

## From a Vulnerable Spatial System to the Paradigm of a Resilient Spatial System: The Cases of Emsher Valley, Germany and

### Val-de-Sambre, Belgium

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**Abstract:** Post-industrial territorial vulnerability means that strategic decisions must be made in terms of rehabilitating, re-categorizing and/or demolishing existing structures, and this may target individual buildings, entire neighbourhoods, or even the zone as a whole. The research targets the issues involved in re-categorizing the derelict land in Val-de-Sambre on the Franco-Belgian border from the industrial period (1850-1950) to today, the aim being to change its image by incorporating the territorial resilience paradigm. For several decades now, the collective unconscious has viewed the area, symbolized by its two main urban centres (Charleroi and Maubeuge), as grim and shabby. Could resilience point the way to a future for the traditional industrial regions of Europe (régions européennes de tradition industrielle–R.E.T.I.)?

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#### **1. Introduction**

Every civilization throughout history has had to face up to the fact that its territory is vulnerable to a range of threats, be they concerned with health, flooding, earthquake and so on. To these we have added modern perturbations, such as energy, population growth, natural disasters becoming more frequent and more serious (Steffen W. A., 2004), societal development, new technologies and economic transformation. For some decades now this has taken the form of an urban conversion process symbolized by huge abandoned industrial sites, added to a loss of economic and cultural identity and, of course, soil and landscape contamination.

At a time when the population and suburban sprawl continue to increase and become more widespread, the unused spaces within cities are starting to represent a major draw for local authorities. Some of these zones contain brownfield sites, but are usually located either in the heart of the cities or on the outskirts, and are

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well-served by road links as a leftover of their past needs. Notwithstanding these situations, many towns are facing up to the stigma of their past, which represents a weighty burden for political and financial decision-makers, among other groups. Could these vestiges of the past be transformed into the legacy of an economically glorious past? Evidence exists that they could. The successful conversion of industrial sites does not mean eradicating the history of these places; rather it needs to be put into perspective by choosing another form of programme. We have therefore decided to focus our research on those territories which have lost their identities, giving rise to negative perceptions which leave them in a weakened state when it comes to a re-launching them in the wake of the deindustrialization process. Our aim here is to analyze an existing zone which has undergone these trials and has overcome them by identifying the methodological heart and essence of reconstruction by incorporating the territorial resilience paradigm. The concept arises from an acceptance of the fact that a geographical territory is actually in a perpetual state of flux, and as such always menaced by threats which have been acknowledged and controlled. The zone we have chosen to study is Val-de-Sambre, a cross-border area (Franco-Belgian) which has indeed undergone the traumas of deindustrialization.

From the early eighteenth century, the river Sambre has influenced the establishment of a number of craftsmanship activities (bluestone quarries, mills, sawmills, stoneware potteries, china and marble-ware) all along its meandering banks, in close proximity to budding rural nuclei. Canalization of the river (from 48 tonnes in 1825 to 1,350 tonnes in 1836) facilitated cross-border trade and the growing transportation of industrial produce (towards Paris) during the industrial development period. At the same time as these major projects were under way, the development of the railway boosted urban growth, and an unprecedented population explosion (from 50,000 inhabitants in 1831 to nearly 300,000 in 1910 in the Charleroi industrial basin), converting the Sambre region into an open-air factory. The opening up of the Scheldt, a waterway running parallel to the Sambre, also linking Belgium to Paris, to ocean-going vessels finally closed off any possibility of the Sambre being similarly engineered. This was a strategic choice which marked the first suggestion of the vulnerability which could slow the region's economic development. It could almost be said that industrial decline had begun. And indeed, from then on the Sambre valley began to decay. When the iron and steel industry disappeared from many of the municipalities, the abandoned sites began to be commonplace, and trade on the waterway fell by two-thirds in twenty years (1,500,000 tonnes in 1970–500,000 tonnes in 1999) (Alain J. M., 2005).

Given the coming growth of the population of Europe, the expansion of suburban sprawl and hence the reduction in undeveloped land, the territory, or in other words the authorities, need to restore as many of the old abandoned sites as they can. Wallonia owns over 10,000 hectares of brownsite land. The potential is there. Indeed, it may be heavily polluted in some cases, but the possibilities cannot be denied.

