

Article

# A Systematic Review for Urban Regeneration Effects Analysis in Urban Cores

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**Abstract:** In this article, we aim to promote a methodology to analyze the effects of urban regeneration in historical sites. Different case studies are observed in depth, and they allow us to understand certain aspects concerning ex-post and ex-ante assessments. This methodology, which is supported by Geographic Information System (GIS) software and an online database, is based on different phases: the first is the quantification of the resources employed within the process, giving attention to the policies that are the basis for social and environmental changes. Then, the analysis moves to the effects of the interventions. In particular, the goal of the methodology was to understand how different urban operations can contribute to creating public value, and importance was given to the available tools for public bodies to develop partnerships and to capture that value. With the ex-post assessment, it was feasible to compare the situations before and after the realization of the projects, whereas, with the ex-ante assessment, it was viable to assess different possible development scenarios and compare them with the baseline of the current situation. The methodology was tested for the ex-post assessment case study of the city of Porto (PT) and for the ex-ante assessment case study of the city of Brescia (IT).

**Keywords:** urban cores; urban regeneration assessment; GIS; capture of betterment

## 1. Introduction

The article seeks to contribute to the research concerning the assessment of urban regeneration effects. In fact, the aim is to support the thesis that the enhancement of cultural heritage, namely of an architectural matrix, can trigger wider policies involving the recovery of parts of the consolidated city [1]. This can be a chance to promote policies for the development of urban cores. Together with historical cores, minor historical areas, which due to their marginal position within the urban fabric have not achieved the status of urban cores, can be developed also. However, how can the recovery of portions of city, which are marked by the presence of elements with architectural value, trigger wider urban regeneration phenomena that will involve the socioeconomic matrix as well?

To answer this question, it is essential to analyze examples where this policy has been successfully employed. Special attention will be dedicated to value creation and value capture theories. This aspect is predominant within this type of process because, from the public body's interventions for the redevelopment of portions of territory, it is possible to start virtuous phenomena in which private properties surrounding public areas acquire an increased value as well [2]. This value can be a stimulus to develop public–private partnerships (PPP) that can promote urban growth [3,4].

This aspect will be deepened within this paper through the analysis of two case studies: the city of Porto, in Portugal, and the city of Brescia, in Italy. In both cases, we will analyze the urban regeneration processes based on the enhancement of the historical–architectural matrix of the territory. The two processes differ. In the Portuguese example it is feasible to discuss consolidated phenomena whose effects are clearly visible in observing the city. This is an ex-post assessment case study. The process in Brescia is much more recent and the urban operations are planned or under development. This is an example of an ex-ante urban regeneration effects assessment.

## 2. Theoretical Framework

### 2.1. Exporting Urban Cores Using Geographic Information System (GIS) Software

The enhancement of historical centers has a consolidated tradition that, originating in Italy, developed since the Second World War and found authoritative exponents in architects, such as Benevolo, Lombardi, and Giovannoni. It is not a coincidence that the Gubbio Chart was drawn in Italy, in 1960, at the end of the National Convention for the Safeguarding and Restoration of Historical Centres, and, a few years later, the Venice Chart was drawn in 1964, which dictated further rules for the reconstruction of historic centers damaged or destroyed during the bombings.

Thanks to the work and research of Giorgio Lombardi, it was possible to develop a methodology for the analysis of the historical areas of the city. That methodology aims to identify the main features of the historical fabric, from the morphological and typological point of view, and to outline a compatible line of intervention [5]. The filing techniques developed by Lombardi were mainly based on the analysis of the building components of the areas examined and had the strength of not being limited only to the analysis of the main monuments or buildings of greater historical–architectural value but included the whole urban area, in accordance with the main urban planning theories that were consolidating in the second half of the Twentieth century and that theorized the existence of a bijective relationship between the monuments and the environment in which they were inserted [6].

As shown in an exhibition that took place in Brescia and Milan between 2015 and 2017, entitled: “Exporting the Urban Core”, these techniques in Italy have had fertile ground to be tested and widely applied (Bergamo, Rome, Assisi, Florence, Genoa, Venice and Brescia are examples among many). These techniques have also found resonance abroad as they have been used for the enhancement of numerous historical sites around the world. Some examples include Chester (UK) in the late 1960s, the renovation project of the Barredo area in Porto between 1969 and 1974 and Lisbon from 1989 to 2000 (Portugal), and Berlin (Germany) from 1975 to 1987. Outside Europe, the most relevant experiences are those relating to the historic site of Mexico City and Cusco in South America, Jerusalem and Baghdad in the Middle Eastern countries and Tunis in Africa.

It is feasible to say, quoting Leonardo Benevolo, that the theories for the enhancement of urban cores are the greatest contribution made by Italian urban planning to the international debate [7].

Today, the main influence of this way of thinking urban cores and minor historical sites is well defined and mirrored in the United Nations 2030 Agenda for Sustainable Development. In particular, “Goal 11: Sustainable Cities and Communities” asks urban settlements to become safer, more inclusive, sustainable and resilient, while Target 11.4 stresses the importance of enhancing historical and natural elements to activate local economies, promote tourism and protect the local identity culture [8,9]. These aspects are also the basis of the Europa Nostra report “Cultural Heritage Counts for Europe” (2015). This report describes experiences from all over Europe in which the protection and enhancement of cultural heritage are the basis of local strategies for sustainable development [1]. The goal is to develop a virtuous circle in which local resources merge for the development of larger areas by involving the resources of individuals and stakeholders.

The most recent lines of research in the urban planning field aim to export this methodology, not only abroad, as was the case in a large part of the last century, but from the historical centers to the peripheral parts of cities [10]. There are important portions of land that have peculiar characteristics

that distinguish them within the areas of expansion and conurbation of the territory. The recognition of the architectural value of these minor sites can lead to the emergence of regeneration policies of large parts of the urban fabric marked by socioeconomic problems, and these can be a way to increase the quality of life in these peripheral areas. The use of GIS software makes it possible to create functional databases in which all the features necessary for the definition of operational guidelines are included. In detail, not only it is possible to use this type of software to describe the morphological and typological characteristics of the building matrix of the area, in analogy with the principles of filing identified by Giorgio Lombardi, but above all, it is possible to georeference the phenomena that occur in the site. This step allows the development of scenarios in which the employed resources are linked to the benefits obtained or the potential.

## 2.2. Capturing Plus Value

Enhancing urban cores and minor historical sites is typically an action promoted by public bodies that has outcomes on the surrounding private areas. This means that private areas can benefit from increased value that is not due to their own efforts [11].

To better understand this, it is crucial to consider the enhancement historical areas within a wider process of promotion of urban regeneration policies. The goal of urban regeneration is to activate private resources to develop part of the territory. Public bodies have different tools to stimulate private owners and stakeholders to operate. The main tools are economic deductions, development rights extension, and infrastructure development.

If a process of urban regeneration is considered, the public body defines the strategy and, with the local urban plan, identifies the areas and development sites in which the process must be activated. Within the urban sectors that are thus outlined, there will be a mix of public and private properties, residential buildings, services and local shops, buildings, and open spaces in which there are built infrastructure and spaces for the community. All these aspects contribute to defining the urban quality of an area and the latter aspect defines the appeal of a site from an economic point of view.

From the moment the public body takes charge of starting a process, either by granting building rights to private owners and negotiating the construction of public works or by building infrastructures or by redeveloping existing open spaces, private areas undergo an increase in their market value as private areas acquire the possibility of carrying out new interventions or because they find themselves within sectors, which, following the implementation of the process, become central within the urban fabric.

When a private individual benefits from an increase in the economic value of their properties due to the extension of the planning choices, it falls in the case of right-based development [12,13], while in the case in which the increase in value is due to the redevelopment of public spaces or to the creation of new infrastructures that make a site more accessible and central within a territory or provide it with a higher quality of services, then, it can be said that the added value is due to infrastructure-based development [12–14]. In both cases, it is part of the direct value capture situation as private areas do not benefit from the result of their actions but from strategic choices defined at the municipal planning level, and, for this reason, it is possible for public bodies to capture part or all of the added value acquired [13,14]. The percentages of increased value that can be acquired and the ways in which the value can be captured vary from case to case and from country to country and depend primarily on the current regulatory and tax system, as well as on the individual negotiated procedures that are upstream of an urban transformation process [11,14,15].

