

# TOWARD AN OBJECTIVE UNDERSTANDING OF SPATIAL DYNAMICS: DESCRIPTION OF A METHODOLOGY AND TWO CASE STUDIES IN QUEBEC

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*The long version of this article is available on the portal of the territorial intelligence*

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**Abstract:** Although territories are currently transforming, the changes are not homogeneous. Territories are in the throes of profound change, hastened by technology, the heightened mobility of goods and services, neo-liberalism and so on. As a result, they must reinvent their identity, but which direction should they take: production, multi-purpose or recreational? With deep, anthropological roots, this dilemma transcends administrative boundaries. Furthermore, the traditional rural and urban divide is slowly giving way to a new configuration of the relationship between human beings and the land. We are now confronted with variable territorial geometry in which economic and ecological discourse stand on opposite sides. Traditional models offer little insight into this new problem. Territorial transformation therefore dictates that we re-examine the traditional tools of observation and analysis. This paper forms part of this perspective and ultimately aims to describe a tool for assessing the "spatialization of development" to better understand the internal and external factors affecting the spatial dynamics of territorial construction or deconstruction, especially in terms of city/country relationships. Based on a structural geography approach, this paper endeavours to describe the application of a multi-level decision-support mapping tool. The main objective of this new explanatory and prescriptive model is to generate a better understanding of the constraints and success factors facing national, regional and local territories.

**Keywords:** spatial dynamics, development, structural geography, rural/urban relationship, territorial construction, geomatic application.

Although territories are currently transforming, the changes are not homogeneous. A series of events is causing upheaval: in some places, the industrialization of agricultural practices is threatening local heritage; in others, the forestry crisis is sending local communities into a tailspin. These are only two examples of radical changes sweeping through regional economies. Territories are in the throes of profound change, hastened by technology, the heightened mobility of goods and services, neo-liberalism and so on. As a result, they must reinvent their identity, but which direction should they take: production, multi-purpose or recreational? With deep, anthropological roots, this dilemma transcends administrative boundaries. Furthermore, the traditional rural and urban divide is slowly giving way to a new configuration of the relationship between human beings and the land. We are now confronted with variable territorial geometry in which economic and ecological discourse stand on opposite sides. Traditional models offer little insight into this new problem. Territorial transformation therefore dictates that we re-examine the traditional tools of observation and analysis.

This paper forms part of this perspective and ultimately aims to describe a tool for assessing the "spatialization of development" to better understand the internal and external factors affecting the spatial dynamics of territorial construction or deconstruction, especially in terms of city/country relationships. Based on a structural geography approach (Desmarais and Ritchot, 2000; Gagnon, 2003), this paper endeavours to describe the application of a multi-level (macro, meso and micro-geographic) decision-support mapping tool. The main objective of this new explanatory and prescriptive model is to generate a better understanding of the constraints and success factors facing national, regional and local territories, with the recent appropriation of the greater rural environment by urban stakeholders since the 1980s constituting a spatial-temporal marker. To better understand spatial dynamics and territorial affiliation, this method was applied in 2006 and 2007 to two studies on designated spaces: *Dynamique spatiale des espaces ruraux de l'Outaouais et de l'Est ontarien: étude de cas comparative* and *Dynamique spatiale et appartenance territoriale: étude de cas de la Ville de Bromont*. The method was used to explain the socio-economic disparities evident in rural areas located at equal distances from the Ottawa-Gatineau urban centre; it was also used to describe the fundamental components of one municipality's territorial affiliation: the City of Bromont.