The purpose of this research is to develop the idea that a territory can recover from a traumatic shock such as deindustrialization through the incorporation of the territorial resilience paradigm from a strategic perspective. The resilience of zones and cities is in fact significant, since by 2030 over 60% of the world population will be living in an urban environment (Fiksel J., 2006). In the first part, after defining the concepts of vulnerability and resilience, we shall develop the method of incorporating the terms in a potentially resilient post-industrial territory, in this case the valley of the Emscher. Part two will set out the results and, following any amendments which may be needed, will show them transposed onto the area under examination, Val-de-Sambre.

#### 2. Methodology

Thanks to an empirical establishment of the terms vulnerability and territorial resilience, we can identify a

theoretical application methodology of a spatial system. The model is applied to a test territory (the Emscher valley, since it passed through a period when it flourished, followed by an unprecedented crisis and an exemplary re-birth) in order to highlight its response capabilities and to identify them in order to apply them to our study region (Val-de-Sambre).

#### 2.1 From a Vulnerable Spatial System to the Paradigm of a Theoretical Resilient Spatial System

Quite apart from the negative connotations of the term, territorial *vulnerability* conjures up the image of the existence of elements likely to give rise to dysfunctional processes within an urban or rural system (Adger N., 1999). These elements, the results of human activities, are capable, following exposure which may or may not be temporary, of spreading an isolated disruption, or a long-term collapse, throughout the whole of a spatial system. An analysis of the vulnerability of a territory may be seen as a preventative tool under the threat of major territorial events. It highlights the sensitivity of a zone to one or more factors in a weakened territory. This diagnostic stage opens the door in the medium term to control and risk management actions ahead of the confrontation. The concept of risk rests on the outcome of two other concepts: *threat* and *major stake*. In order to study and manage a territory, it is a good idea to have a good grasp of its spatial, demographic, social, economic and ecological aspects (Leurent F. A. T., 2007). Vulnerability expresses the degree of degradation of a stake (major) under pressure of a threat (of variable intensity) (Ancey C., 2005).

All spatial systems are affected, on a range of scales, by vulnerability. The intention here is to use the territorial resilience paradigm approach, a multi-disciplinary concept, to mitigate it. The concept originally derives from the technical vocabulary of physics, and referred to a process of gradual deformation involving a reaction and adaptation time. The system has the capacity to recover its initial state following a shock or under continuous pressure. Resilience allows the degree of weakening (and hence vulnerability) of the material in question to be characterized (Blétry M., 2006). C. S. Holling introduced the concept of resilience into the field of ecology in 1973. He described resilience as the capacity of an organism or an ecosystem to recover, to adapt, to right itself and regenerate in the wake of a disaster (flood, etc.) in a progressive and natural way. C. S. Holling assessed a number of stable situations and introduced the idea of meta stability as the adaptation of a structure to change whilestill retaining a similar direction. As explained above, the concept implies the cancellation, purely and simply of an action in order to return to an original state. In the field of ecology, the concept takes in the idea of adaptability and the development of a system in a natural way towards possible different paths. In psychology, resilience is enriched by the inclusion of history. According to B. Cyrulnick, "resiling from a commitment also implies no longer being hostage to a past, and freeing oneself from it. Resilience has nothing to do with a claim to invulnerability or superiority on the part of some parties, but the capacity to re-establish a human existence despite an injury, and without focusing on that injury". It is also defined by J. Rebotier as "the capacity of a socio-spatial system to recover from a disturbance and to reduce the expected impact during a subsequent disturbance by learning and the incorporation of feedback in the characteristics of the system" (Rebotier J., 2007). In geography and spatial planning, resilience may take the form of an ability to anticipate a perturbation and/or a developing weakness, to resist it by adapting, and to recover by restoring the original state of the spatial system (Madni A. M., 2007). Having established current practice in this way, we can assess and define the resilience of a spatial system as capable of application to a multi-scale space, either rural or urban, incorporating systemic and transferable concepts, undergoing or having undergone one or more negative events. These spatial risks are the results of perturbations or major key elements affecting a territory. They are implicitly linked to each territory and thus imply overall vulnerability, albeit on a small scale. "This close link between major key elements and territory imply the inevitable transmission of the vulnerability of a major identified and located key element throughout the whole of the territory. In other words, the vulnerability of a territory may be measured through the vulnerability of its major key elements" (D'Ercole R. M., 2009). Resilience may be a factor involved in the battle against the vulnerability of a complex system, but by including the possibility of movement towards a new system sometimes differing from the original.