Enhancing historical sites is a tool for public bodies to trigger an urban regeneration process. Inside a process for enhancing valuable areas, public bodies can develop recovery plans in which there are guidelines for interventions, or they can operate on public buildings and historical open spaces, such as piazzas or main squares. The former is a right-based development situation, while the latter is an infrastructure-based development situation.

At the end, it is feasible to say that public bodies can use their heritage as leverage to stimulate stakeholders to operate and to promote public–private partnerships to begin urban transformation processes and promote spatial development.

### 3. A Methodology for Urban Transformation Analysis

The article focuses on the evaluation of urban regeneration processes and intends to shed light on a definition of a methodology for the analysis of urban transformations. This methodology will subsequently be applied to the ex-post analysis of the case study of the UNESCO site of Porto and to the ex-ante analysis of the ongoing processes in Brescia.

At the basis of the process assessment, there is the analysis of how different urban planning actions produce public value. Different operations can induce different effects on the land concerning the social, economic or environmental spheres of the city, but all these effects combine to create a better quality of life in an urban environment, and this can be translated into public value [16]. This parameter can be used as an indicator to compare the effects of different processes or to compare different development scenarios in analogy with the theories of value-led development planning approaches [17].

The proposed methodology is divided into different phases (Figure 1): Quantification of the resources used in the transformation process and quantification of the benefits obtained, in the case of ex-post analysis, or obtainable in the case of ex-ante evaluation; in this phase it becomes possible to define the indicators for the estimation of externalities. Finally, there is the analysis of the public value created. The quantification steps are borrowed from other consolidated analysis methodologies, including the Analytic Hierarchy Process (AHP) and Multicriteria Assessment (MCA) [18].

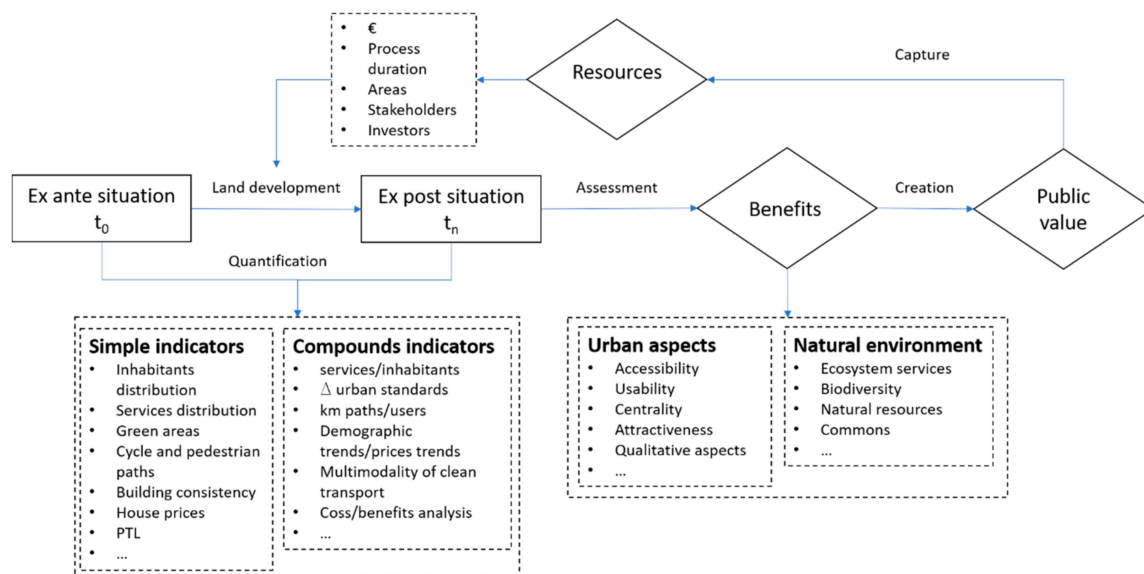


Figure 1. The process for the assessment of land development effects in urban areas.

The preliminary step is the definition of the case study area; then, it is viable to define the urban regeneration process and the interventions that contribute to transform the examined area in a certain period.

The starting point is the quantification of resources. This step employs different indicators based on what type of resources is intended to be quantified [19–21]. The second aspect is whether the measurement takes place in an upstream or downstream phase of the process. Going in depth, the cost of the works carried out falls into this phase. If the process is analyzed in monetary terms, then sub-indicators, such as public investments and private investments, can also be obtained. Another aspect that can be taken into consideration is the duration of the construction sites: also, in this case the data can be broken down, and therefore, a classification of the process can be obtained

based on the year in which the works began or a certain percentage of interventions was completed. Another aspect that can be detected is the quantity of the works included within the process. This indicator includes, for example, the number of established services or new commercial activities, the number of kilometers of new cycle and pedestrian paths built, the extension of public areas redeveloped, or the number of buildings renovated. These data can either be taken in absolute values or can be relative, for example, to the extent of the site, the number of potential users or the cost itself required for their creation to obtain a more objective measure. It is also possible to do further environmental analyses, such as the variation of green areas, the increase in trees or green essences, or the growth of permeable areas in relation to the impervious ground.

The second phase is the quantification of the benefits, and this consists of detecting illustrative indicators of how the site changed following the completion of the transformation process. In this phase, it is possible to measure purely urban aspects, such as the variation in the proximity of first and second necessity shops or the increase in accessibility to neighborhood services. It is also viable to obtain parameters of a more socio-economic nature, such as variations in the distribution of population or changes in the number of employees. If, on the other hand, there is the will to analyze aspects more related to the environment, it is possible to quantify the ecosystem services associated with the new natural areas.

Therefore, interventions that have different assumptions and natures produce diversified effects on urban fabrics. However, each urban operation contributes to improving the quality of the area and to make it more attractive for residents, users, and investors. In this way, public intervention helps to increase the value of private properties as well. This increase in value can be captured due either to the upgrading of infrastructures or to the increase in the quality of public spaces or, alternatively, to the transformation of the rule of law of a specific site. All these operations contribute to increasing the value of private properties without the owners taking direct actions. For this reason, it is legitimate for the public body to capture this added value.

The analysis of the possible mechanisms by which administrations can capture added value is central within this methodology as different systems can produce different consequences on the territory. These processes are more fiscal in nature than related to technical urban planning; however, the externalities directly reflect on the urban quality. The mechanisms examined in this article are two-fold: the development of public–private partnerships and taxation systems. Within a single process, these mechanisms can coexist and be used to achieve the result of a better urban quality.

Within the proposed methodology, the use of GIS software plays an important role. This type of software allows, on the one hand, to streamline the work of cataloguing the real estate assets by taking up the consolidated experience of Giorgio Lombardi and, on the other hand, to link the various aspects of which the site is composed allowing systematization of the data at the base of the previously proposed indicators and the correlation of them together to obtain compound indexes.

#### **4. Different Experiences of Enhancing Historical Fabrics**

Two examples of main centers where the process of enhancing historical areas has been developed are Brescia, in Italy, and Porto, in Portugal (Figures 2 and 3).

In these cities, the methodology for the analysis of historical fabrics described in Section 2.1 was highly implemented; thus, it is of interest to observe how the same approach to heritage was adopted in different geographic areas. It is interesting to compare these situations because the Portuguese case study is more advanced than the Italian one and can be used as a reference to understand the effects of land development at historical sites.

In this section, the processes that have happened in these two cities since the second half of the 19th century are described, giving special attention to the urban transformations in the urban cores and historical sites in the last twenty years. Here, the aim is to analyze the role of the actors involved in the process and the ways in which processes are developed considering the resources employed, related benefits, and available tools for public bodies to encourage stakeholders and to capture value.