After forty years of regional development policies in Canada and in Quebec, major socio-economic disparities persist to this day among the so-called "outlying and central" regions, and within the territories, between "rural and urban environments." What accounts for these differences? Traditional regional economic theory informs us that income is uniformly distributed over a radius of 100 to 150 km around urban centres of development (Desjardins, 2005; Joanis and Martin, 2005; Polèse and Shearmur, 2002, 2005). These same studies also tell us that in rural spaces, generally declining levels of income and demography usually become apparent as we move away from the urban centre to outlying areas (urban – rural axis). However, even far away from urban centres, we see significant income differences among various contiguous rural areas (such as popular resort areas/devitalized villages). In answer to this kind of phenomena, the generally accepted models of regional economics offer no explanation. How, then, do we explain such qualitative swings so far from urban centres? While the metropolization phenomenon may certainly account for the rural→urban divide, what about the internal (rural↔rural) differentiation mechanism? Although the rise of the service-sector economy over the past forty years has certainly encouraged the rural exodus and a degree of socio-economic segregation in geographic space, can it explain the intrinsic difference observed in the rural environment?

According to the traditional approach dating back to the 1960s, developing the economic potential of a territory is less a matter of site characteristics than the presence of facilities. In terms of the various analytical scales (local, regional, etc.), land planning and development strategies are associated with potential or even circumstance: uniqueness, accessibility, position in relation to other territories, facilities, planning, local support capabilities, the availability of services, etc. The economic success of a territory therefore is therefore grounded in the organization of space, in what allows for the fulfillment of content

previously identified to represent potential, regardless of the location or its natural or anthropic features. In terms of the land planners typology, satisfying the demands of various markets, especially metropolitan markets, are basic parameters along with equitable service and investment. Two major categories of equipment are considered: that dependent on the presence of resources (forest, ore, fast-flowing water, land, etc.) and that related to market proximity (tourism sites, shopping centres, etc.). The plans of land planning and development agencies (CLD, DEC, CRÉ, MRC, ATR, etc.) attest to this type of "voluntarist" approach. For supporters of this approach, the territory is essentially perceived as a resource and a platform, a usable substrate for meeting society's needs. The mere presence of a resource or nearby market is enough to justify the planning and deployment of equipment. From this perspective, the "value" of the location is the product of its development, and not of the location as such. Equipment is therefore carefully standardized and normalized to ensure a degree of equity in its distribution and size. This voluntarist method affords little recognition to the role of spatiality in territorial organization. It views the space as a platform for an activity, not as something of intrinsic value. Based on this approach, socio-economic features evolve of their own volition in a "homogeneous" space, with characteristics (demography, activities, etc.) projected onto a spatial substrate: this operation is called "decree of value."

The rural world has traditionally defined itself in contrast to the city, at least in relation to low population density. This essentially quantitative definition is clearly inadequate in describing the recent spatial dynamics rocking the countryside. Not only is it static, it fails to account for the diverse trajectories running through urban environments, which do not form a homogeneous whole (Roy, Paquet and Domon, 2005, Donadieu, 1999). The rural environment is heterogeneous. While rural spaces may have specific characteristics, though not necessary shared by all, we observe the coexistence of rural/urban categories in one territory (Fortin A., 2006; Gagnon, 2003, Ritchot, 1999, Thomsin, 2001). Thus, a quantitative definition does not account for the heterogeneity of existing positions. Research must endeavour to meet precisely these requirements. The hastening pace of change, exacerbated by the mobility of goods and services and the volatility of technology, dictates a new reading. A new power relationship has taken hold and the stakeholders involved are not adequately equipped to address this new issue. An understanding of the rural environment therefore required new tools for observation and analysis. This paper advances a new method for examining society's relationship to its environment that allows for an assessment of the relationship between environmental concerns and the needs of socio-economic development.

