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PROCESSES OF URBAN CHANGE: PLANNING AND MONITORING STRATEGIES THROUGH THE APPLICATION OF THE FRINGE BELT MODEL TO NANTES AND RENNES (FRANCE).

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Abstract : *This study is based on the fringe belt model, tested on Nantes and Rennes (France). The model stresses the alternance of high and low density zones (fringe belts). Formerly at the edge of the built-up area, they are now embedded within it. Their formation and evolution are analysed. This theory is adjusted with the use of GIS and reconsidered through the recent French law on Urban Solidarity and Redevelopment which encourages compact city policies, calling low-density fringe belts areas into question. Thus, the evaluation of the model could shed new light on the French decision making in urban planning.*

Introduction

In the contemporary context of globalisation, the internal structure of cities is changing. This paper brings to the fore the current issue of densification versus urban spreading. It is aimed to understanding the processes of urban change at the intra-urban scale to a morphological point of view, and to proposing new methodologies in monitoring urban forms of tomorrow. With this intention, the fringe belt model is mobilized and tested for the first time to French cities.

Three points will be considered in this article. First of all, the fringe belt model will be shortly presented. Next, an application of the model to Nantes and Rennes, two French cities, will be proposed. It illustrates the pertinence of the model and serves to understand the complexity of urban dynamics. Finally, the model will be put in perspective with the issue of the « Renouveau urbain » in France. In this frame, it may cast new light on planning perspectives.

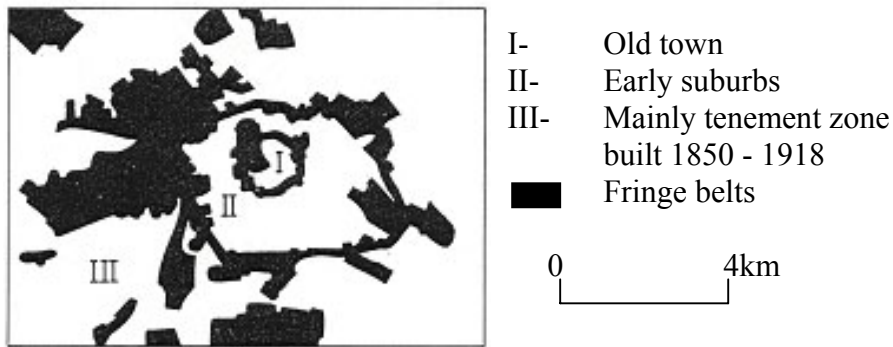
The fringe belt model

The original *Stadtrandzonen* concept developed by the German geographer H.Louis in his study of Berlin (Louis, 1936), as shown in figure 1, was refined by M.R.G. Conzen in his analysis of Alnwick (Conzen 1960). J.W.R. Whitehand made his theoretical contribution to this concept by bringing it together with economical theories (Whitehand 1972).

Origins

The model is predicated on the idea that the city as a physical entity has been created by a series of growth pulses or alternating periods of rapid and slow growth. As a result, as illustrated on figure 1, one can observe the presence of distinctive regions, formerly at the edge of the urban area, and then embedded within it. M.R.G. Conzen defined a fringe belt as “a belt-like zone originating from the temporarily stationary or very slowly advancing of a town and composed of a characteristic mixture of land-use units initially seeking a peripheral location” (Conzen 1960). Initial fringe belts embedded within the urban area are left as residual features in the urban landscapes.

Figure 1: The fringe belts of inner Berlin.