**Figure 2.** An overview of the Porto area with the UNESCO site highlighted.



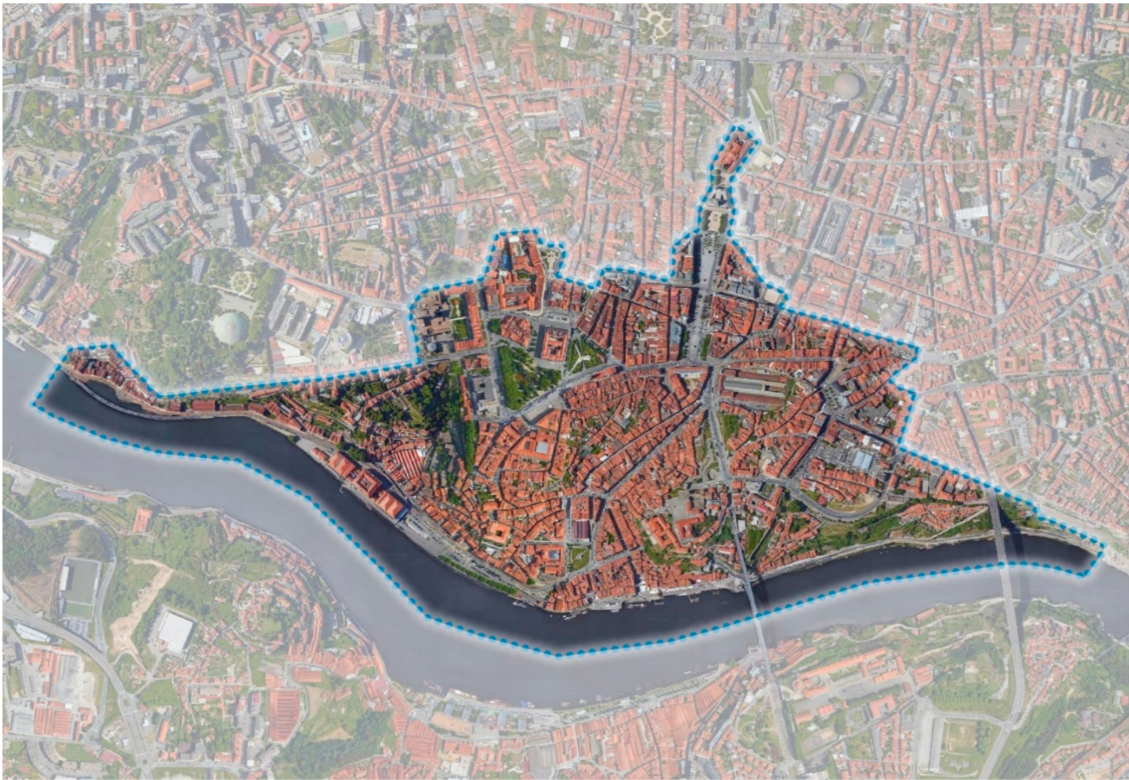
**Figure 3.** An overview of the Brescia area with the UNESCO site highlighted.

The case studies differ: the Portuguese process started in the 1970s, while the Italian development is more recent as it started less than ten years ago, fostered by a new local urban plan that was approved in 2016. The Porto regeneration process is at a more advanced stage than the Italian one; the transformations analyzed are already largely completed and have already profoundly marked the urban quality of the area revitalizing the economic and social fabrics.

The case of Brescia, however, is more recent. The municipality recently decided to start the process and the interventions are being finalized. For the Brescia case study, our analysis was focused on the potential outcomes and benefits. It can, therefore, be said that the process evaluation methodology applied to the Portuguese case is an ex-post evaluation in which the effects produced by urban planning actions are observed in the field. The Italian case, on the other hand, falls within the scope of ex-ante assessments as a starting scenario is defined and an estimate of the resources to be used and the possible results to be obtained is made on the analysis of the projects approved with the resolutions of the City Council.

#### 4.1. Urban Regeneration in Porto

Porto is in the Northwest of Portugal and, today, is the second most important city in Portugal and the capital of the homonymous metropolitan area. The World Heritage Site is the oldest area of the cities of Porto and Vila Nova de Gaia, classified as a Cultural Heritage of Humanity since 1996 (Figure 4). The urban fabric is the result of a process of about three thousand years, dating back to the Roman, Medieval, and Almada periods (18th century) (Figure 5) [22].



**Figure 4.** An overview of the case study area in Porto.



**Figure 5.** The classified area of the historic center of Porto. Source: Porto Vivo SRU (Sociedade de Reabilitação Urbana). Source: <http://www.portovivosru.pt/pt/centro-historico/enquadramento>.

At the beginning of the 20th century, there were visible needs in terms of infrastructures, which led to the Plan of Improvements and Extension of the city of Porto, led by Barry Parker, a British architect

and urban planner. From 1914 to 1962, there were ten Urban Plans, which culminated in the Municipal Director Plan, by French architect and urbanist Robert Auzelle. Urban conceptions from the 1940s–1960s proposed the demolition of the most degraded areas (e.g., the demolition of the old houses in front of the Cathedral, destroyed in 1939–1940 to expand the Terreiro da Sé). A working group created in the 1960s, under the guidance of architect Fernando Távora, published a report in 1969 prepared according to the principles of the Venice Charter with proposals for the urban renewal of Barredo [23].

However, the coup d'état of 25 April 1974, and the ensuing changes, brought about a new holistic approach to the historic center, as a global heritage value that included historical, architectural and cultural values. i.e., an aesthetic, but also a social and cultural reality. Consequently, the Commissioner for Urban Renovation of the Ribeira/Barredo Area (CRUARB), under the dependence of the central government, began rehabilitation works almost immediately in the same year. This urban renewal operation put into place the proposals of the 1969 report, despite contradicting certain guidelines and principles of the Municipal Director Plan that was in force. In 1982, CRUARB was under the supervision of the Municipality of Porto and, in 1985, under the Direction of the Municipal Project for Urban Renovation of the Historic Centre of Porto. At the beginning of the 1990s, the Foundation for the Development of the Historic Centre of Porto (FDZHP), financially supported by the local and central governments, together with CRUARB, aimed at promoting urban recovery and poverty reduction with greater participation of the local stakeholders.

From 1993 onward, CRUARB managed the works in the physically and socially degraded Bairro da Sé. The 'Pilot Urban Project of Bairro da Sé' was designed and implemented for the conservation of heritage and cultural assets; renovation of the urban environment of the area; reintegration of the resident population; consolidation and development of tourism; expansion and renewal of commercial activity; and implementation of a partnership network. After 1996, the 'Rehabilitation Operation of Ribeira/Barredo' integrated the riverside area between Ponte Luís I and Alfândega Nova following the guidelines of the Pilot Project of Bairro da Sé. Similar interventions were carried out in other areas, such as the operation in Miragaia, in 1998, and in Vitória, more recently [24].

Despite consensus around the quality of the work developed by CRUARB and FDZHP in the Historic Centre, the question of the return on the three decades of investment started to weigh in the early 2000s. Balsas (2007) argued that revitalizations in Porto (and Lisbon) between 1990 and 2005 were partial physical facelifts that overlooked the social and economic aspects of the revitalization and called for a more integrated approach between the revitalization of public and private spaces and organizational interventions [25].

This eventually led to the dissolution of CRUARB in 2003—at that time an office exclusively dedicated to the historic center in the Town Planning Services of the City Council—and the extinction of the Foundation for the Development of the Historic Zone of Porto in 2007. The physical recovery of the Historic Centre and the downtown area was taken over by urban rehabilitation society (SRU) Porto Vivo as the unremitting physical decline of the core areas of the oldest Portuguese cities led to the establishment of urban rehabilitation societies (SRUs). SRU Porto Vivo is a public partnership owned 60 per cent by the central government (Instituto da Habitação e Reabilitação Urbana—IHRU) and 40 per cent by the local government (municipality) based on private investment incentives, as an alternative to a purely public model [26].