The following figure represents an approach via a schematic theoretical spatial system subjected, following various perturbations and impacts, to one or more incidences of vulnerability within its system. The response system (naturally—over the long term—or in response to residents and representatives), initiated by a triggering factor, turns into a territory in transition before it achieves, via a reactive methodology (by spontaneous adaptation) or a proactive methodology (by early adaptation), territorial resilience scenarios.



Figure 1 Resilient Spatial System Diagram Theory

Our intention is to test this methodology on the Emscher valley, a region which dramatically mitigated its post-industrial vulnerability by undergoing a renewal and a conversion which was quite groundbreaking in Europe. The Ruhr basin used to be the largest coal and steel basin in Europe. Located at the end of the mining basin (Belgian/French/German), this territory developed around coal and steel industries following the example of a number of towns such as Charleroi (Belgium) and Maubeuge (France).

# 2.2 From the Vulnerable Spatial Industrial System to the Mysteries of Territorial Resilience in the Emscher Valley

"First the mine dies, then the town" was the slogan on the miners' banners in the early days of the coal crisis. The Ruhr basin, profoundly affected by the powerful and rapid 19thcentury industrialization and unfettered urban growth, crashed helplessly during the 1957 crisis, followed by industrial decline, leaving behind hundreds of abandoned hectares of industrial sites, racked by the violent structural changes it wrought. The fact that it had been based on just two products (coal and steel) left little room for SMEs, and this became yet another threat.

The initial aim of the representatives was to remove this demeaning evidence from the area. In the shadow of this collapse, the photographic work of Bernd and Hilla Becher featuring these landscapes and wastelands raised the awareness of the population, thus provoking interest among the representatives, in the region's industrial heritage by highlighting its aesthetic qualities. It may be possible to claim this modest event as the birth of resilience in the Ruhr region. The official trigger was the intervention of the I.B.A. (*International Bau Ausstellung*), which recognized and wanted to change the gloomy and negative image as it existed both on the ground and in public perception. This was a huge challenge for the I.B.A. and for the whole of the region. The loss of economic activities caused high unemployment, while the population density exceeded the national average.

"The major key elements are identified with regard to a territory; the territory depends on its major key elements." (D'Ercole R. M., 2009). The major challenge is thus to restore a form of economic activity, and this must be achieved by the innovative procedure of converting the territory into a network of industrial culture with an ecological, cultural and heritage-oriented approach, while accepting a deferred economic impact. Bounded within an area of +/- 800 km<sup>2</sup>, the I.B.A. planned a strategy based on four major thrusts with the aim of establishing a new image for this urban region (Lusso B., 2010):

• History and the past to serve as a trigger by incorporating Industrial Culture with the preservation and utilisation of the brownfield sites as heritage sites;

• Improving the poor image of coal by creating cultural activities within the actual former sites themselves;

• The beginnings of sustainable development, with a need for an ecological approach in view of the severe contamination;

• A need for architectural quality and contemporary landscape development.

The aim of the I.B.A. was to halt the ballooning emigration from the region due to the rising unemployment, and to attract the population and private investment back in order to restore the regional economy by overhauling its image. Seen from then on as the engine driving projects aimed at boosting urban zones (Andres L. A., October 2008), regeneration through culture dominated for decades in the development policies of the large cities, and particularly those with a background of heavy industry (Bianchini F. P.,1993).

Our goal here is to identify the risks, effects and areas of vulnerability formerly present in the Ruhr basin (in the post-industrial period), to include them in the outline of the theoretical spatial system, adapting them if necessary, and to assess the capacity for resilience. It should be noted that the United Nations has set as a strategic goal: "The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards."

