



# Urban Regeneration for a Sustainable and Resilient City: An Experimentation in Matera

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**Abstract.** In urban policies, Italian and European, the urban regeneration of residential districts, especially suburbs built in post-war urban expansions, has been a crucial question since the 1990s. An integrated approach is now essential for effective urban redevelopment programs, which consider not only architectural and urban, but also social, economic, naturalistic-environmental and cultural aspects, in order to return dignity, identity and centrality to the marginal areas that today express tangible and intangible forms of urban unease. The development in recent decades of innovative tools such as complex programs, social housing, therefore, marks the transition to a new way of urban planning, characterized by a different approach to urban and territorial policies, aimed at integrating a plurality of functions and typologies of intervention and that contemplates the possibility to involve private operators and private financial resources for the realization of public works. The paper presents a case study as a best practice approach to urban regeneration.

**Keywords:** Urban regeneration · Sustainability · Resiliency · Housing market  
Profitability of the investment

## 1 Introduction

The great urban expansion in the years of the post-war boom has generated in many cities a building product that today is characterized by a serious situation of urban blight. This condition is often accompanied by socio-economic decay, which to some extent can be considered an effect and cause of the former. The answer to the post-World War II housing demand, determined primarily by population growth, was mainly quantitative, with little attention to the quality aspect of the building. This has generated mostly peripheral built areas without adequate urbanization works and essential services. Moreover, the majority of those buildings were built in reinforced concrete with the use of materials and techniques that currently, even for the changed awareness of the risks, would not be eligible and that make the building stock, in the areas prone to seismic risk, very vulnerable. This is compounded by the degradation of many of these buildings caused by the absence of normal maintenance, which has amplified the effects of time on poor projects and poor quality materials.

It is known, both in Italy and in Europe, the existence of a considerable percentage of residential buildings that has now exceeded the performance efficiency limit, both due to the widespread obsolescence and the lack of maintenance interventions, necessary to fight the unstoppable degradation process. The 15th General Census of Population and Housing (ISTAT 2011) highlights that 70% of residential buildings are older than 30 years, while 55%, over 40 years of life, the limit beyond which substantial interventions of maintenance are indispensable.

This is a patrimony of about ten million homes, which does not respect the technological qualities required today for a building and that, due to its advanced aging, risks losing part of its economic value. Many of those suburban residential districts built in post-war urban expansions are today characterized by building obsolescence, physical and psychological isolation from the city, abandonment and degradation of the spaces outside the houses, single-function (dormitory).

The described constructive and urban characteristics that regulated the construction of residential real estate, from the post-war period to the early 80s, today characterized by physical degradation and obsolescence often accompanied by socio-economic depression, have imposed a reflection on the opportunity to intervene on the built, with redevelopment strategies adapted to real needs.

Urban regeneration has become a crucial question in current Italian and European urban policies [1]. A new approach to tackling the issue is fundamental, capable of developing both physical (construction or urban) and social and economic actions.

Another fundamental factor that generates a growing concern both in Italy and in other European countries and that decisively pushes planning towards forms of urban regeneration is the consumption of soil. For example, Germany has set the goal of reducing to 75% the current land consumption by 2020; the United Kingdom has implemented a series of actions ranging from the establishment of *green belts*, to the priority recovery of *brownfields*, to the adoption of minimum density limits for areas of new urban growth.

The second paragraph describes the principles that underlie a correct and sustainable approach to urban regeneration. In the third part with reference to a case study, a simulation of a process of urban regeneration was carried out to verify the feasibility and sustainability of complex interventions through the partial demolition and reconstruction of the existing obsolete building stock of which energy retrofit and the structural and functional renovation is not convenient.

## 2 Model of Sustainable Approach to Urban Regeneration

There is a strong link between urban regeneration and sustainable development. Some researchers have tried to measure the sustainability of urban regeneration processes [2–5]. In literature, there are many attempts to conceptualize urban regeneration sustainability in different contexts [6–8]. Respect for the criteria of environmental, social and economic sustainability is fundamental to regeneration processes. Urban regeneration is a comprehensive integration of vision and action aimed at resolving the multi-faceted problems of deprived urban areas to improve their

economic, social, and environmental conditions [9]. In fact, an effective urban regeneration process is based on compliance with the criteria of environmental, social and economic sustainability. Environmental sustainability must be pursued through strategies that can act on the transformation of urban spaces, reducing land consumption, increasing the resilience of existing real estate assets or reducing their vulnerability to natural events or environmental changes. The notion of resilience is rapidly gaining ground in the urban sustainability literature [10, 11]. The urban resilience has been defined as “the degree to which cities are able to tolerate alteration before reorganizing around a new set of structures and processes” [12]. The natural disasters that hit the cities of central Italy in the last decade and the consequent awareness of the vulnerability of human settlements make resilience a fundamental question in the planning for future of urban lands.