### **For an "Intelligent" Reading of Territory**

Between the descriptive level (phenomena - socio-economic development) and the epistemological level (object), the structural geography methodology admits the objective existence of an anthropological and geo-political organization underlying the socio-economic level, surface occupations and concrete manifestations: a "black box" that mediates the relationship between society and the environment. From this perspective, the spatial dynamics of a territory are linked to the meaning that this underlying (internal) structure actualizes, and that concrete facilities (external) cause to appear on the surface of things, on the land. Using three theories combined into one in *Morphogénèse de Paris*, Desmarais laid the methodological groundwork for understanding the organization of territory (1995). These three theories form part of the general field of dynamic structuralism. One of them, the theory of urban form, first developed by Gilles Ritchot in 1976, generated a number of premises (Ritchot, 1985: 23-45). In addition to clarifying the premises of the theory of urban form, Gaëtan Desmarais reinvented them as a multi-level engenderment "path": "le parcours morphogénétique de l'établissement humain" (1992: 251-273; 1995: 49-95; Desmarais and Ritchot, 2000: 61-86). Combining historical, cultural, social, political and economic factors, this path crosses the identified levels at three layers of spatiality (structural levels). Let us now examine how the theoretical formulation and conceptual construct proposed under the structural geography approach can be used to prove the relevance of this outlook in interpreting and evaluating the spatialization of development.

### Spatialization of Development and strategic management

Space is not created but rather engendered by a series of actions driven by internal spatial dynamics with an observable outcome on the land. These actions, and the attendant generating dynamics, are summarized in the diagram name: PARCOURS. This diagram shows the stages of geographic space engenderment from a dual point of view: sequential and dynamic. Between each structural level —also called strata of spatialization— are conversion operators that allow the transition from one level to another. The PARCOURS includes three "times" that pertain more to an order of priority than a chronological period. The order of the levels—deep (landscape), intermediate (territory), surface (facility)—reflects the emergential nature of the interpretation of spatial dynamics (read down-up: t1→t2→t3). Grouped into three families of strategic spatial management parameters, the levels of analysis are: t1-**anthropological** (imagination), t2-**geopolitical** (governance) and t3-**socio-economic** (development). This process specifies that the occupation of a visible surface space (t3), essentially socio-economic in nature and called "development," depends on an underlying, geopolitical level (t2). This level includes a series of rules and influences that govern the appropriation and use of space, as well as the autonomy of territorial stakeholders. This level may be called "governance." Territorial governance, in turn, depends on another, deeper layer (t1) of an anthropological nature called "imagination," which pertains to the meanings or valuations of the landscapes, whether aesthetic, cultural or utilitarian.

**The Territorial Generation Path (PARCOURS)**

	Structural levels (analytical level)	Spatialization Strata	Generating Dynamics
time 3	<b>SOCIO-ECONOMIC</b>	Surface –FACILITIES–	of land use (development)
co	Situation rent (SR)		
time 2	<b>GEOPOLITICAL</b>	Intermediate –TERRITORY–	of appropriation (governance)
co	Political control of mobility (PCM)		
time 1	<b>ANTHROPOLOGICAL</b>	Deep –LANDSCAPE–	of valuation (imagination)
co	Artialization process (ART)		

co: conversion operator

Source: Desmarais, 1995; Gagnon, 2003.

The PARCOURS therefore begins at the deepest, anthropological level and moves upward to the surface or socio-economic level—from landscape to facilities. To understand and interpret any observed disparities, it is therefore necessary to analyze the coherence among the three layers of spatiality (imagination-►landscape, governance-►territory and development-►land facilities). An alignment among these three levels of analysis indicates spatial coherence (SCI) conducive to a corresponding economic activity. We therefore discern three types of space: "**exploitation**" (intensive economic production), "**consecration**" (symbolic reserved space) and "**cohabitation**" (shared by production and reserved space). Therefore, a location equipped with known aesthetic landscape characteristics —t1-anthropological—the subject of representation over a long period of time (in paintings, photographs, post cards) with a strong capacity to mobilize territorial stakeholders —t2-geopolitical— and developed for recreational or conservation purposes —t3-socio-economic— would be a coherent place of "**consecration.**" The parameters for strategic management of the location are somehow "aligned." We may therefore speak of "spatial coherence. Opposition to any plan to alter the value of such a coherent engenderment path

would come as no surprise. We might also consider coherent any facility constructed for intensive development purposes at a location with a highly utilitarian landscape in t1, and where the rules of territorial appropriation and development are geared to production (t2 + t3). This was the case of the agricultural plain in the Rouville MRC of the Montérégie area. In this kind of location, a consensus exists concerning production-oriented uses, in this case, agriculture; it would therefore be described as a "**exploitation**" location.