The urban regeneration process in the Porto UNESCO site, conducted by Porto Vivo, started in 2005 and is the result of a long analysis process in which the different blocks composing the case study area were analyzed, highlighting not only the geometric and typological characteristics of the projects but also the ownership structure and the conservation state [26]. Subsequently, Porto Vivo analyzed the characteristics of the area from a socio-economic point of view and outlined an intervention policy by identifying the most suitable sectors to host the strategic functions to be included in the site to facilitate its relaunch. Porto Vivo, which managed the transformation and relations with private operators, in relation to the identified strategy and the conservation state of buildings, identified a series of interventions aimed at redeveloping the building matrix of the site with the aim of obtaining

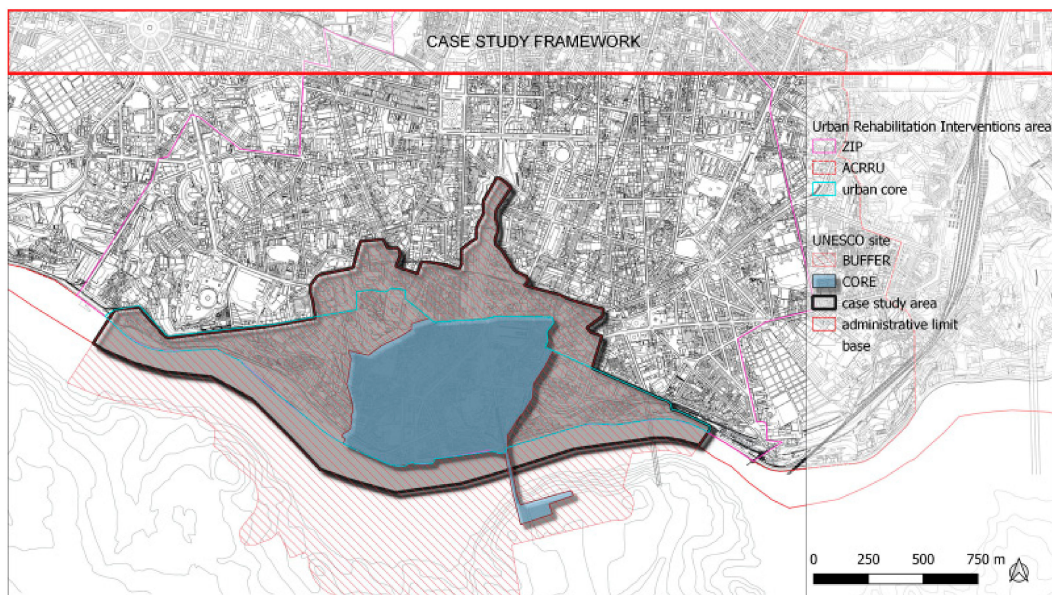


higher quality housing. In addition, Porto Vivo also prepared a plan for monitoring the effects [27]. Outlining an intervention policy for the individual buildings managed at an urban level allowed the creation of a large-scale but coherent operation for all of the analyzed area, which can also be replicated in other portions of the territory and is compatible with the characteristics of the buildings in question.

There are thirty sectors with different morphological and typological characteristics that fall within the case study and for which different actions have been outlined.

#### 4.2. The Ex-Post Assessment for Porto Urban Regeneration Process

The first step in the analysis of the case study of Porto is the definition of the area of interest, which is the site embodied in the perimeter of the UNESCO site, established in 1996, inside the Porto municipality (Figure 6). The UNESCO site includes two municipalities that are divided by the presence of the Douro river. On the Porto side, there is the core zone of the UNESCO site in which it is possible to find the historical area of the Ribeira and the city center with the most important churches, monuments and palaces, which are at the base of local tourism, like the famous iron bridge Dom Luis I realized between 1881 and 1886 by Théophile Seyrig, a Gustave Eiffel apprentice. Around the core there is the buffer zone, which is half in Porto and half in Vila Nova de Gaia.



**Figure 6.** The case study area in Porto.

Once the area was defined, it was feasible to begin the assessment. The first phase was the quantification of resources, which considered two main aspects: the features of the built environment and economic resources employed within the process. In this phase, open spaces and monuments were mapped as well. This aspect is important because the considered process is the one that aimed to enhance historical buildings and started in 2005; however, it was forerun by another process whose goal was to redevelop open spaces inside the urban cores (Figure 7).

As stated in Section 2.2, intervention regarding open spaces and infrastructure is one tool in the hands of public bodies to boost private interventions. Enhancement of streets and squares allows the surrounding private buildings to acquire a higher value, and this can be a stimulus for stakeholders to operate to redevelop their properties. This theory was confirmed by practice as the following process started in 2005 with the aim of promoting architectural efficiency. Most of the buildings included in interventions are private, and the Municipality has the role of project manager [27]. Thanks to the creation of Porto Vivo, it was feasible to manage the relationships with private operators and to encourage them to employ private economic resources. This aspect allows the Municipality to invest little money within the process.

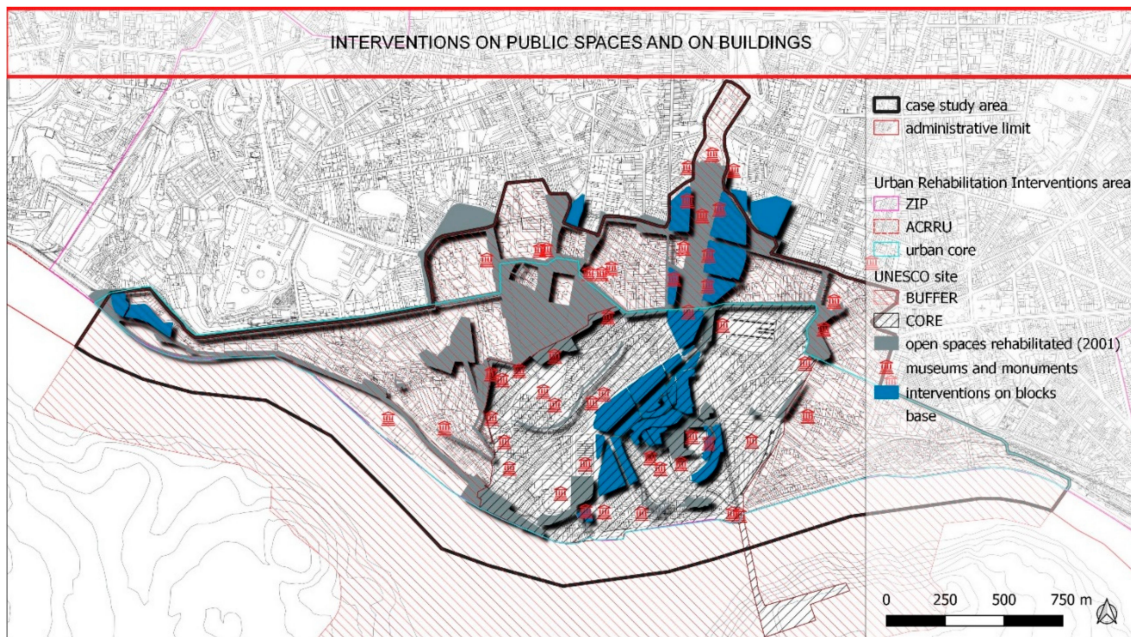


Figure 7. Analysis of the redeveloped asset: open spaces and historical blocks.

From the analysis of the data contained in the reports drawn up by Porto Vivo, it was possible to find information regarding the process, such as the year in which the work started (Figure 8) in each sector and the percentage of work currently completed (Figure 9), the extension, the cost, and the contribution paid by the public body, as well as the part covered by individuals (Figure 10).



Figure 8. Blocks subdivided by the year in which operations started.

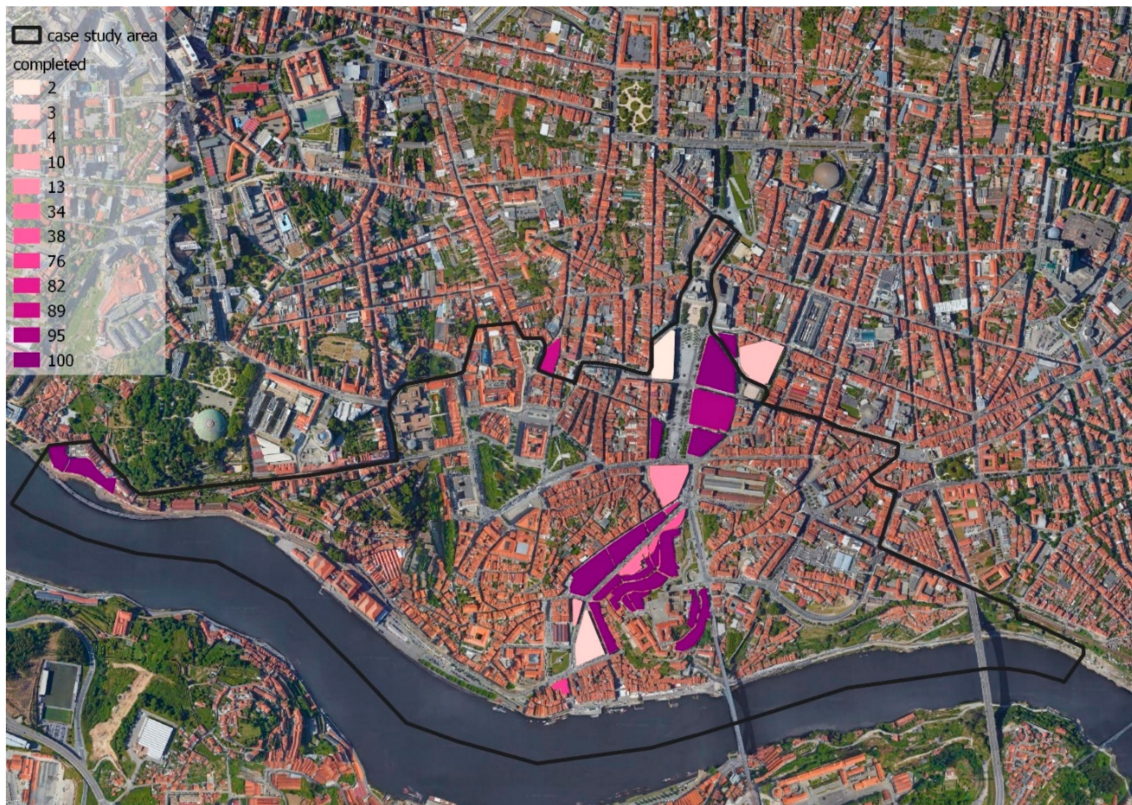


Figure 9. Blocks subdivided by the percentage of interventions completed.