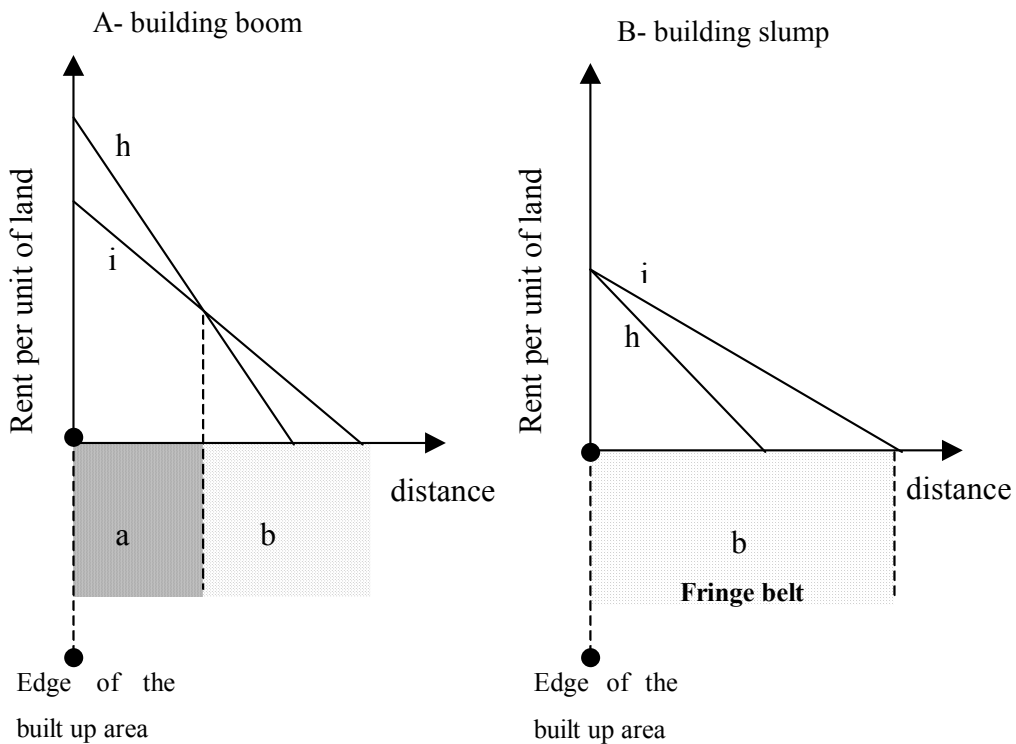


Source: H. Louis, 1936.

Theoretical developments

The fringe-belt concept was linked to land-rent theories by J.W.R. Whitehand who associated the creation of fringe belts with slumps in residential building and periods of low land values (Whitehand 1972), as shown on figure 2.

Figure 2: Hypothetical relationships between bid rent and distance from the edge of the built-up area



h : housing development
 i : institutional development
 a: intensive land-use
 b: extensive land-use

Source: After Whitehand, 1987.

It has been shown that these dynamics, combined with geographical obstacles, generate an urban area in which compact residential growth zones alternate with more loosely-structured fringe belts. Institutions like hospitals, universities, parks, cemeteries, jails, military barracks or large houses isolated on large plots are typical of the type of land uses that would locate at the urban fringe during periods of slow urban growth. When the urban growth resumes, the hiatus leaves a permanent mark in that the fringe belt becomes embedded in the urban area. This model “provides a means of putting order into the otherwise bewildering complexity of urban morphology” (Whitehand, 1967). It questions the processes of transformation from rural to urban land and the processes of evolution of urban fringes and suburban areas over time.

An application to Nantes and Rennes (France)

The pertinence of the model has become evident in current researches on French cities (Ducom 2003, 2004).

Fringe belts recognition

Using a Geographical Information system (*Arcgis*), it was possible to stress the presence of different fringe belts in each city, characterised by their mean plot size, mean percentage of building coverage, mean building size. Thus, three fringe belts were delimited in Nantes and Rennes, as illustrated on figures 3 and figure 4.

Figure 3: Nantes’ fringe belts, 2005.