Between the two types of space presented above a host of combinations exist. With their multi-purpose uses, such locations are referred to as "**cohabitations**." They can also be coherent if the strategic parameters are aligned: the Dunham area of the Eastern Townships is one example. Combinations of non-aligned strategic parameters indicate a need to examine space management. Locations confronting spatial incoherence would include, for example, those with imaginary attributes of an aesthetic nature, but that stakeholders would like to use for intensive economic development. A statistical analysis of data on coherence among strategic parameters (structural levels) allows the identification of spaces subject to extreme variability among the levels of analysis: anthropological (imagination), geopolitical (governance) and socio-economic (development). It also allows for a diagnosis of the possible causes of strategic misalignment and suggests appropriate courses of remedial action. The following table illustrates the types of actions advisable in specific cases of spatial incoherence.

#### *Generating Dynamics and Spatial Indicators*

Each level of analysis (structural levels) of space corresponds to a specific generating dynamic revealed by indicators selected from geographic data banks. The indicators are instruments used for describing or measuring a reality according to a scale of reference; the reality in question is the reality of the location, hence the use of "spatial reference" data bases. In accordance with the theoretical and methodological framework, to obtain a cartographic and spatialized reading of development requires performing a sequential analysis of the spatialization: **landscape valuation** (time 1), **territorial appropriation** methods (time 2) and **development occupations** (time 3). Because the inventory data must include spatial references—called *LOCI* (or *LOCUS* in the singular)—they are compiled into a series of inventories and specific mapping (see table below). Using a geographic information system (GIS → ARCview), the various contents inventoried, shared and grouped by structural level are classified according to a series of spatial indicators as shown above. The PARCOURS (stratigraphic, in three times) makes it possible to distribute the inventories by spatialization strata (down-up), thus giving meaning to the data and allowing for a theoretically relevant mapping application. This emergent methodology thus forces the GIS to provide an assessment of the positions (*LOCI*) for each of the inventories processed. From this perspective, we note that the GIS is not an end in itself, but rather an interpretative tool that works effectively with the three structural level model (PARCOURS) and allows an evaluation of the strategic alignment and spatial coherence of positions.

To summarize, based on structural geographic theory, the form of settlement "emerges" from an engenderment process (PARCOURS). Briefly, the meanings associated with the locations, once acknowledged (deep level – t1-anthropological), create a desire for appropriation that leads to the establishment of territorial governance mechanisms (intermediate level– t2-geopolitical) suited to these meanings. This impetus creates a "situation rent" redeemed through economic activity (surface level – t3-socio-economic), with the term "economic" used in its broad sense. This process is termed "coherent" to the extent that the spatial indicators at each level are aligned with the same reality (internal and external strategic alignment). The problem at the land planning level therefore concerns modelling spatial aspects of the phenomenon, where spatial inscription of the phenomenon comes **first**. Thus, all space is organized around locations with characteristics that must be identified and external and internal dynamics that must be understood (system/structure complementarity). Spatialized development assumes that the geographic space is approached using a responsible and applicable theoretical construct. Under the structural analysis approach proposed, space is geographically defined by evaluating the relationship between the

valuation of a territory and the socio-economic wealth generated. To complete our demonstration of a methodology for interpreting the spatialization of development, we must therefore clarify the value/wealth relationship.

### Cartographic Processing of Structural Levels

We must now explore the characteristics of each of the structural levels —anthropological, geopolitical and socio-economic—and how to sequentially analyze the spatialization of valuations (imagination ▶ landscape), appropriations (governance ▶ territory) and occupations (development ▶ land planning). As already stated, the structural levels (level of analysis) are processed in three times, each corresponding to strategic parameters of spatial management. We will now examine how cartographically process each.