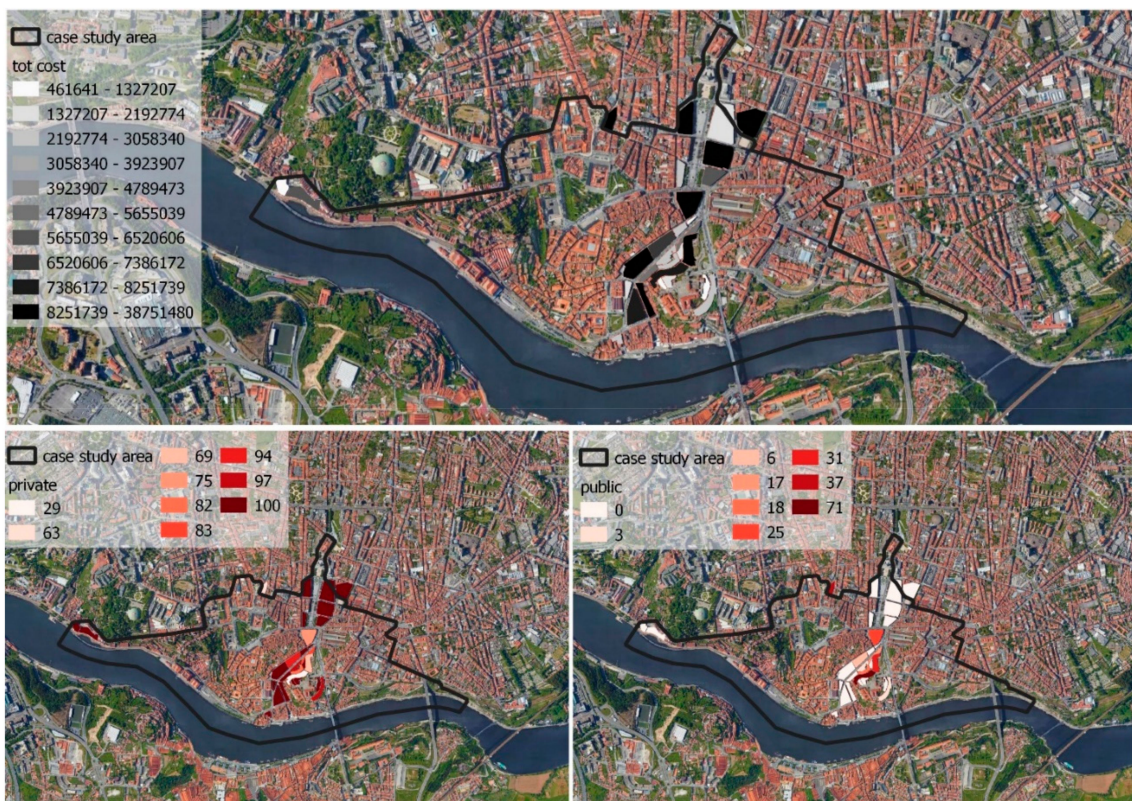


Figure 10. Subdivision of total costs of the interventions in public costs and private costs.

The various interventions started at different times and covered a period of about five years. In addition, the interventions analyzed were uneven also from the point of view of extension and cost. The use of the GIS software facilitated the creation of a database in which all the information reported in a disaggregated manner on the Porto Vivo website was systematized. This allowed us to determine, through mapping, how, where, and when public and private resources were invested.

From the analysis of the GIS cartographical bases obtained, the results indicate that the process, in the UNESCO site of Porto, took place in an asynchronous way and that the actors involved contributed differently to the success of the operations. In many cases, the public body only played the role of coordinator of operations; in other interventions, however, it also contributed economically.

The developed strategy enabled a series of new territorial services and facilities to be installed, which have contributed to making the area more suitable for accommodating the growing residential demand and the growing tourism flows. This allowed the start of widespread regeneration phenomena since, over the years, the entire site benefited from the effects of the process that revitalized the economic matrix of the site, transforming the area, which, following the collapse of trade by ship, had been suffering a long process of physical and social degradation.

Currently, the site presents itself as a strong polarity capable of attracting tourists and equipped with numerous accommodation facilities and services in which the historical character is well recognizable in the typical architectures that have maintained their typological and morphological aspects (Figure 11).



**Figure 11.** The effects of urban regeneration in the Ribeira.

There is a special contribution to the municipalities of Porto, due the property valorization emerging from public infrastructures (e.g., the road and rail systems and science and technology parks). This special contribution levy is charged once on each building. The Tax Base is the difference between the value of the building after and before the construction of the infrastructure, corrected by application of the coefficients of devaluation. There is also a tax on Real Estate based on the tax value of

buildings. The taxable property value is determined by valuation, both annually and based on the type of building. There is an additional tax to the Municipal Tax on Real Estate, only applicable for those with real estate values above € 600,000. To promote property value, there is also a Municipal Tax on Real Estate Transmission—this tax is levied on onerous transmissions of real estate (buildings)—and a tax on the gains obtained with real estate sales (Capital Gains Tax), which is a Tax charged whenever the sale of house generates gains. The taxable amount corresponds to half of the capital gains. The gains with real estate sales are calculated by making the difference between the value of the sale of a property and the value of the acquisition of it, if considering deductions.

To achieve these goals, and to foster private participation, the Porto Municipality and Porto Vivo, adopted tax benefits and municipal incentives. The first available tool is the “Public Domain Occupancy Rates”, which allows stakeholders to have an 80% reduction in the amount of fees due for the licensing of occupation of the public domain due to works directly related to the construction, reconstruction, conservation, recovery or rehabilitation works of the built park, located in the case study area. The second tool is “Fees due for Advertising Licensing”, which lets private areas obtain an 80% reduction in the amount of fees due for advertising licensing, to be placed in the aforementioned Priority Intervention Zone, alluding to entities that, under the “VIV’A BAIXA” program, operate in partnership with Porto Vivo. The third tool that lets the Municipality boost a public private partnership says that owners of buildings located in the case study area that carry out rehabilitation works within the scope of the Sim-Porto regulation are entitled to negotiable construction credits to be applied in new construction in other areas of the city.