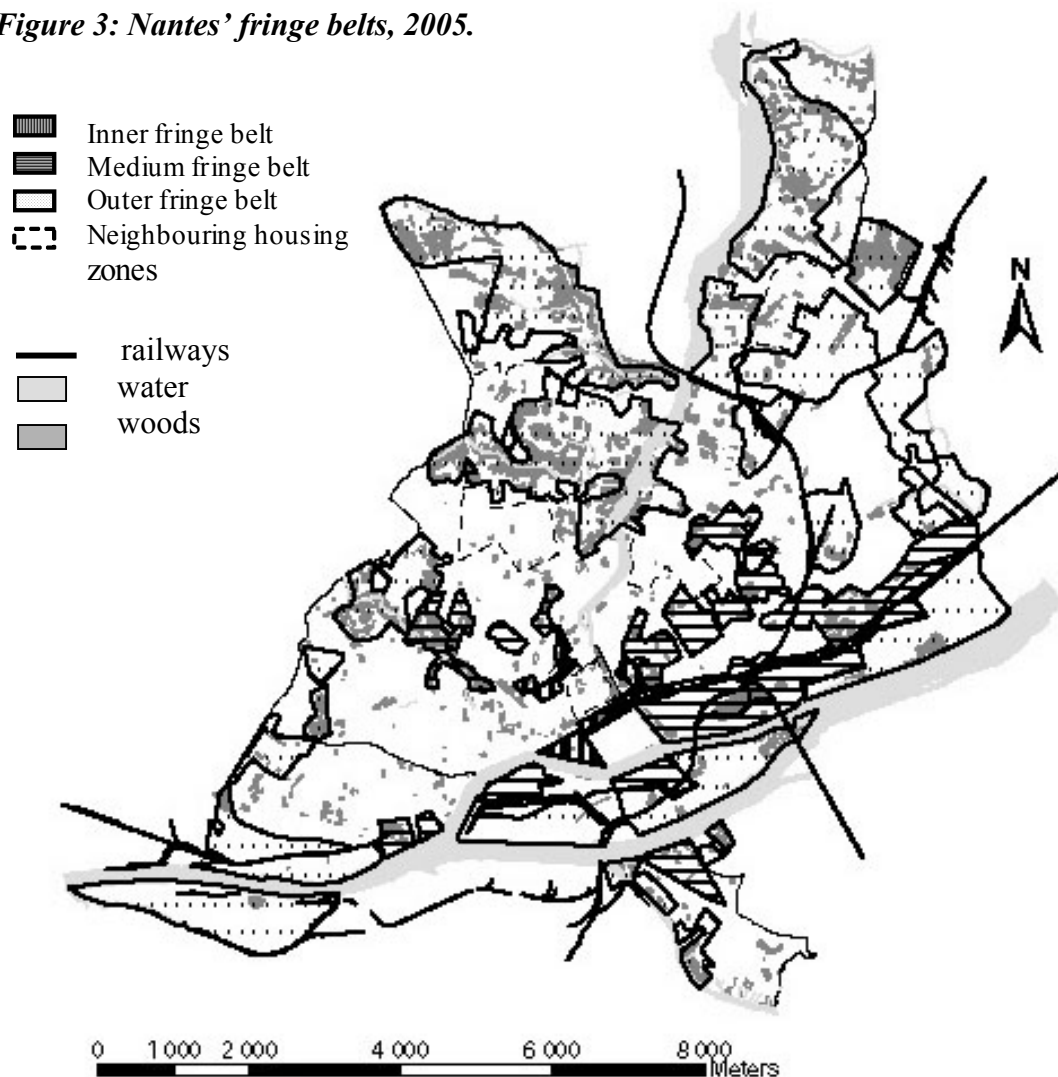
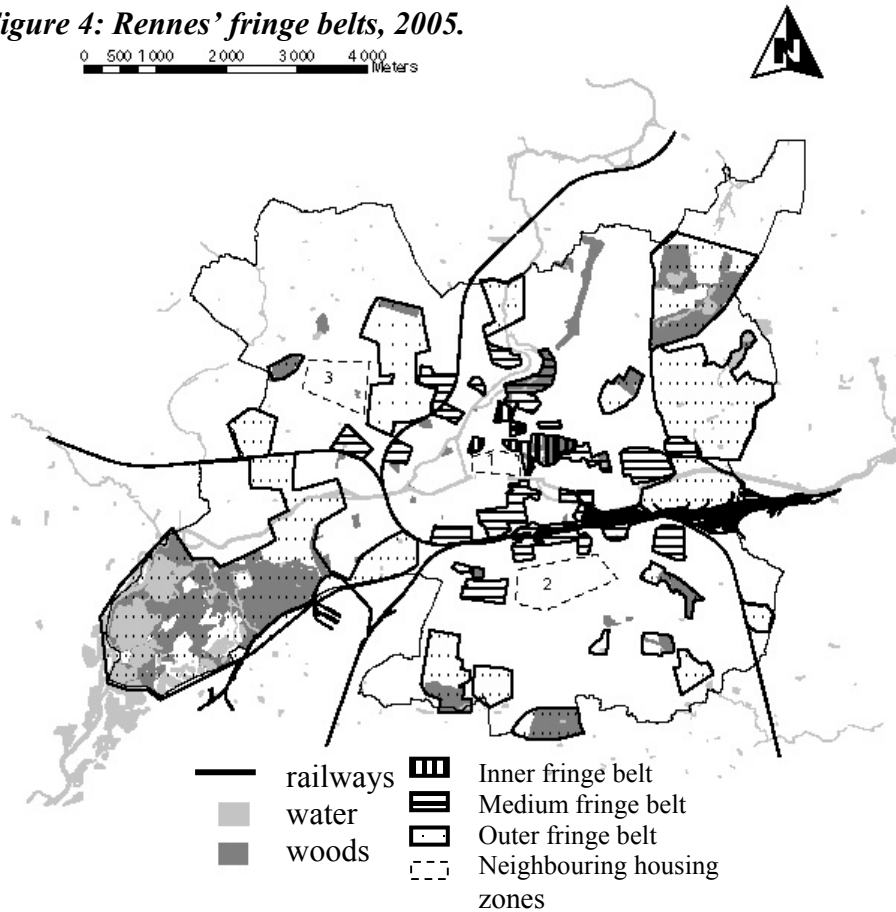