#### .Spatialization of Valuations or Localization of Anthropological Imagination

Anthropological time is the stage at which stakeholders form a vision based on images shared and information received about the space, and their specific points of reference or values. This step highlights the objectivity inherent in the landscape concept and space valuation assessment (*cf.* value/wealth *infra*). For example, depending on the imagination of a stakeholder, a mature forest on a hillside may signify development and economic benefits. From this stakeholder's perception, the landscape has a function and a **utilitarian** quality. For another, a wooded hillside may be a source of inspiration to the artistic soul, and if there happens to be a waterway nearby, he might take out his easel and start painting. The second stakeholder therefore perceives the location to have **aesthetic** value. In both cases, the landscapes are "artialized" to various degrees (Beaudet, 1999; Domon, Beaudet and Joly, 2000; Roger, 1998). Between these two extremes, the utilitarian and the aesthetic, exists a range of values applicable to every location. The analytical tools developed in this regard can clarify how these values or the localized imagination, comprising content highly significant to the populations concerned, can play a decisive role in the emergence and survival of spaces that are vital to solid social ties. The mapping tool developed makes it possible to understand the complex relationships between geographic space and the anthropological representations that guide the behaviour of social stakeholders at the next level (t2-geopolitical).

#### .Spatialization of the Capacity for Action or Degree of Geopolitical Governance

Land governance has been the focus of extensive study. It is described as a process of coordinating the stakeholders in an area to achieve commonly held goals that "favorisent ensemble la capacité d'agir" (Ayeva, 2003). The geopolitical spatialization stratum —intermediate— is engendered precisely by the capacity of group or individual stakeholders to take action in an area. Geopolitical time applies to all mechanisms that regulate the allocation of land and the degree of autonomy of the stakeholders—called "political control of mobility" (PCM). It highlights the many organizations that affect space at every level, whether in the private or public sectors (federal, provincial and municipal). In an ideal world, coherence exists in the geopolitical action taken by stakeholders and the values invested in the space at the previous level (t1-anthropological), and in the planning efforts of all stakeholders in a given space (next level— t3-socio-economic). Obviously, the reality is quite different. Discrepancies between our vision of a location and the actions that follow are the daily lot of organizations called upon to administer lands. In this regard, spatial coherence in the planning and development process is the exception, not the rule. Land is managed through a series of authorizations and prohibitions. Geopolitical tools of analysis therefore provide an understanding of the intrinsic relationships linking geographic space to the movement of stakeholders and to the appropriations that occur through political control of mobility (PCM). They offer rigorous content on actions by social stakeholders to acquire, hold on to and organize places amongst themselves.

#### .Spatialization of Enhancements or Type of Socio-Economic Development

Lastly, the socio-economic time reflects the true value of geographic space occupation (*cf.* value/wealth relationship *infra*), as should be observable in the field and as understood through relevant data on population and economy. However, caution is necessary whenever numbers are interpreted. The socio-economic spatialization stratum—at the surface level—is therefore engendered by the spatial occupation process deployed through the "situation rent" (Ritchot, 1981). The tools developed at this level make it possible to show how tangible facilities and activities are subject to the constraints of the spatial structure inherent in the geopolitical and anthropological positions established at the two previous levels (time 1 and 2). These constraints concern the way that positions are valued following variations in the situation rent (SR). An intrinsic relationship between geography and economics ensues, showing that economic factors related to valuation by the rent depend on the artialization process (ART: operator from time 1 – imagination) and political control of mobility (PCM: operator from time 2– capacity for action). Spatialized development, such as development of a settlement that account for specific local features in relation to the whole, is therefore incorporated into the appropriation process, not only private and individual (t2), but sometimes through pre-emptive rights that allow for the collective defence of basic values (t1). The spatialization of socio-economic content therefore involves developing a typology of uses and developments in which human settlements are characterized by the predominant economic activities.