Social sustainability [13] can instead be fostered by actions that aim at social inclusion, that is, the coexistence of social classes of different economic capacities, through a mix of properties sold and leased with financial contributions to families [14], avoiding recognizable differences between buildings made by private companies and public buildings.

Finally, economic sustainability can be achieved through the planning and execution of urban regeneration based on concertation and partnership forms [15–17]. The spread of negotiation practices through the involvement of private investors in the implementation of social housing projects and in the renewal/redevelopment of existing assets and the use of specific financial and fiscal instruments [18, 19], can guarantee the success of urban regeneration processes.

The introduction of a reward system, financial incentives and tax relief tools has triggered a growing participation of private individuals in the complex transformation processes of the cities: real estate investors, banking and insurance institutions, non-profit companies, social sector operators. These subjects actively cooperate through forms of partnerships often activated from below, aimed at the construction of shared paths of physical, social and economic development. Please note that tools and policies aimed at involving private capital are essential to respond to the current housing disadvantage that often invests families belonging to the so-called “grey belt”, whose income is too high to access public housing policies, financed exclusively with the use of now very limited public resources.

In order to achieve sustainable development, public-private partnerships need to move beyond the realm of narrowly defined economic development to encompass social and environmental aspects that eventually have impact on economic development.

In cases where the expectations regarding the increase on value of land deriving from forms of urban regeneration that include demolition and reconstruction interventions are not able to generate a surplus with respect to the existing real estate, the hypothesis of the city’s destruction seems unlikely [20]. Instead, an intervention, more selective, aimed at enhancing the existing building capital is feasible. The value of the existing city, linked to its still unexpressed development or to the residue of what is still contained in the buildings, becomes crucial in order that the sustainability of urban development to be transformed into sustainable economic processes. Otherwise, the abandonment of obsolete urban lands and the exploitation of new lands is a rational choice in the absence of economically sustainable alternatives [21].

The implementation of urban regeneration also deals with operational problems that often cannot be overcome. For example, those neighborhoods built in the post-war years, which today have reached an important level of obsolescence, have fractional properties that are not homogeneous in terms of intentions and strategies, whose recomposition must certainly be considered complex and financially burdensome. Even when a developer were to purchase the property of a plurality of owners, he should bear all the costs related to recomposition of properties. In the case study this problem, for reasons of simplicity, was not considered but obviously significantly affects the conditions of legal and managerial feasibility of reconversion processes of areas of the existing city.

### 3 Case Study

#### 3.1 Area Description

In order to assess the feasibility of urban regeneration that also includes interventions for the replacement and reconstruction of the existing building, research<sup>1</sup> has been carried out with reference to the concrete situation of an urban area of Matera in Basilicata.

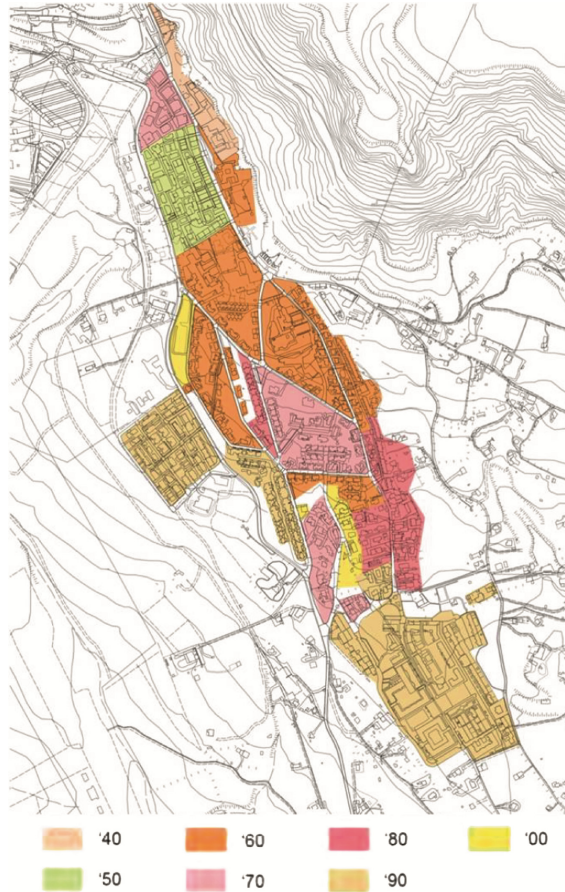
This urban area considered (Fig. 1) is in the southern outskirts of the city and includes the neighborhoods of “Cappuccini”, “Aagna”, “La Specchia”, “Aagna Le Piane” and “San Francesco”. The total population settles amounts to about 6,000 units. The experimentation started with a cognitive analysis aimed at getting to know the structure and conditions of the territory and related social problems. The field analysis highlighted the presence of poorly exploited places and empty urban spaces, within a settlement often characterized by urban, building and social decay.