Figure 4: Rennes' fringe belts, 2005.



E. Ducom.

Figure 5: Fringe belts physical characters

| NANTES | Mean plot size (in m ²) | Mean building size (in m ²) | Mean percentage of building coverage |
|---------------------|--|--|---|
| Inner fringe belt | 1076 | 446 | 61% |
| Medium fringe belt | 2004 | 220 | 37% |
| Outer fringe belt | 3642 | 362 | 18% |
| Neighbouring zone 1 | 283 | 185 | 89% |
| Neighbouring zone 2 | 393 | 79 | 39% |
| Neighbouring zone 3 | 497 | 71 | 27% |
| Whole city | 1024 | 136 | 38% |
| RENNES | Mean plot size (in m ²) | Mean building size (in m ²) | Mean percentage of building coverage |
| Inner fringe belt | 2048 | 283 | 92% |
| medium fringe belt | 2969 | 350 | unknown |
| Outer fringe belt | 6954 | 382 | unknown |
| Neighbouring zone 1 | 275 | 203 | 92% |
| Neighbouring zone 2 | 312 | 62 | 35% |
| Neighbouring zone 3 | 1148 | 586 | 61% |
| Whole city | 1233 | 157 | unknown |

Figure 5 sums up the main physical characteristics of each fringe belt. It is obvious that they considerably differ from neighbouring housing zones. Put simply, fringe belts contain a high proportion of open spaces, large plots with heterogeneous building types, but usually important sized building. Those characteristics also differ from one fringe belt to another. There seems to be a pressure gradient from the city center to the peripheral area. Inner fringe belts have smaller plots with an important building coverage, mostly public institutions or educational institutions. There is a big contrast between Nantes' and Rennes' medium fringe belt, corresponding to the cities' functions as the belt developed. Thus, whereas Rennes's nineteenth century fringe belts are mostly composed of schools, military barracks and jails, large houses, hospitals, sportyards, parks, railwaystations, Nantes's fringe belt is occupied by the same heterogeneous land uses but also by many industrial buildings and plots. Finally, outer fringe belts are characterised by their great proportion of sports grounds, allotments, green open spaces and a large proportion of plots entirely vegetated.