#### *4.3. Enhancing Cultural Heritage in Brescia*

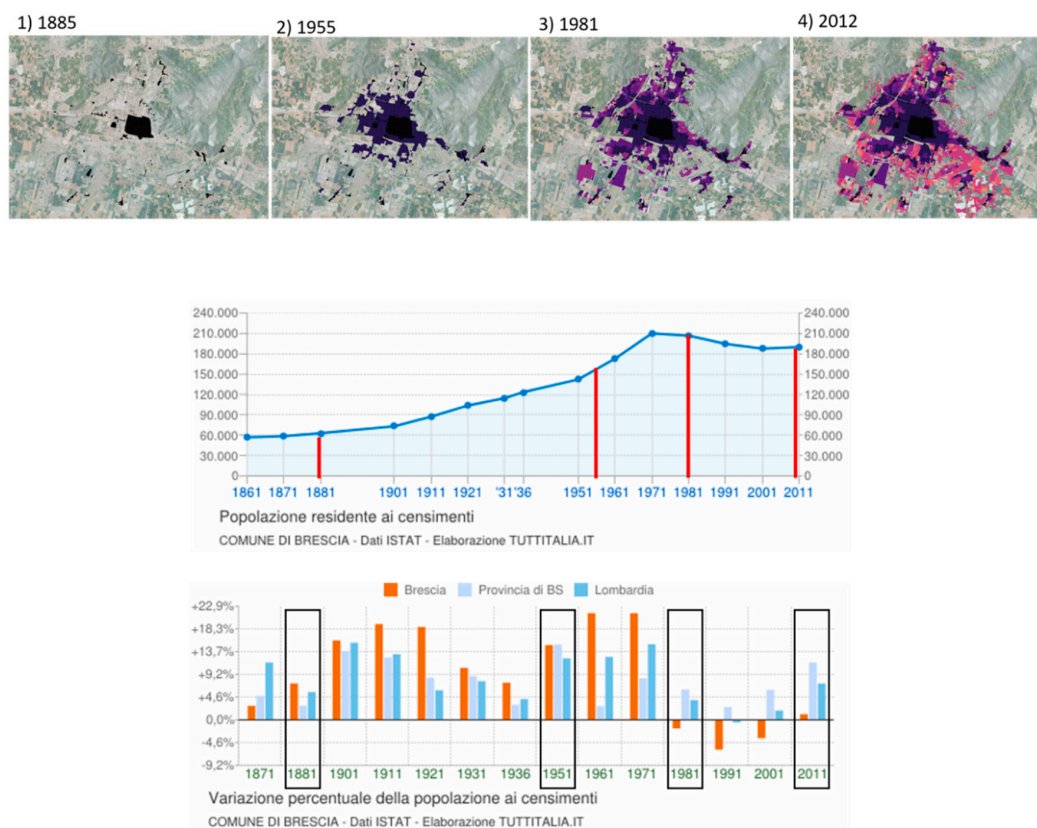
Brescia territory is deeply marked by two main factors: the first factor is the development process that the city experienced, particularly in the second part of the last century, while the second factor is the land morphology, which is characterized by the presence of hills and mountains in the northern part and rural fields in the southern part. The city has Roman origins, and the urban settlements developed around the Roman nucleus at the bottom of Cidneo hill. Until the end of 19th century, the settlement remained inside the Medieval walls and the outer territory was signed by the presence of an isolated nucleus, which was considered as a different town, and rural houses. The part of the city that was inside the perimeter of the walls (now demolished) is what is typically considered as the modern urban core; while the isolated nucleus, which is now inside the consolidated city, is now considered as the minor historical site. During the first twenty years of the 20th century, the city began to occupy territory outside the Medieval walls. The creation of the historical fabrics happened in these years with ancient suburbs composed of old industrial sites and working-class neighborhoods on one side and new neighborhoods characterized by the presence of high-quality mansions for the wealthy on the other side.

Since the second half of the last century, Brescia development has gone through several phases. Between the 1950s and 1960s, the territory witnessed a rapid growth of urbanized areas where city development was marked by the presence of numerous industries, linked mainly to the metallurgical sector. The presence of these economic activities participated in attracting many inhabitants from the countryside. In this phase of expansion, the number of inhabitants grew considerably, and the city also saw a strong increase in its size. In that period, many working-class neighborhoods, characterized by low quality popular economic constructions, arose.

The second phase of urban development took place between the 1980s and 1990s. In this twenty-year period, due to the processes of globalization and the dislocation of productive activities, the urban territory lost appeal. Many industries abandoned the city creating huge voids within the consolidated fabric. Even today, in terms of size, those voids have an important specific weight and are a cause of environmental and social problems. In this phase of dispersion, it was possible to observe a shedding phenomenon in which the inhabitants preferred to live outside the consolidated urban fabric. This brought a reduction in the number of residents within the administrative center, while, in parallel,

there was growth in the neighboring municipalities. This dispersion led to the significant consumption of environmental and energy resources, such as large portions of free territory that were urbanized and subtracted from agriculture use. In order to serve these new settlements, it was necessary to build and maintain infrastructures that were increasingly large.

The third development phase was from the beginning of the new millennium until the 2008 economic crisis. In those years, there was a progressive conurbation of the various settlements gravitating towards Brescia, and the number of inhabitants slowly began to grow again (Figure 12).



**Figure 12.** The urban development process in Brescia. Different thresholds of soil consumption linked to demographic trends in Brescia (upper graph) and demographic variations (lower graph) in Brescia (orange), Brescia Province (light blue) and Lombardy Region (blue).

In 2016, the Brescia Municipality approved the general variation of the land use plan (Piano di Governo del Territorio or PGT) in which a new way of development was defined. The municipality wanted to promote a qualitative growth of the city instead of a quantitative one [28]. To achieve this, the growth of the city was grounded on two pilasters: avoiding free soil consumption and fostering urban regeneration [25]. This strategy has the goal to respond to the demand of services and residential areas not by urbanizing new land, which is considered as important and finished resources, but by using urban voids that are in strategic positions inside the consolidated city [28]. In this strategy, existing neighborhoods are provided with new services, existing open spaces are redeveloped and links between different parts of the territory are strengthened with the creation of clean mobility infrastructure and the enhancement of public transport lines. All these actions are in the direction of creating a high quality of life inside the city. This is intended to make the settlement more attractive for residents, tourists, and stakeholders.

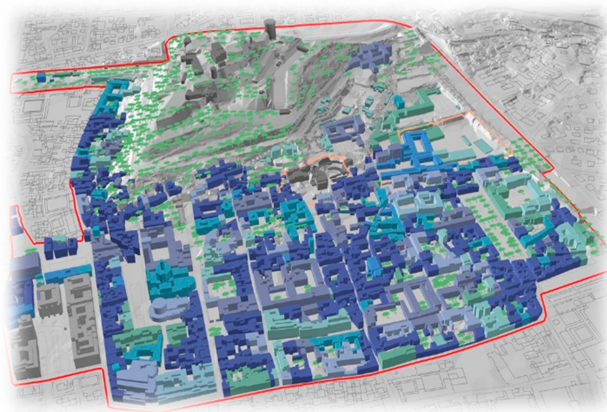
To achieve this goal, the PGT 2016 contains a deep analysis of the historical areas composing the municipality. For every one of these sites, there is an analysis of the buildings highlighting the typologies and the architectural value. To the latter aspect are linked a series of admissible interventions and guidelines for private owners who want to operate on the asset.

#### 4.3.1. The Archaeological Urban Park

One of the first actions promoted by the municipality, in common agreement with the Archaeological Superintendence, was the process to create an archaeological urban park that embodies the existing archaeological sites of Roman and Longobard origins and the castle on the top of Cidneo hill. This new park is located in the eastern part of the Brescia urban core and is composed of archaeological evidence and historical monuments dating back to different ages, such as the Santa Giulia Museum with evidence from the Roman ages and Medieval times, the Loggia Palace realized during the Renaissance, the two Cathedrals and other important churches and palaces (Figures 13 and 14).



**Figure 13.** An overview of the case study area in Brescia.



**Figure 14.** The project for the Archaeological Urban Park extension.

Close to these monuments are minor historical buildings with a low architectural value, and many of these are residential houses that are still in use. It is possible to talk about the archaeological urban park as a diffuse park because monuments are spread all over the examined area and they are linked by a network of streets (for the most part of Medieval origin), little squares, and piazzas [10]. The majority of the monuments and constrained valuable buildings are public properties; however, there are plenty of palaces and other minor historical assets that are private. Public intervention can enhance and renovate open spaces, can promote policies of urban redevelopment, and can develop guidelines but cannot force owners to begin redevelopment procedures.