**Fig. 1.** Area under study

<sup>1</sup> The research started from the study developed by Alessandra Patti as part of the degree thesis in Building Engineering-Architecture at the University of Basilicata.

The urban environment under examination (Fig. 2) has developed since the Second World War, based on different interventions. First - at the turn of the '40s and '50s - an intervention of “spontaneous urban planning” with the construction of the Cappuccini district and then with the semi-rural village of the Agna district, built in the 60s, as part of the rehabilitation of the Sassi, and characterized by isolated single and two-family house with backwaters.



**Fig. 2.** Stages of growth of the Agna-Le Piane settlement in Matera

In the '80s and '90s, the urban area, in implementation of the Land-use Plan of 1975, was expanded with the construction of a public housing project – which partially densified the existing residential fabric with the construction of aligned buildings or with courtyards, inserted in the wide meshes of pre-existing semi-rural gardens – and with the construction of a new church and annexed buildings.

In the '90s, in Agna Le Piane, a new district of public housing was built, characterized by an aligned buildings system, distributed around large condominium courtyards that

gravitate on a large central public space, today still poorly equipped. At the same time a private parceling out was created in the San Francesco district, on the edge of the Montescaglioso road, with multifamily residential buildings and without any provision of public facilities and spaces.

The extra-urban space has great environmental value characterized by the presence of a rocky and spontaneous vegetation; the southwestern margin was partly affected by the proposal of the “Integrated Program” (IP) called “Housing città dei Sassi”. The area covered by the IP, of about 53 hectares and whose perimeter is implemented by the new Town Planning Regulations not yet adopted, includes the suburban agricultural area, now abandoned, owned by the Matera ‘90 company, and degraded urban areas or underutilized public property (Fig. 3).



**Fig. 3.** Area involved in the Integrated Program called “Housing città dei Sassi”

The IP aims to improve the urban-building quality of the southern outskirts of the city by increasing the housing offer of the district and strengthening the endowment of essential services and infrastructures in order to guarantee a high level of mix functional to an area that, for the position, is strategic for the regeneration of the entire city. The IP takes advantage offered by the “Piano Casa”, approved by the Basilicata Region, and transforms the social and private housing project into an opportunity to promote a more rational urban structure of the southern suburbs of the city, through the creation of new infrastructures and services, both on a neighborhood level and on an urban-territorial level. A fundamental element of the program is the public-private partnership, which sees the cooperation between the Matera ‘90 srl, as private investor and owner of most of the areas involved, and the Matera Health Authority (MHA) as public subject.

The contents of the IP are divided into five lines: (1) infrastructure and parking, (2) public and/or public services and commercial functions, (3) sports equipment and green spaces, (4) social housing (Fig. 4), (5) private residential construction. Moreover, in the southwestern edge of the area, the enhancement of the Jazzo Gattini and the Masseria San Francesco and the construction of a large public park, called “Parco San Francesco”, are proposed.



**Fig. 4.** Rendering of the social housing project planned by Integrated Program

At present, the restoration of the Masseria San Francesco is completed, which is an important element of attraction, welcoming and promoting local tourism. In 2015, the construction work for the social housing was started, while the next planned intervention is the construction of a House for the Elderly.

### 3.2 Problems Highlighted

Despite the quality of the numerous design choices, the IP presents a great limitation: it deals only with areas owned by the Matera '90 srl. There has not been the will and the ability of the municipal administration to develop a reflection on the entire urban area south of the city to promote a more general process of urban regeneration of this part of the territory. The surveys and analyzes conducted for the entire urban area have highlighted, in fact, the presence of an urban structure characterized by the lack of infrastructure, public and private services and public aggregation spaces, as well as by a non-homogeneous urban pattern resulting from disjointed summation of uneven urban episodes. The work of preliminary knowledge, also supported by the administration of questionnaires to a significant sample of the residents, represented the basis for developing a process of interpretation and evaluation of the context after which the main problems and, therefore, the objectives and the strategies to pursue to start a widespread process of urban regeneration were identified. Problem framing in urban regeneration is pivotal to understand urban regeneration strategies [22].