Conditions of creation

The presence of fixation lines is a factor of fringe belt development: any linear feature (town walls, topographical features, rivers, railways, boulevards, ring roads, green belts...) restricting outward growth and allowing fringe belts to form beyond. The observation of maps of the eighteenth century shows the burgeoning of institutions outside the townwalls. Most of them are religious, but there are also a few health and military institutions. These zones have remained after started urban growth beyond the walls and form the current inner fringe belts. The medium belts mostly developed along the new railways and outside the boulevards. Rennes has a very obvious outer fringe belt corresponding to a successful green belt policy associated with the presence of a ring road (progressive construction from 1968 to 1995). It strongly influenced the formation of a fringe belt at the current edge of the urban area, which plays the role of a barrier containing the outward growth of the agglomeration. There is not such a clear outer fringe belt in Nantes, whose suburbs spread without any morphological rupture.

In conformity to J.W.R. Whitehand's model associating the creation of fringe belts with slumps in residential building and periods of low land values, the building cycles of each city were recounted. Heterogeneous sources were available. First, statistics stemming from the different censuses (municipal censuses from 1822 to 1930 and INSEE censuses from 1946 to 1999), then the number of authorised and built houses and flats during the 25 last years obtained from the *Direction régionale de l'équipement*. Finally, statistics concerning the year of construction of houses and flats, which must be specified by the owners when paying the land tax. It lays emphasis on important simultaneous hiatus in house and flat building, first in the second half of the nineteenth century, then at the very beginning of the twentieth century and of course during the Second World War, and finally between 1975 and 1990. At the same time, comparing ancient maps of the cities, those periods seem to be those of the creation of inner fringe belts, which had begun to form well before the nineteenth century, and medium fringe belts, which correspond to Edwardian fringe belts in the English speaking world (Whitehand, 1987). According to these observations, there seem to be an obvious link between the building cycles and the formation of fringe belts.

Nevertheless, this link has not seem as significant since the Second World War. Whereas the inner and medium fringe belts were obviously to a considerable extent the product of economic factors, the outer fringe belts seem to have been strongly

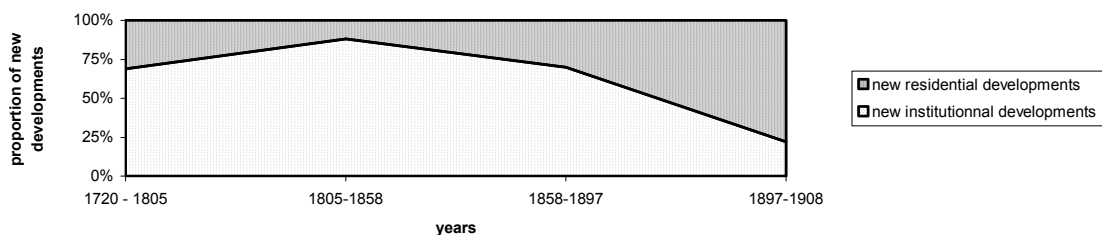
influenced by the cities' green belt policy from about 1960. This brings to the fore the question of the validity of the model in a current context of strong public planning, since the land occupation is now decided by the public authorities and not by spontaneous economic processes any more. Until the beginning of the twentieth century, urban areas were very limited in space. The progressive urban growth was mostly the result of individual initiatives. But nowadays, the public authorities can strictly control the land market, which partly invalidates the model. However, the model offers some clues of comprehension of the urban morphology's evolution.

