land-management units, ejidos have had to deal with the undeniable pressure of urban expansion unclear formal rules and struggles over land between many social stakeholders. However, urban expansion also occurs over private land, which differs from the ejido in the sense that the ultimate responsibility for managing the peri-urban land falls on municipal governments who, according to Article 115 of the Constitution, shall ultimately deal with the transformations of the structure of agrarian properties intermingled with human settlements, water administration, and environmental management.

In the past decades, the laws that rule such municipal and local governments changed significantly. In the early 1980s the government created the National System of Democratic Planning, based on the amendment of the aforementioned Art. 115 of the Constitution. This article allocated to states and municipalities many planning functions that previously belonged to the federal government. The main objective was to put municipalities in charge of many administrative tasks and public services, including the provision of public lighting, water and waste collection, public security and the regulation of land uses via the formulation of urban development programs and environmental plans.

One of the first regulations that stemmed from the new decentralized planning scheme was the Settlements Law (LGAH). These programs are the main instrument that local governments have to control, allowing and restraining the diverse demographic and economic processes that take place in their territory
via Urban Development Programs (UDPs). However, peri-urban social-property land is also under the regulatory scheme of the Agrarian Law. Frequently, the functions of the municipality stated in UDPs may overlap with the functions of legal ejido authorities in several aspects; for example, according to the Agrarian Law, the Assembly of Ejidatarios defines and changes the limits of the ejido’s urban zone. However, the municipal government is also in charge of settlement zoning via Urban Development programs. In this particular case, the Settlements Law has a slight predominance over municipal governments, who must approve the proposals of the Assembly of Ejidatarios and ensure the agreement between the two plans of zoning.

A second aspect which causes frequent misunderstandings and overlapping functions between municipal governments and ejido organizations is urban land-use management. For example, according to the Agrarian Law, the ejido (including its “urban” area) is a federal zone. However, once this urban zone of the ejido is marked out and registered in the Agrarian Registry, the plots should also be registered in the municipal Public Property Registry because all subsequent changes of ownership, public service supply or land use are subject to common law. The institution in charge of approving and issuing land use licenses is the municipal government.

Land management outside the formal limits of urban areas is under the regulation of the Environmental Law (LGEEPA). LGEEPA regulations apply to areas outside formal urban boundaries, even if these spaces are extra-legally urbanized and are not part of official urban areas. This means that if peri-urban land is subject to any environmental regulation plan (communal, municipal, or under a special regime as protected area) the violations of such regulations are potentially subject to sanctions from the Environmental Attorney (Profepa) or the state/municipal authorities.

To this point, it is clear that the legal framework that regulates Mexican territories has been constructed under the following assumptions:

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3 The Mexican ejidos are formally regulated by two associated legal instruments: the Ejido Commissioner and the Assembly of Ejidatarios. The Ejido Commissioner is a committee integrated by a President, a Secretary and an additional third member. They represent and coordinate the Assembly of Ejidatarios, which includes every ejidatario (a person within the ejido that holds land rights). This Assembly issues final resolutions on matters of land-use change and audit, among others.
The urbanization processes is clearly delimited.

Urbanization is fundamentally a common process that occurs under land reserves.

Crucial natural resources subject to ecological urbanization are externally located in reference to urban areas.

The municipality is the most adequate level of territorial management.

These assumptions on the nature of different territories correspond to the limits and scope of each territorial regulation framework, which are summarized in Table 1.

All these gaps and overlaps in the Mexican territorial regulations system showed in Table 1 give rise to a number of issues that in recent years have been increasingly recognized by those studying urban peripheries or the interface between urban and environmental matters in Mexico. The most relevant issue that has emerged regarding such legal framework relates to the scale at which issues are visualized and recognized by researchers and public organizations, and, hence, to the scale of actions taken to tackle them.

At this point, it is worth mentioning that despite the undeniable and increasing role of local governments in territorial matters and their crucial role on decentralization processes in strengthening social participation in public issues

Table 1. Scope of each territorial legal framework in Mexico

<table>
<thead>
<tr>
<th>Human Settlements (LGAH)</th>
<th>Environmental Protection (LGEEPA)</th>
<th>Agrarian Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urbanised zones, land reserves destined to urban expansion, and infrastructure such as roads, and other human settlements supply infrastructure.</td>
<td>Territories “outside” formally recognised urban areas, particularly those involved in key natural resources management, or those involved in crucial environmental services such as waste disposal.</td>
<td>Ejidos and agrarian communities, including their urbanised areas and common land that houses infraestructure necessary for human settlements.</td>
</tr>
</tbody>
</table>
and promoting local development (Parker and Serrano, 2000: 3), Mexico still displays four characteristics that have generally hindered municipalities from being participatory, transparent and efficient public entities:

• Social policies have been historically handled by central offices until recent decades, and municipalities (particularly non-urban or peripheral municipalities) are still public organizations with little experience and “scarce human and economic resources for the development of a complex public action at the local level” (Ziccardi, 2008: 132).