### 3.3 Solution Proposed

The vision proposed in this research is the development of a process of urban regeneration characterized by a building and urban planning operation of composition and completion of the different parts of the settlement system. The project proposal - starting from the redefinition of some choices of the Integrated Program approved but not fully implemented – aims to outline an organic urban planning configuration, including, in addition to the areas covered by the Integrated Program, also the areas not yet transformed indicated and regulated by the Urban Planning Regulations, currently being approved.

The proposal, in addition to the completion of the settlement system (involving some transformation areas provided for by town planning instruments), also provides for the demolition and reconstruction of the most degraded buildings in the Cappuccini district. Some previous experiences have shown that positive benefits can be extended from regeneration areas to contiguous relevant portions of the city, and that even a limited number of regeneration areas can produce relevant benefits [23].

This last intervention, in fact, is achievable thanks to the possibility of creating new surfaces fact, on the transformation areas and in addition to those already programmed by the Planning Regulations, with design solutions that respect environmental and urban sustainability. The additional surfaces and adjacent lots will be in the availability of the public administration in exchange for the recognition of building rights to the current landowners to the extent already provided for by planning instruments.

The proposal also concerns some land currently included in the suburban area, already subject to assessments in the past regarding the possibility of partial building transformations; also for these lands – on which there are, however, new limits to the extensive settlement based on a restrained index of conventional building recognized to the owners – through an equalization mechanism, the construction of new buildings to replace the existing ones will be balanced by the free transfer to the Municipality of areas for equipment (in particular, in order to relocate the sanitary equipment already provided for by the IP, and to increase in the urban park).

The urban regeneration proposal reinterprets some design choices of the Integrated Program “Housing Città dei Sassi”, in the light of the opportunity to involve other areas not yet used in the process of transformation and completion of the settlement. The goal is to develop a more rational and functional urban design and, at the same time, respecting the environmental characteristics of the territory. In particular, by distributing the volumes, envisaged by the IP, on a wider territory, significant results can be obtained in terms of lesser impact of the buildings with respect to the landscape features, as well as significant expansions of the urban park planned at the edge of the area.

Likewise, by developing a reflection on the entire urban context under examination, the conditions could create to imagine credible proposals for redevelopment of the urban pattern of the Cappuccini district, with demolition and partial reconstruction and the transfer, in public adjoining areas, of building rights necessary to make cost-effective the replacement of the existing building stock, as shown below.

The Cappuccini district, which covers an area of about 7.2 ha, has developed since the post-World War II years, in an area surrounded by arable land, vegetable gardens



and orchards, through unplanned and spontaneous interventions, consisting mainly of private residential buildings, made of tuff bricks. Over the years, the quality of life in the entire district has undergone considerable deterioration, due to a widespread state of abandonment of buildings and the surrounding urban environment.

The lack of a unitary urban project, in fact, has produced a chaotic development of the district that, today, presents several critical issues both at urban and building level. The lack of services makes this part of the city a simple aggregate of residential buildings, moreover, with questionable characteristics from an aesthetic and compositional point of view, rather than an organized place of common interests and social identity.

The interventions provided for by the Planning Regulations for the Cappuccini district are aimed at reorganizing, improving and/or completing the morphological/functional characteristics of the settlement, in order to give greater identity to the organization of the space through the increase of the services and the green space equipped, the improvement of accessibility and of vehicular and pedestrian mobility, the qualification of public spaces and building. In light of these indications, the demolition and reconstruction of a part of the Cappuccini district was proposed, through interventions aimed at improving the urban fabric, for the most part obsolete and of low value, at redefining accessibility, at increasing of parking areas and open spaces for social gathering.

The project proposal provides for the redevelopment of the existing urban fabric through the demolition of some degraded buildings that present greater criticality in terms of architecture, energy and structure (Fig. 5).



**Fig. 5.** Plan with indication of the buildings to be demolished in the Cappuccini district (red). (Color figure online)

In the area previously occupied by the demolished buildings, the construction of a new system of aligned residential buildings is provided for, characterized by a new

distribution, in order to create an urban fabric with lower building density in favor of open-air social gathering spaces, green areas, currently non-existent (Fig. 6).