#### 3. Results and Discussion

After more than twenty years, the outlook for the Ruhr region is definitely positive. The economy of the Emscher valley, and that of Germany in general, remains exemplary, despite the endless crises of recent years. The culture-based conversion of this conurbation has, for over twenty years, driven up tourism and helped shape the image of a solid and resilient territory. We should also point out that not all existing completed projects were planned as part of a strategic forward-looking scenario, and that as conversion proceeded a degree of easing was favoured, so that the reactive or proactive resilience could be to some extent anticipated; nevertheless, the adaptation of the players to the needs of the investors is essential. Thanks to the application of the method within the Ruhr territory, we are now in a position to correct the methodology (see the illustration) used to analyze vulnerability and the mechanisms deployed to render a territory resilient.

The Val-de-Sambre region, bordering on the Emscher valley, has endured similar vulnerability factors on a reduced scale (Emscher valley—70 km in length, Val-de-Sambre—35 km in length). Its cross-border territory was affected by deindustrialization and hence by the need for reconversion. For several decades, the region, symbolized by two urban centres (Charleroi and Maubeuge), has been looked down on and equated with a "disaster zone" by the general public. The suburban green belts are currently metamorphosing into industrial zones with a view to multifunctional redevelopment, while the wastelands from the industrial era remain abandoned. Could it be that the cost of decontaminating these sites is the sole obstacle to regional planning and

redevelopment? Our aim here, then, is to evaluate the evidence of the vulnerability of this territory (present or future) and to identify any signs of resilience in this cross-border region, and to create an awareness-raising movement with possible trigger factors as with its German neighbour.



Having defined the signs of areas of vulnerability in Val-de-Sambre during the industrial area in the introduction, we also spotlight some contemporary areas of vulnerability. The stigma of the industrial era clearly remains an aspect of this, but are the local and regional stakeholders making the right choices for their territories? Charleroi (plus its suburban belt) is the largest city in Wallonia, and is surrounded by abandoned industrial wasteland. From east to west along the Sambre it remains deserted, and economic activities are stagnating. In an effort to more effectively restore the local and regional economy, a green site to the north of Charleroi set down in the local development plan as a joint municipal industrial development zone (Z.A.C.C.I. since 1979) has been transformed into a science and technology park (Gosselies Aéropôle [aerodrome]). It opened earlier this century, and is now home to over 150 companies (international companies and research centres); this attraction is boosted by the Brussels-South Airport (1991) adjoining the Aéropôle. This increases the number of commuters exponentially thanks to RyanAir (the low-cost airline opened here in 2001, and is now used by 800,000 passengers). Is this airport a sign of the vulnerability or the resilience of the territory? Regardless, the six million annual visitors (2011) make it a major economic stakeholder for Wallonia<sup>1</sup>. Most are merely passing through, and miss the potential of this region, such as a site registered on the UNESCO World Heritage List, le Bois-du-Cazier, a former industrial site with a very grim past now brought back to life as a souvenir museum, restaurant and landscape park, not to mention the photography museum, etc. The convenience of the airport encourages businesses (new and established) to relocate from the city centre to this area, leaving the urban core abandoned. We must support this economic technology complex which is generating a large number of jobs for all the residents in the region (over 3,600). Even so, the many abandoned brownfield sites could have been used to accommodate these competitiveness clusters. The city and the region seem to be very cautious about resuscitating these former industrial sites. The strategic decisions made in terms of urban planning and territorial development have been legitimized through the political commitment and energy which should be the bastion of new ways of thinking which focus on the use of discarded sites by reusing pre-existing infrastructures (Dumesnil F. O., 2002).

<sup>&</sup>lt;sup>1</sup> Lecture "challenges and prospects for Charleroi airport", Financial forum, January 17 2013, La Louvière, Belgium.