Fringe belts modifications

Parts of the belts have survived whereas others have been alienated. Two cases of evolution will be examined in Rennes (figure 12). figure 7 illustrates the case of an alienated part of the nineteenth century fringe belt. The aerial photo taken in 1885 from an airship at 800 meters high shows Rennes's railway, in thick white dotted line. The city has not yet grown beyond the railway to the South, and all that can be noticed is the jail, boxed in white dotted line, and a manor called Villeneuve, boxed in black dotted line. The Sacré Coeur church illustrated on figure 7 second picture was built from 1908 to 1911, in the fringe belt, preparing the development of the city to the south. At this time, it was quite isolated. Nowadays, it is embedded in a residential area, as shown on the third picture of figure 7, taken in 2002. At the background, boxed in black dotted line, the steeple of the church rises up, surrounded by a great number of houses. That kind of stone-built houses with three floors is typically representative of the 1920', 1930'. In this example, the fringe belt was alienated by a residential growth. Figure 6 represents the chronology of the process. The fourth document of figure 7, a density map from 2002, shows the process of densification that took place in this area, where the nineteenth century fringe belt has been reduced to a few residual features within the urban landscape.

On the contrary, figure 8 illustrates the case of a consolidation. Its first picture was taken in 1885 from an airship at 800 meters high. The hospital Pontchaillou (boxed in black dotted line) was just a farm, the "Boulevard de l'Ouest" (here in white), now in the city and named Boulevard de Verdun, was in the country, like the railway. There was only a military barrack (caserne Mac Mahon), which still exists, and a manor. As illustrated on the second picture, in 1900, the military barrack, boxed in white, and the first construction of the hospital Pontchaillou, boxed in black dotted line, are obviously visible, in the middle of an emerging fringe belt. Those huge plots have remained and are still visible in the area in 2000 (third picture). The fourth document of figure 8, a density map from 2002, illustrates that high density urban extensions have develop beyond this area, leapfrogging the fringe belt. It would appear, then, that in this area, the fringe belt has remained and even increased, du to a process of attraction: as the fringe belt had developed, the probability of same siting extensions was weighted according to the existing pattern of sitings. Thus, the hospital was enlarged and sports grounds and a campus were laid out.

Figure 6: Evolution of new urban developments in South Rennes



Source: Archives Municipales, Service cartes, Ville de Rennes.