• The framework for territorial regulation has been fragmented into institutional pieces of different scopes and goals, which increases the time that local bureaucracy needs to learn, plan and execute their programs, within a context of no reelection.

• The political culture privileges discretionary decision-making and informal protection networks in exchange for votes, rather than transparency and accountability (see for example Bardhan and Mookherjee, 2001: 2).

• Finally, agreement between municipalities on shared issues becomes difficult due to the regional nature of many of the issues that municipalities face, which will require a supra-municipal reorganization of territorial regulation. This includes crucial components of territorial regulations, such as water management, solid waste disposal or design of transport systems, among others.

Peri-urban municipalities are entities where these four aspects are particularly visible, given their dual characteristic of being urbanized but yet outside formal urban centers, with a mixture of land uses. LGEEPA, LGAH, and sometimes the Agrarian Law tackle the issues associated with this type of space, and even though the laws are not evidently contradictory, the lack of consistency both between the three laws and between these laws and the geographical processes they regulate generate many areas of conflict between municipalities, state governments, ejidos or community commissioners, environmental attorneys and other stakeholders that affect and hold interests in the territory.

In the following section I will address three sets of issues which characterize the peri-urban interface derived from their geographical and legal situation that shall be observed and recognized in order to rethink the current territorial intervention mechanisms and develop new ones.
A typology of issues at the peri–urban or rural–urban interface

As discussed above, the peri–urban or rural–urban interface as a distinctive concept stems from the intervention programs of development agencies (Mbiba and Huchzermeyer, 2002: 118-119). In this sense, the specific features of the territorial problems that occur at peri–urban and rural–urban interfaces are not new, given that such problems have been the major drivers of peri–urban studies, rather than their scientific geographical characterization.

The most relevant attempt to specify and redefine the rural–urban and peri–urban interfaces and synthesize their multiple territorial problems has been carried out by several projects under the Peri-Urban Interface Program of the Development Planning Unit at University College London. In these projects, the peri–urban interface is defined as a ‘heterogeneous mosaic of “natural” ecosystems, “productive” or “agro-”ecosystems, and “urban” ecosystems affected by the material and energy flows demanded by urban and rural systems’ (Allen, 2003a: 136–137; Allen, 2003b: 11–12), where the heterogeneity of populations, interests, activities and land use play a core role. The unit’s work has focused on the development of planning strategies for and management of natural resources in peri–urban areas, where it has proposed some schemes of intervention, particularly on water management. The unit identifies the peri–urban interface as the result of a ‘continuous but uneven process of urbanization produced by land speculation, shifting economic activities of higher productivity, and the emergence of informal and often illegal activities ...’; the social composition of peri–urban systems is highly heterogeneous and subject to change over time. Small farmers, informal settlers, industrial entrepreneurs and urban middle–class commuters may all co-exist in the same territory, but with different and often competing interests, practices and perceptions (Allen, 2003a: 137). According to Allen (p. 136) ‘the peri–urban inhabitants’ identities and social positions are based and constructed from the labels ‘semi–urban’ or ‘degraded rural’,

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4 For example, their most recent project was ‘Service provision governance in the peri–urban interface of metropolitan areas’. Previous projects were ‘Strategic environmental planning and management for the peri–urban interface’; ‘Consolidation of knowledge about the peri–urban interface’ and ‘Synthesis of peri–urban interface knowledge’. See http://www.ucl.ac.uk/dpu/pui/index.htm, accessed 14th April 2008.
which makes that besides their distinctive geographical features, their social character is also unique.

Based on this characterization, this section will discuss two types of issues that emerge or are particularly intense at peri-urban interfaces in Mexico. Such issues are:

• Extra-legality and lack of social protection schemes.
• Poor provision of public services that leads to sanitation issues and environmental degradation.

Extra-legality and limited formal social-protection schemes

In previous paragraphs I have discussed the extent to which the peri-urban space is the outcome of different appropriation modalities of both private and social land, favored by the gaps and overlaps of the legal and institutional framework. In particular, there are two strategies that peri-urban households follow systematically and can be causally linked to such territorial layout:

• The use of cheap rustic land for housing (including social property land) expecting to obtain public services and increase their value in a mid- and long term (see Iracheta and Medina, 2008: 565).
• The intensive use of their workforce on multiple economic activities, most of them precarious and with no benefits (unwaged farm workers, contract-manufacturing workers, bricklayers, street vendors) that vary according to the market conditions and distances, skills and season.