"In addition to becoming an alternative to the peripheral growth of the city centres, the city will also find its multifunctional nature enriched and will boost local development." (Dumesnil F. O., 2002). Launched in 2004, the project dubbed "Charleroi 2020" is intended to represent a forward-looking exercise by local politicians. In its final report, the City stated that "while the economic redeployment of Charleroi must include innovation and the development of new activities, particularly in the so-called "cutting edge" sectors, it also requires the decontamination, rehabilitation and recovery of the disused industrial sites, many of which are surrounded by housing. They make any balanced territorial development particularly difficult and seriously hinder the creation of a new image. The removal of these scars, together with the abandoned urban zones, will also constitute an important element in improving the standard of living and the aesthetic value of the city as far as the outside world is concerned."<sup>2</sup> Could such a tool not have included this business park within its comprehensive strategic vision for the Charleroi brownfield sites, the area of which is comparable to the vacant terrain used to restore the image and the economy of a region experiencing significant socio-economic problems? Notwithstanding these comments, other projects upgrading the territory covered by "Charleroi 2020", such as the project for the new police station created by Jean Nouvel (Charleroi in search of the "Bilbaoeffect"?), the "Phoenix project", which is defined as the complete renovation of the Sambre bank (walkway, shopping mall, etc.) seem like a good idea for changing the image of the city.

Great oaks from tiny acorns grow... Could this proverb apply to the resilience of territories in transition? Could a series of tiny elements combined create a whole of great importance in the field of urban planning? Could residents' associations or the mobilization of the public, at their own level, initially without municipal support, reduce vulnerability? Within the Charleroi urban zone, an innovative project which includes these criteria is attracting our attention, known as the "*Couleur Carolo [Charleroi Colour]*". This rejuvenation project, launched by the residents and backed by the municipality, is focusing on bringing six symbolic Charleroi sites (the "Rockerill" at Marchienne-au-Pont, Michel Levie Square in North Charleroi, the slip roads of the Small Ring Road R9, a hospital site, and the Nexans water tower) back to life in bright colours, in direct contrast to the image of the Black Country. The image is developing... little by little change is being brought about by and for the residents.

#### 4. Conclusion

Reclaiming the post-industrial infrastructure is part of an attempt to adapt and transform the city within the city. Rather than turning our back on the past and demolishing the contemporary legacy in its entirety, the re-use, and hence the resuscitation, of abandoned industrial sites is leading towards a new urban flowering, leaving virgin spaces intact. In parallel with this urban planning concept, it has been noted that the rehabilitation of discarded brownfield sites encourages positive efforts on the part of the community with economic, environmental and social goals (Dumesnil F. O., 2002).

The Emscher valley has experienced and passed through a form of post-industrial vulnerability driving it towards a position as a resilient territory in a way which is innovative for its time. Thanks to a forward-looking political strategy, the valley has deviated from its regions and bordering countries with similar scars. This was an overarching policy for the whole conurbation with a single theme: the development of an image and a territory

<sup>&</sup>lt;sup>2</sup>Charleroi 2020, Final Report, report by the steering committee on the forward-looking action undertaken by the people and life blood of Charleroi, 2005.

through conversion and culture. The incorporation of the virtually mono-functional vulnerability of its yesteryear economy has yielded to an economic and tourist-focused system, and thus to a diversified culture.

The Val-de-Sambre zone, a cross-border territory symbolized by two post-industrial cities, has for decades borne the brunt of a negative image. The abandoned sites from the post-industrial period which abound in the Charleroi region make it highly vulnerable. The unemployment rate in this area is above the national average, and the economy, despite some ad hoc attempts, remains weak. It is possible that resilience might be found in micro-events, often largely unknown to the general public, but, like the Emscher valley, it should be a global unifying project, and not one undertaken at city level (a local project), as part of a (motivational) forward-looking and proactive strategy which saves this territory with such potential.

If hints at resilience are encouraged and proven, it will not be through the conversion of the post-industrial infrastructure, but through outer-suburban actions, since post-industrial vulnerability is extremely evident. A new abandoned site 100 hectares in size has recently appeared to the west of the greater Charleroi area, a site which is very well served and comfortably seated in the landscape. The hope for conversion and a fitting image overhaul gives hope for resilience in this territory in transition.

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