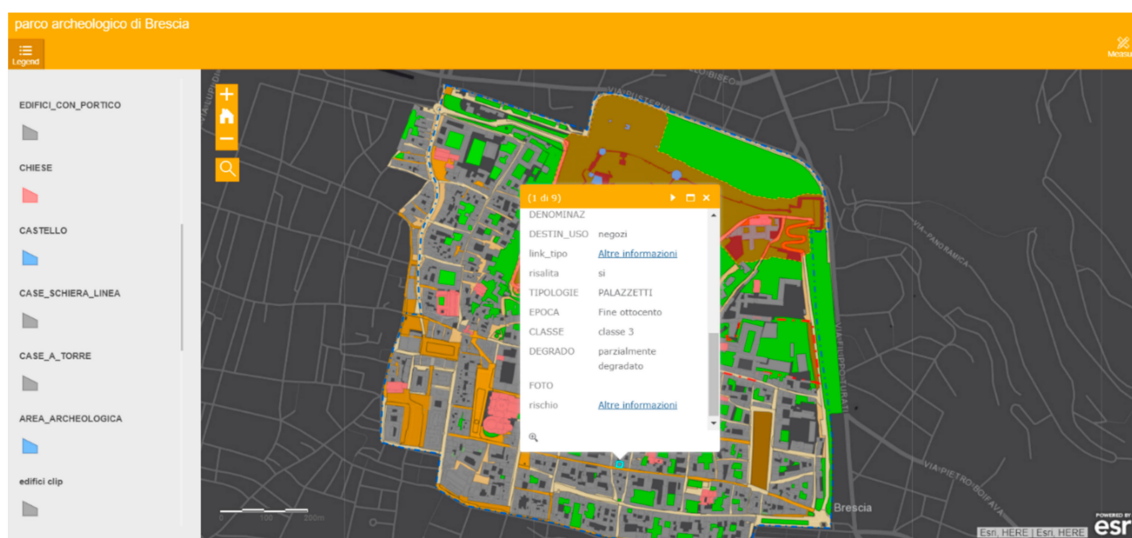
Activating private resources is one of the goals of the creation of the archaeological urban park. Strengthening the network of monuments and squares and developing a system of local services is one way to promote the site with the optics to reactivate local economies and create a system of tourism based on cultural resources. Another way to boost stakeholder interest in the site is to develop common guidelines for operating on the asset. The method adopted to develop those guidelines was

grounded on the features of the asset. To analyze the case study area, it was necessary to create two databases: the first one referred to open spaces, and the second one considered buildings subdivided into typologies.

#### 4.3.2. The Implementation of the Lombardi Filing Methodology for the Analysis of the UNESCO Site in Brescia

Analyzing open spaces allows the determination of where services are and how people move inside the park. Analyzing buildings allows us to understand the main features and to create a compatible strategy for their enhancement. Thanks to GIS software, it was possible to spread data with designers to share knowledge and create coherent projects and with users to let them to know what kind of monuments are in the park, where they are, and the best paths to reach them [10,29,30].

The strategy to enhance historical buildings is grounded on two different levels of analysis. The first level is more related to urban planning and refers to a lower scale level of detail, while the second level is more linked to conservative restoration and is carried out at a higher scale. The role of GIS is to link these two levels to create a database in which are mapped not only the features that are useful to build the strategy but also the minute interventions at the architectural scale. The use of a georeferenced database allows the addition of links to external documents that contain detailed pictures of damaged elements and sheets that explain how to operate (Figure 15).



**Figure 15.** The online map of the Brescia Archaeological Urban Park. Data are linked to the mapped object and are presented through popups.

For the analysis of the Brescia UNESCO site, and its potential urban development, the filing methodology developed by Giorgio Lombardi was used; however, the use of the GIS software allowed us to implement linking in the database for certain multimedia content, which explains the relationships between buildings and open spaces and, above all, the relationships between the historical assets and users.

We, thus, argue that the methodology developed by Lombardi found a deep application for the ex-ante analysis of the possible effects of the enhancement of a portion of the ancient city. The quantification phase allowed us to map the characteristics of the urban environment. This was the starting point for the subsequent analysis of the socioeconomic matrix that characterized the case study area.

From the intersection of the data on the physical and social characteristics, it was possible to create digital databases, viewable online, useful both for promoting the use of the site from a tourist point of view and for the definition of operational guidelines for the maintenance and enhancement of the



architectural heritage. This made it possible to develop different scenarios in which the protection of the assets that most characterize the site are at the basis of the development of the area.

The tourist promotion of the site is the cornerstone on which the development of public–private partnerships is based as public investments for the enhancement of the site help to make it more attractive and the greater number of users can be a lever capable of stimulating private operators to intervene in accordance with the guidelines developed starting from the filing phase. Therefore, in the case of the UNESCO site of Brescia, the enhancement of the architectural heritage is a grounding for urban regeneration policies with long-term effects capable on the one hand of moving even private resources and on the other of providing the administration with the tools to capture the added value that private areas assume when the site takes on a new centrality. All these resources can help finance the process itself and contribute to the creation of better urban quality.

#### 4.3.3. Via Milano Recovery Plan

Exporting the urban core means that the strategy employed to enhance cultural heritage in the city center was used to study and define a strategy for minor historical sites as well. In particular, PGT 2016 identified the site around via Milano as strategic for the development of the city, [28,31]. This site is located on the western side of the urban core and creates the primary access to the city center for people coming from the western parts of the city and from the countryside (Figure 16).



**Figure 16.** A scheme of the strategy to enhance the via Milano area.

The area of the object of study concerns three districts: Fiumicello, Porta Milano, and Primo Maggio, with a resident population of about 15,000 inhabitants and is composed of several elements of historical importance. The Fiumicello district was developed around the ancient nucleus of the same name and includes the historical fabric of via Milano as well (Tiboni and Botticini, 2019). This fabric constitutes the first expansion of the city of Brescia outside the medieval walls at the end of the 19th century and is characterized by the presence of production sites that have many elements of industrial archaeology, while much of the important areas have been dismembered or disposed of. The Porta

Milano district is characterized by the presence of different historical fabrics with distinct typological and morphological characteristics.

These first two sites have a main industrial vocation, and, over time, they evolved to host many working-class neighborhoods. The last district is Primo Maggio, which has a main agricultural vocation, visible through the many historical rural houses that compose the site. Over time, the area grew with many working-class neighborhoods.

The municipality desires to redevelop this site because, due to the evolution process, today there are many former industrial areas that now are unused and are located close to the main infrastructures. Due to delocalization, many industries moved and left the original site with a host of environmental and social problems [31].

The municipality decided to begin an urban regeneration process at this site promoting the creation of new open spaces and new services and boosting private interventions to redevelop buildings under the architectural efficiency and quality point of view. This strategy of redevelopment of a peripheral area also had the support of the National Government, which is financing part of the works in progress, thanks to two different calls for financing, in which it asked to competitors to produce projects for the regeneration of the deteriorated urban areas, considering not only the physical structure but also the social matrix. The projects that won the call aimed to produce urban quality and to achieve the goals indicated by the United Nations through the design of open spaces deeply linked to the analysis of the people that live in the area. This is an important aspect because the process of urban regeneration, called “Beyond the Street”, is based on participation and fosters social inclusion and security through the creation of areas that are appealing under the architectural aspects [31].

#### 4.3.4. Ex-Ante Assessment for Via Milano

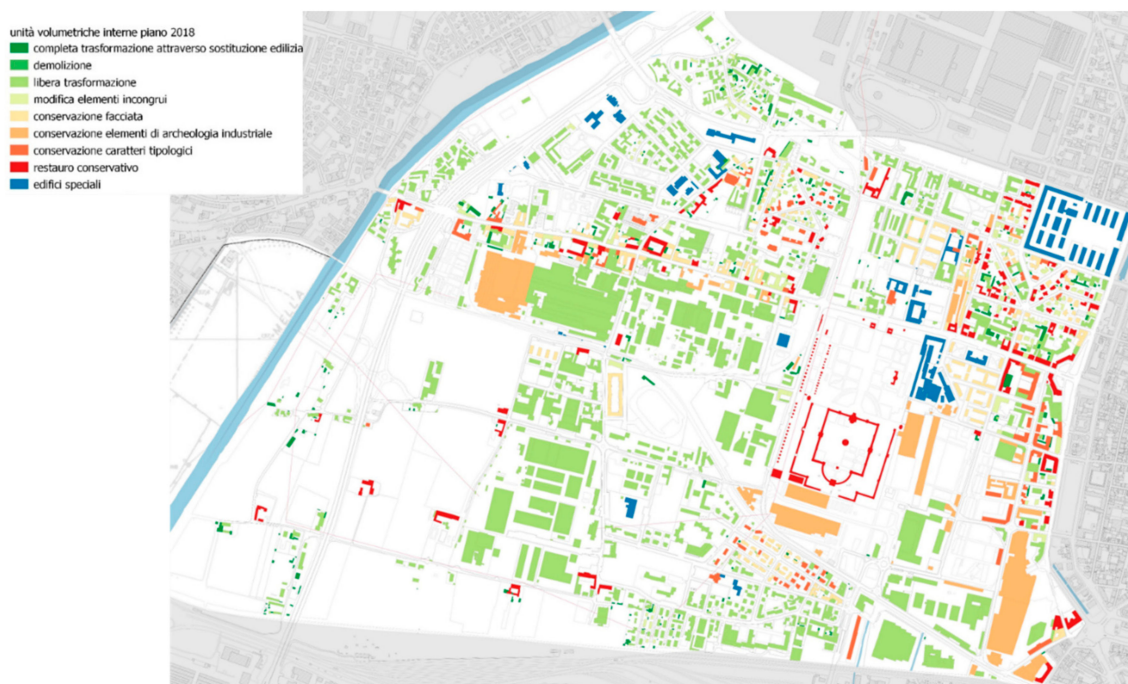
The analysis of the process happening in Brescia is based on the provisions contained in the final projects of the works, which have the goal to change the urban framework of the city to create a better life quality in urban areas. Using GIS software allows us to compare different scenarios to compare different ways in which resources can be used [32]. These ex-ante analyses were developed for the case study area of via Milano regarding the different aspects of the site, such as the demographic trends and the effects of new infrastructures for clean mobility and open spaces on services and local shops.