These two strategies involve a degree of informality that ‘does not imply the absence of the State, but a different type of relationship in which State agencies accept that certain activities exist at the edge of the legality’ (de la Peña, 1996: 111). In this paper, I propose that such situations and their consequences for peri-urban inhabitants are better understood under the extra-legality concept. This paper uses the definition of extra-legality presented by de Soto (2000: 21, 28; see also Varley, 2002: 449-450), who emphasizes the idea of ‘informal binding arrangements to protect and mobilise peoples’ assets’. Under this definition, it is clear that at the peri-urban interface most social groups use extra-legality
as the dominant modality of social interaction, and that their strategies are part of the causes that differentiate peri-urban territories from urban spaces, which despite their inevitable degree of informality as part of social life, are subject to another combination of regulatory forces.

The predominance of extra-legal social mechanisms in the peri-urban interface poses a huge challenge to territorial regulation and social development policies. For example, this brings long-term housing insecurity and the need of tenure regularization programs that reproduce the irregularity and whose delivery under the Mexican political conditions is vulnerable to land speculation, discretionality and even corruption (Jones and Ward, 1998: 87; Monkkonen, 2008: 16). Besides, extra-legality is the basis of a sprawled, unplanned occupation where the main criteria is given by the availability of cheap land for low income-groups, rather than the adequacy of such land for specific uses.

Another serious issue associated with the characteristics of the interface discussed above is the limited presence of adequate social protection. Social protection refers to a number of different types of policies grouped into two types: social insurance and social assistance. On the one hand, social insurance (both private and public) assists individuals and households to protect themselves to fall into poverty or lose their assets. On the other hand, social assistance refers to ‘non-contributory, tax-financed benefits, in cash or kind, used to assist target groups’ deemed eligible because of deprivation and vulnerability (Norton et al. 2001: 12). An example of a social protection instrument is the cash-transfer, poverty-alleviation oriented Programa Oportunidades.

But, how do limited social protection opportunities relate to the geographical characteristics of the peri-urban interface?

- There is a generalized informality of employment conditions, which in Mexico are directly related to access to public insurance and social benefits.
- The peri-urban interface has been invisible to most social and territorial intervention programs. Due to its characteristics that differ from those of true rural and urban spaces, rural and urban development programs cannot cover the specific risks and needs that peri-urban households face, which would imply ‘unusual’ combinations of social protection applied to a single household (e.g. agricultural insurance, payment for environmental services and cash compensations for commuting excess time).
One key dimension of some social protection schemes is the physical availability of public services (public spaces, schools, health services, leisure facilities). Such physical availability comprises both location and mobility, two dimensions that in the case of the peri-urban interface are difficult, if not compromised, by its low density, in addition to other conditions that restrain its access (cultural availability). For example, the consciousness and practical knowledge of citizenship rights; the conditions of informality of peri-urban dwellers usually involve a low degree of exercise of such rights.

In conclusion, although the recognition of peri-urban specificity by the State and the development of adequate social policies is unavoidable, I do not see formality and the sole strengthening of legal social regulation schemes as the panacea to solve social issues and their geographical expressions (Iracheta and Medina, 2008: 564-565; Eibenschutz and Benlliure, 2009: 13-14; Satterthwaite, 2009: 305). However, it is undoubtedly clear that the peri-urban interface is composed by social groups that routinely deal with difficult conditions generated by processes whose mid- and long-term effects cannot be ignored. In the following subsection I will discuss some of them.

**Poor provision of public services leading to sanitation issues and environmental degradation**

Dwellers at the rural-urban interface live under particularly difficult conditions to meet their water and sanitation needs, mostly for three reasons: the low population density directly increases the cost of public services; also, formal plans and programs are usually limited at the squatter and sprawled settlements that characterize the rural-urban interface (Allen *et al.* 2006: 337; Black and Fawcett, 2008: 42), and specially regarding sanitation issues, because such settlements are officially outside the recognized urban area. An additional difficulty in planning the provision of water and sanitation services is the lack of “reliable and detailed data [because] at best, statistics only distinguish between urban and rural areas” (Allen *et al.*, 2006: 343). In this sense, peri-urban settlements are increasingly in the agenda of development agencies, due to their specific problems to meet the Millenium Development Goals and other internationally agreed guidelines that safeguard quality of life (Norström, 2007:...
In this section, I will discuss three of the most common problems found at rural-urban interface sites: household solid waste and wastewater; small-scale industrial waste; and pests as disease vectors.