**Fig. 6.** Plan of the new intervention proposed in the Cappuccini district.

The realization of a multi-storey underground garage for public and private use under the buildings and public spaces is also planned.

In addition to the intervention on the building fabric, the urban regeneration proposal also provides for the redefinition of the road and infrastructural system in order to reduce the traffic that crosses the district and to improve pedestrian mobility.

Regarding the social and economic sustainability of the proposal, a simulation was carried out which, starting from the evaluation of the demand expressed by many families currently resident. It assumes that a private entrepreneur, to be selected on the basis of a public announcement, proposes to private owners of the buildings, to be demolished and rebuilt, the exchange with a smaller housing unit, but built with new construction technologies and therefore of equal value or higher than the demolished one. To promote this operation, the private investor will have to build a larger amount of residential properties to be sold in the free market, within two areas subject to new construction and completion (which will be acquired by the Municipality, as compensatory areas,

within the equalization district), consistent with the provisions of the Urban Planning Regulations.

In this way, the investor can recover the construction costs of the properties to be sold in exchange for the building to be demolished through the revenues obtained from the sale of the new housing units. In the simulation an algorithm has been defined that allows, once the percentage of building to give to the original owners has been preliminarily fixed, to calculate the amount of surface that the investor must realize and, consequently, the housing units that will be sold in the free market.

Finally, the Internal Rate of Return (14%) was calculated in order to determine the profitability of the investment. The assessment is therefore performed on behalf of the private investor. This is a summary evaluation which, however, takes into account all the possible elements useful for verifying the economic sustainability of potential private operators. The future development of research is the measuring of the economic viability of the operation on behalf of the community through the discount cash flow analysis of all social benefits and costs.

Given the complexity of the proposed transaction, the hypothesis is that an Urban Transformation Company conducts the operation, in which one or more private entrepreneurs, together with other public subjects (the municipality certainly) and private (for example the owners of lands to be transformed), will implement the urban regeneration project.

The Matera '90 company will have an interest in accepting the proposed changes compared to the original approved Integrated Program, and will take care of the implementation of the interventions already defined in the signed Program Agreement. Within the territorial dominion, the private owners of the areas will carry out the interventions relative to their share of housing units and will cede the lands for services and for social housing to the Municipal Administration. The Municipality will take care of all the urbanizations that are not charged to private operators.

The selection of the private operator who will carry out the demolition and reconstruction of part of the Cappuccini district and the new residential volumes, to be sold, on the lands that the Municipality will acquire for free as a compensatory surface, will take place in a public tender.

## 4 Conclusion

The assessment of the social costs related to land consumption and settlement dispersion are the premise for policies that promote the redevelopment of the already urbanized parts of our territory through the reuse of public and private parts [24].

An important issue concerns the ways in which economic operators look to re-use as an investment opportunity and, in particular, if such opportunities for performance can derive from demolition and reconstruction or only from more or less significant transformations of existing buildings [25].

The simulation made in the case study can be a useful example of how to intervene in the existing city, where there are no conditions and economic advantages for the redevelopment and recovery of existing buildings. This case has shown how demolition

and reconstruction of existing buildings can become convenient if placed within an urban regeneration program that involves larger urban spaces than those directly affected, including public property, and a volumetric reward system.

The case study proposes a simulation that, unlike previous experiences, tries to verify the concrete sustainability (social, economic and environmental) of the operation, involving a wider area than the one occupied by the existing buildings to be demolished and rebuilt, limiting the impact of the increase in existing volumes aimed at making urban transformation economically sustainable. The interests and needs that the simulation has tried to balance are of:

- (1) the private owners of the properties to be demolished, which will have to accept as compensation new housing units whose surfaces are equivalent to those resulting from the relationship between the market value of original buildings and the unit price of the new ones;
- (2) the investors who will have to obtain a financial advantage from additional volumes that can be placed on the market;
- (3) the community that from the whole process of urban regeneration can obtain economic benefits (recovery of dignity, identity and centrality of the places) able to balance the social costs (land consumption).

Due to its particular complexity, the proposed operation can be achieved thanks to the collaboration between different subjects that, organized within an Urban Transformation Company, could guarantee, through public and private funding, the feasibility of urban regeneration.

The promotion of an Urban Transformation Company would allow the Municipality to maintain the political control of the initiative and, at the same time, entrust to a public-private entity the direction of all the operations, from the acquisition of the properties to the marketing of the same after transformation.

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