Figure 7: Alienated fringe belt, South Rennes

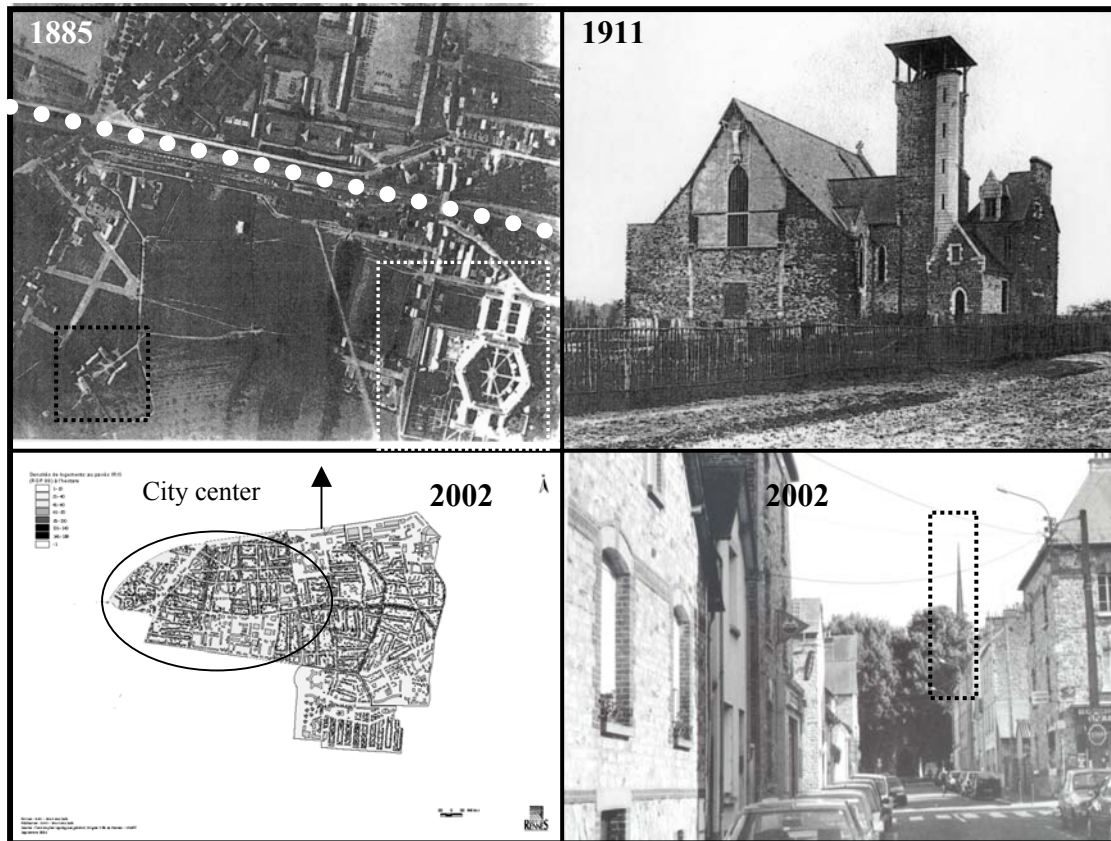
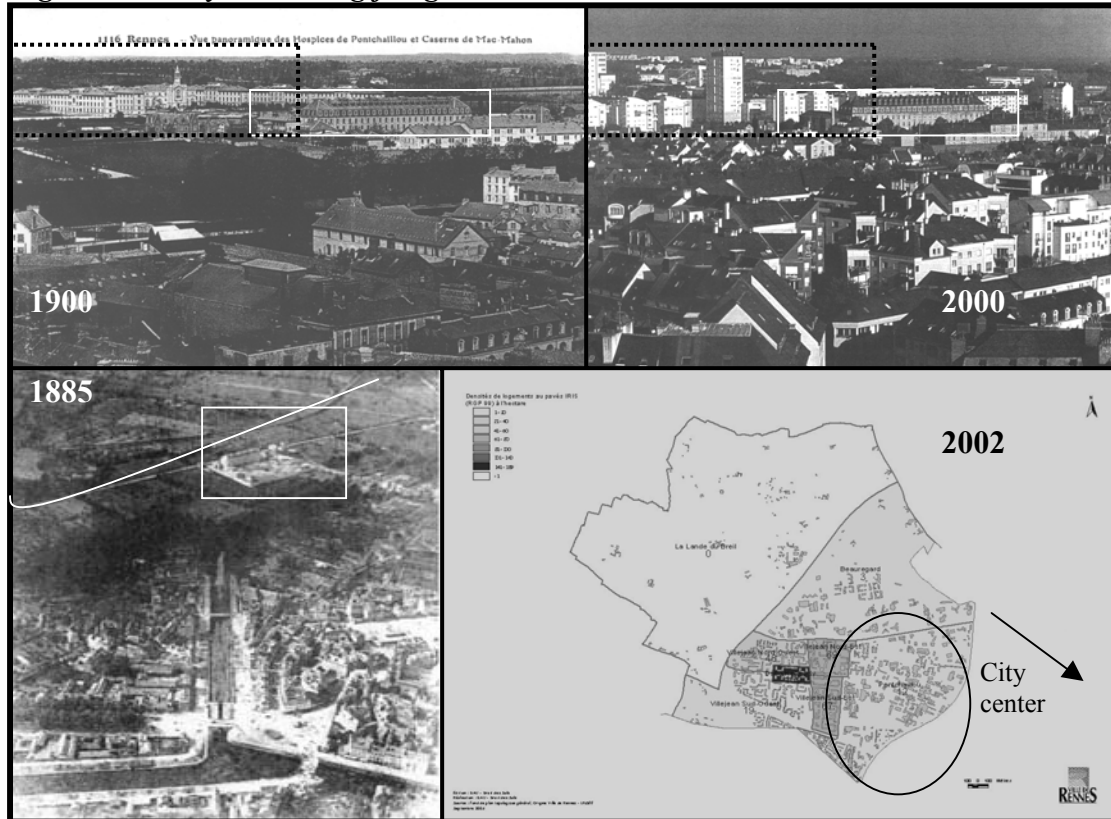