By interrelating artialization (valuation), political control of mobility (appropriation) and situation rent (occupation) processes, we can develop a map that synthesizes the engenderment path of a geographic space. The correspondence among the various structural levels—anthropological (t1), geopolitical (t2) and socio-economic (t3)—thus leads to an interpretation of the development spatialization that subsumes administrative boundaries and borders between States.

### **Toward a Geographic Definition of Territorial Reality**

Geography centred on understanding and interpreting the spatialization of development requires specific knowledge of spatial organization at three levels: micro, meso and macro-geographical. Such geography formulates an analysis of space-generating dynamics dependent on:

- a) an objective definition of development;
- b) a theoretically constructed model of interpretation;
- c) an operational classification of inventory data.

Developing a geography of territorial reality is therefore not limited to listing or describing the sensitive manifestations associated with a given number of identified economic activities. The purpose of geography that explains and interprets economic activity is to recognize the vital structuring role that geographic space plays in the organization and operation of these activities.

The PARCOURS therefore acknowledges three levels of spatiality conveying different content: the socio-economic level, called "development → planning" assumes engenderment of the geopolitical level, called "governance → territory", which in turn assumes the investment of deep value (anthropological level, called "imagination → landscape"). The categorization arising from this PARCOURS thus organizes space according to the levels produced by generating dynamics: valuation (time 1), appropriation (time 2) and occupation (time 3) programs. Typology development is performed individually for each of the structural levels traversed by the PARCOURS.

Using this theoretical and methodological framework, we hoped to propose new contributions concerning the three main problems of land planning and development, and thus reconstitute the various phases involved in geographic space engenderment. To do so, we had to turn to fundamental categories in geography such as landscape, territory, planning, valuation, appropriation and occupation. The geographic characterization of space and the analytical tools proposed – the anthropological, geopolitical and socio-economic structural levels—provide a methodological framework for reporting and explaining the evolution of economic land uses. To summarize:

1. The development of a space results from an emergent process;
2. Landscapes are signifiers whose value is invested and subjectively understood by populations;
3. The investment of value, landscape emergence, later translates into actions that generate landscape by shaping the land;
4. Underlying economic interests conceal an anthropological meaning related to the deep value of a location;
5. Pioneer value then reflects what once was, which allows for the generation of wealth *a posteriori*;
6. The level of development of forms of occupation is associated with the alignment between planning practices and the initial value of a space;
7. Socio-economic gains presume an acknowledgement of this pioneer value.

In the field of development, the structural method makes it possible to meet the analytical challenges just described. What is involved? 1) How do we approach complex phenomenon while avoiding the pitfall of merely describing empirical diversity? 2) How do we move from the diversity of facts and events to an object of knowledge that not only describes this diversity, but also allows for subsequent generalization? To clarify the emergence of the geographic spaces that give structure to economic activities in general, the structural geography method has the advantage of showing that diverse facts can nevertheless relate to an object of general and universal knowledge (Desmarais, 1995, 1998a, 1998b; Desmarais and Ritchot, 2000; Ritchot, 1999).

In addition to offering firm internal and external coherence, the structural geography methodological framework offers an original and effective theoretical frame of reference for analyzing regional disparities and spatial dynamics. This methodology gives meaning to the statistics, something beyond the reach of traditional analyses of data gathered from administrative divisions. Structural methodology therefore allows for a more accurate geographic interpretation of human settlement.

What is new, and of interest for the interpretation of planning and development actions, is that this reading will cast new light on the processes underlying the complex organization of a region, and lead to a more accurate understanding of city/country relationships. It also takes account of spaces with variable geometry. The spatialization of development also makes it possible to view the current territorial transformations from a fresh angle by drawing attention to the similarities and contractions among existing or planned land uses, and a spatial dynamic that variously constrains land uses and their economic performance, an asset of lasting value in guiding territorial development activity.