The importance of adequate sanitary facilities has been widely acknowledged as a precondition for the satisfaction of human needs (Doyal and Gough, 1991: 197; Leemans and Groot, 2003: 78). However, the set of conditions in the peri-urban interface discussed above complicates the proper disposal of household wastes, meaning a private or shared facility with cleanliness standards that prevent the pollution of other sources of water, food and air. This broad definition includes not only the traditional water-based collection and treatment infrastructure, but also other forms of water-free disposal such as a properly designed sewer or dry latrines. In this sense, it is worth stressing that the sanitation data available in Mexico tends to mask the territorial conditions of sanitary infrastructure beyond households facility reports; that is, although households have a runningwater toilet, the excreta is disposed of either within the household plot, in open streams or even in closed channels that discharge untreated water downstream, leading to important but still unacknowledged consequences for public health. For example, an estimate of sewage system coverage for 33 municipalities located in the Upper Lerma basin (a significant part of which shows a settlement pattern typical of peri-urban interfaces) based on data provided by the Water Commission of the Government of the State of Mexico reveals that, although 81.3 percent of households have running water, the sewage system covers only 56.3 percent of households, which means that more than one million people likely discharge their wastewater directly to open streams or onto their plots (Ruiz, 2008: 113). An additional issue that is receiving increasing attention is the use of urban wastewater for irrigation (Jiménez, 2009:93 ff; Cirelli, 2003: 417 ff), which involves serious health risks due to the amount of pollutants (biological and chemical) diluted in urban wastewater that is being used in peri-urban agriculture.

Environmental issues are not restricted to wastewater, though. Peri-urban interfaces are the most common sites for the disposal of urban solid waste, in addition to locally generated waste; sanitary landfills coexist with uncontrolled sites (e.g. ravines, rivers, vacant land) tolerated by local governments due to their inability to cover waste collection and provide adequate final disposal sites (McGranahan, 2004: 20). The peri-urban interface is then where current ur-
ban solid-waste management schemes take place, mainly because of the short distance to the points of generation (Allen et al., 1999: 15), but also because “usually more than one administrative area shares the peri-urban territory, having weak formal linkages and poor decision-making regarding issues such as transport, water, energy, solid-waste and wastewater management and land-use planning capabilities; this leads to uncertainty as to “who administers what” (Allen, 2003b: 5). This is crucial for solid waste management, because unregulated dumping has important environmental impacts not only in the adjacent area but also at a regional scale if it pollutes water bodies, air or agricultural land (Ávila and Jiménez, 2009: 12).

There are two additional aspects that are virtually unacknowledged in the geographical literature, which will pose serious threats to the health of peri-urban inhabitants in the near future. One deals with wastes discarded by small workshops and contract manufacturing facilities of several types of economic activities that have proliferated at many rural-urban interfaces. The other refers to environmental changes that led to an increase in vector-borne diseases and pests.

As many authors have documented (Tacoli, 1999: 9; Kay, 2005: 331; Escutia and Monroy, 2006: 188 ff; Larralde, 2008: 86 ff; Ruiz y Delgado, 2008: 79 ff), rural-urban interfaces are territories that display a considerable mixture of economic activities, most of them informal, which range from craftwork, textile and garment production (Abrahamer, 2004: 63 ff), small manufactures (specially assembly) to large industrial developments that take advantage of the lower price of land, the proximity to urban markets and the opportunities for local governments to avoid environmental regulations.

Although a research agenda on environmental impacts over urban hinterlands has been present in the geographical literature in Mexico since a while ago (Ávila, 2001: 123-124) and there are several studies that address critical areas like water supply, it is remarkable that the environmental effects of the transformation of economic structures in rural-urban regions and households have neither been empirically documented nor discussed. In this sense, it is necessary to conduct further research and produce quality data to illustrate environmental degradation profiles according to population densities, land uses, coverage of sanitary infrastructures, economic activities (both formal and informal), type of supplies, wastes and disposal mechanisms. That is, territorial regulation urgently demands to pay attention to these research gaps at the peri-
urban interface, which will require the development of new policies and intervention mechanisms to prevent further negative environmental effects.

Conclusions

In this article I propose that current attributes of Mexican peri-urban interfaces need to be understood not only as the result of urban dynamics, but also as the geographical outcome of specific political and institutional structures generated by a legal framework with important gaps and overlaps regarding territorial regulation. Current regulatory schemes still assume a clear border between urban and rural territories, each with its own development needs; this division is at least inadequate to address the problems that rural-urban and peri-urban interfaces display regarding issues such as urban sprawl and natural resources management, among others.

The literature review on social geography and urban-regional planning reveals a limited understanding of the characteristics of rural-urban and peri-urban interfaces and of the consequences of such territorial layouts on people’s well-being. It is particularly important to carry out further empirical studies on the extra-legality and limited formal social-protection schemes that derive from such territorial structure, as well as the problems that peri-urban inhabitants face regarding the delivery of public services and, especially, in relation to public-health issues and environmental degradation. The geographical diversity of Mexican territories, as well as the development issues addressed in this article should be made visible and considered in the territorial planning agenda to face the complex issues that current trends will produce in the near future.

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