Figure 8: Partly remaining fringe belt, West Rennes



Source: service cartes, archives municipales ville de Rennes, photos E. Ducom.

Applied interest of the model

The model stresses that fringe belts are parts of the historico-geographical development of cities, when they are in fact rarely taken in account as entities by planners (Morton, Whitehand 2003). However, in the current French context of “Renouvellement urbain”, the model could shed new light on urban planning.

French context: the law on Urban Solidarity and Redevelopment

In France, the recent law on Urban Solidarity and Redevelopment (August 2000) encourages compact city policies. The law is aimed to restricting the urban sprawl which contributes to the environment degradation and leads to some central or peri-central areas desertion. With this intention, it favours reasoned interventions on the existing urban space. Put simply, it is a matter of reconstructing the city on the city instead of letting the urban spread infinitely go on. But the time and means necessary for urban recycling are not the same than those necessary for peripheral extension. Thus, the feasibility of the urban renewal obviously depends on public interventions. In this frame, the recognition, identification and comprehension of forms under pressure for change can be an interesting tool for prescriptive purposes.

The fringe belt model: a tool for urban planning?

Within this French framework of urban regeneration and renewal (Chaline 2005), one of the burning issues of urban planning is the problem of densification of certain parts of the cities, calling the low-density fringe belts areas into question. The strongest pressure for change and intensification concerns the surviving inner and medium fringe belts. For instance, the project of the Island of Nantes concerns 350 hectares in the medium fringe belt of the city (figures 9 and 10). This area has become deeply rooted in mental maps and is significant for the cities' image, which makes the revitalisation programme polemic (Calvet 2005). In Rennes, a shopping center has been planned on a 3000 m² area, La Visitation, situated in the inner fringe belt and corresponding to an ancient convent (figure 11).

But fringe belts are not taken in account as entities by planners. The site by site decision making essentially depends on land opportunities. Members of Nantes and Rennes planning office and planning agencies (the AUDIAR, Agence d'Urbanisme et de développement Intercommunal de l'Agglomération Rennaise, and the AURAN, Agence d'Urbanisme de l'Agglomération Nantaise) were interviewed. None of them was aware of the model and of the fringe belts resulting from the complex historical development of the city as a whole. For most of them, the model was a good explanation tool, but hard to bear in mind for the decision making. The question of the gulf lying between fundamental research and planning practise arose. In France, as in England, “The fringe belts concept, like many other concepts about the structure of cities, has been used almost entirely for explanatory rather than prescriptive purposes (...) Neither the decision making of those influencing fringe belts plots nor the significance of fringe belts for planning have received much attention”. (Morton, Whitehand, 2003).” Nevertheless, the comparison between the fringe belts maps and the maps of public interventions areas (*Zones d'Aménagement Concertées*) is striking, as illustrated on figure 12, with the example of Rennes. Most of the urban renewal operations that are undertaken are situated within fringe belts. Moreover, in the case of Rennes, the voluntarist policy of keeping a green belt despite the pressure for building land stresses that the current outer fringe belt, which can be mostly assimilated to the green belt, is planned by the public authorities who paradoxically don't have conscience of them morphologically. To that point of view, the evaluation of the fringe belt model as a tool of reflexion on urban form dynamics could help the planners in their practise and decision making.

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