The first step of the analysis was to define indicators to define how land use can change if a certain type of urban provisions is realized. To achieve this goal, it was necessary to define a scenario 0 that can show the land use before projects’ implementation; then, it was possible to measure the indicators after modelling different future scenarios.

For the via Milano case study, one of the goals of the municipality was to promote and to boost local shops and services system through the enhancement of historical assets (Figures 17 and 18), such as the elements of industrial archaeology, which are now unused. To reach this objective, we analyzed different elements, such as the features of the built environment. This step is linked to the scheme developed by Giorgio Lombardi [5] and allowed us to identify the sites that can host new strategic functions or economic activities, people, and services distribution on the whole site and the infrastructure system with special attention to the clean mobility network.



**Figure 17.** A map from the via Milano recovery plan in which the architectural value is highlighted.



**Figure 18.** The admissible interventions map.

An example of this study is the analysis employed to define the features of the former Caffaro industrial site, which has buildings from the end of the 19th century and covers an area of about eleven hectares (Figure 19). Today, this area is a large empty space in a strategic position: it is in a very crowded area in which there are more than forty nationalities, and it is a potential link between the northern part of via Milano area and the southern neighborhood of Primo Maggio. The site is also close to high capacity streets, such as the western bypass. This site has the potential to achieve the municipality's objective even if deep soil remediation interventions are necessary.



**Figure 19.** Historical assessment of the asset composing the Ex Caffaro industrial site. A map from the via Milano recovery plan.

Once potential containers were found, an analysis of compatibility was developed. This allowed us to understand whether there were buildings with historical features compatible with the new uses. For this, it was necessary to link the results highlighted with the analysis explained in Section 3 regarding historical value.

The next step was the analysis of the possible outcomes related to the services implementation in historical areas. To define this point, it was feasible to operate on three main factors: people distribution, closeness, and accessibility. These aspects are linked together with the network analysis. This is a useful tool to access the possible future outcomes and externalities related to an urban policy. This analysis was based on defining the areas of influence of an economic activity and allowed us to understand the main paths that users can take to reach the examined service.

Once the catchment area was defined, it was possible to analyze the social structure inside. This step allowed us to understand, in relation to the total possible users that live inside the examined area, the percentage of people that lives within walking distance from the service or the local shop.

## 5. Main Results

The analysis described above allows for the development of reflections that can be divided into two main macro-topics: the first is the comparison between the ex-ante analysis and an ex-post analysis methodology. In particular, with the ex-post assessment it was feasible to understand how resources were directly employed within the mechanisms of generation of value and what strategy was adopted by local bodies to capture this value.

From the analysis of both case studies, the enhancement of a site of historical interest, such as an UNESCO site, has repercussions on the wider urban fabric generating benefits not only in the historical areas that are valued but also on the surrounding places. These benefits fall within the scope of greater visibility of the areas and better accessibility and, consequently, the entire site becomes more attractive for both tourists and investors, generating widespread economic benefits.

The analysis showed that a careful study of the architectural, typological and morphological characteristics allowed for the determination of a compatible intervention strategy to enhance the historical assets and to promote the administration's strategies at the same time. This policy was grounded on creating the conditions for sustainable development of the site based on the characteristics and peculiarities of the site itself as desired by the European guidelines for the conservation and enhancement of the historical and artistic heritage.

The Portuguese case study can also be taken as a reference for the Italian process as the strategies that the Brescia administration began to use in the last few years relate to, in principle, the choices that contributed to transform the urban core of the city of Porto over the last twenty years.

The developed methodology showed how the use of GIS software can help in defining an intervention strategy. This defined two aspects: the database with the characteristics of the heritage, in agreement with the Giorgio Lombardi filing techniques, and the comparison between possible scenarios. Regarding the first point, the use of GIS allowed us to comprehensively evaluate not only the characteristics of the monumental assets but also the entire urban areas that make up the historical fabric, also taking into consideration the assets of minor importance whose enhancement is, nonetheless, fundamental for the involvement of private operators.

For the Italian case, the use of the GIS software made it possible to analyze the results of an urban regeneration process for a minor historical fabric faced with the same methodology that has been outlined and consolidated over the years for the protection of historical centers. This methodology was "exported" to a more peripheral area but characterized by the presence of elements of industrial archaeology.

In detail, the use of GIS and web-GIS software helped to understand the link between the resources and outcomes, and this point is at the base of the assessment analysis of the effects of the processes. The creation of the database, within the quantification phase supported the development of the indicator system required to compare and systemize the different interventions. The transformation process was based on two factors: improving the quality of the built environment and the quality of life of residents through the definition of guidelines for the efficiency of the building stock and through better accessibility to neighborhood services and first necessity shops.

The analyses outlined the features of the areas to develop a compatible strategy. The use of the indicator system allowed us to understand the strengths and the weaknesses of each case study. Through the network analysis, we determined the necessity of intervening on two factors with the aim of developing a system of soft mobility. These two factors were making activities more accessible through the strengthening of pedestrian paths and improving their proximity by distributing them in a more homogeneous way on the territory.

The aim of the via Milano case study was to demonstrate the thesis of how the enhancement of the historical fabric is an opportunity to promote urban regeneration policies capable of activating private resources. The Porto case study is a confirmation of this thesis because, being in a much more advanced stage, it demonstrates what the effects of these policies can be.

The activation of private resources introduces the issue of the generation and capture of value because, as mentioned in Section 2.2, the public initiative generated an additional value for private areas, and, for this reason, it is legitimate to capture part or all of this added value.

The first direct capture mechanism is provided by the taxation of private operators. The taxation mechanisms differ from country to country and according to the specific negotiating agreements that are entered with stakeholders. The capture of the increase in the land value can be defined as the capture of the tangible value. The second value capture mechanism concerns more intangible aspects, such as the better quality of the area that is obtained at the end of the process.

The consequent activation of private resources helps to make the building stock more efficient and, therefore, to reduce energy consumption and to better use resources. The private contributions also make it possible to install a greater number of territorial facilities. These actions can be translated

into economic benefits for the public body that manages the process, which, in turn, benefits both directly and indirectly from the externalities of the process.

## 6. Conclusions and Further Developments

This article and the introduced methodology are part of wider research to assess the effects of diffuse urban regeneration processes. This is not an ending point but, instead, is the first step in the direction of defining indicators that can describe how interventions can change land use and impact on the quality of life. This research intends to contribute to measuring the land use efficiency: a front that has the aim to understand the relationships between the employed resources and final benefits through the assessment of different scenarios [20,21,33].

This article focuses on the indicators related to service distribution on land and their accessibility; however, it is feasible to assess indicators that support the United Nations' Sustainable Development Goals in a holistic way [8,9]. In particular, the main purpose of this kind of research is to define the highest and best use of land to achieve a sustainable use of resources. Thus, it is feasible to say that indicators can be grouped into environmental and socioeconomic (including indicators related to services) types.

Finally, it is arguable that different projects that aim to solve different issues have different effects on land use and land resource employment but that every action contributes to create a better quality of life. Different contributions can help in solving problems related to residential conditions, mobility issues or microclimate problems; however, even if externalities are different, there is one common aspect: they all foster the creation of public value. Specifically, public value can be chosen as a common index to compare different projects and scenarios [4,17] that have diverse goals pursued by urban planning actions that can be grouped into the three dimensions of sustainability [8,9].

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