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# Non financial compensation for the redevelopment of the historic urban landscape: the case study of Villasor in Sardinia (Italy)

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## Abstract

In Europe, the debate on the recovery of the historic centres has been developed, over the years, around the balance between conservation and transformation needs in order to meet the new demands of the contemporary world. In the field of urban planning, the strictly conservative and binding approach has gradually been supported by flexible and consensual mechanisms that act as a stimulus to private initiative in the redevelopment and regeneration of the historic urban landscape. The consolidated Italian experience in the policies for the protection and enhancement of historical settlements is being significantly innovated after the entry into force of the Urbani Code, which extends the character of landscape heritage to the historic urban fabric, transferring to the regional authorities the task of establishing the specific regulations for its use and transformation. The Region of Sardinia has achieved an important role in the implementation of policies for the recovery and redevelopment of the historic centres identified by the Regional Landscape Plan (RLP). The common and consolidated practice is still characterized by the use of traditional regulative instruments, in particular the detailed plan, which provide rules for the requalification of the compromised urban fabrics through a set of rules and guidelines to be applied to the replacement of recent buildings and the renovation of urban patterns that for density, ratios between solids and voids, heights, alignments and elevations are incompatible with the values of the context. The constraint and binding approach is effective in the conservation strategies but often inadequate to implement actions of integrated redevelopment of urban fabric altered by new buildings in contrast with the historic urban landscape features, also due to the global crisis situation and the shortage of public funding. The paper proposes the use of the non-financial compensation tool, based on the granting of bonus development rights to realising on site or in alternative locations, in order to encourage urban regeneration projects that also involve the replacement of buildings incompatible with historical urban landscape morphological patterns. The integration of a methodology for assessing the financial feasibility of the demolition and reconstruction of the incompatible structures in the planning process, as tested in the case study of Villasor municipality, has allowed the elaboration of a model to support the use of a compensation mechanism for the redevelopment of historical settlement values. In this perspective, the paper aims to investigate the opportunities provided by market-oriented and flexible approaches to support and promote private urban regeneration projects. In particular, it illustrates the experimental results of a methodology for the analysis of the urban fabric that takes into account the factors influencing the feasibility of the intervention of demolition and reconstruction of the incompatible buildings. Finally a model for the

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assessment of any bonus in terms of additional building capacity is suggested, to be granted to private operators as an incentive to ensure the cost-effectiveness of the project.

**Keywords:** Historic centres, Redevelopment, Feasibility, Detailed plan, Landscape planning

## Introduction

In the second half of the Nineteenth century, the rapid urban growth and the real estate speculation have compromised the historical parts of European cities. In Italy, since the 1960s, a greater awareness of the uniqueness and value of ancient sites fostered the evolution of the normative and technical framework according to the need to extend the protection from the single monumental building towards the urban scale that includes parts of complex and stratified fabric, without a particularly relevant historical value (Bonfantini 2012; Clementi 1990; Colavitti 2018; Giamb Bruno 2007; Wallach 2000). The Italian culture on the urban renovation, as clearly expressed by the Gubbio Charter and promoted by the National Association of Historical and Artistic Centers (ANCSA), has influenced the role of local plans in the physical preservation of the urban environment, involving cultural and social factors in a process of continuity and changes (Bandarin and Van Oers 2012; Rodwell 2007). The research of a universality of approaches and practices has failed due to the complexity of each settlement and to the changeable nature over time of the historic urban landscape, that need a constant update of the planning choices according to the uncertain political and socio-economic conditions (Angiuli 2015; Gabrielli and Gastaldi 2004).

During the seventies, the historic center has acquired a new value as an economic resource, both in terms of financial and social use, which cannot be reconciled with a strictly conservative approach based on the total preservation of historical-artistic features without evaluating its effects on the socio-economic context (Cervellati 1991; Mazzoleni 1991; Tallon 2010). The 1975 Charter of Amsterdam encourages an integrated conservation approach, combining architectural restoration techniques with the preservation and enhancement of the environmental specificities and the local identity (Aristone and Palazzo 2000).

In fact, urban recovery has often overlooked the social and economic factors, focusing on the morphological issues, thus neglecting any strategies for the reintroduction of the historical heritage into the real estate market (Savino 2005). Strict conservative constraints, even in case of a low value built heritage, have often led to abandonment and degradation, violation of rules and illegal construction. Moreover, they have negative impacts on the permanence of manufacturing and commercial

activities and lead to processes of gentrification and modification of urban structures (Indovina and Savino 1997; Semi and Tonetta 2020).

The policies for historical centers are mainly based on the use of the Recovery Plan, a detailed plan that defines the admissible interventions and methods for the conservation, recovery and reconstruction of the existing buildings, according to the assessment of historical and architectural values (Karrer et al. 1998).

The landscape planning season, introduced by the Urbani Code (D.Lgs. N.42/2004), emphasized the role of participatory and consensual activities in the definition of "landscape quality objectives" in the municipal urban planning, by implementing recovery and redevelopment interventions in areas that have been significantly affected or degraded as well as by adopting criteria for the correct integration of new developments in the historical urban landscape.

In the Sardinia Region, that has a long tradition in the recovery of the historic centres, the innovations on the national scene and the adoption of the Regional Landscape Plan in 2006 (Sardinia Region 2013) have not generated changes in the municipal planning instruments used to implement strategies for the redevelopment of historic sites. The detailed plan is still characterized by a strong analytical component, aimed at the recognition of widespread historical and cultural values, and by a framework of conservation and transformation actions that is often defined without an adequate assessment of the financial feasibility and sustainability. Such operations often involve the requalification of settlements that have been particularly compromised by recent buildings for which replacement and reconstruction in a compatible way are expected. Such measures usually find limited agreement from the owners of buildings legally developed in compliance with the urban plans in force and then declared by the detailed plan as incompatible. The plan purpose, which leads to a substantial economic loss to the owner, cannot be realized without fiscal benefits, government grants or rewards that would result in reasonable profitability. For this reason the research investigates the opportunity to apply a market based approach to support this kind of urban regeneration practices. The paper illustrates the results of the research applied to the case study of the municipality of Villasor, in the Province of South Sardinia, through the experimentation of a methodology of analysis and a model for the incentives

assessment, to be integrated in the Detailed Plan for the recovery of the historic centre. The case study selection resulted in a medium-sized municipality, characterized by a low-density urban pattern with large unbuilt areas that increase the opportunities for the redistribution and transfer of development rights. The research is part of the drafting of the detailed plan for the recovery of the historic center, which was carried out by the University of Cagliari in cooperation with the municipality of Villasor.<sup>1</sup>

The municipal initiative to adopt a detailed plan derives from the strict restrictions imposed by the RLP on the construction activity in the historic centres. Without such an instrument, only ordinary and extraordinary maintenance, restoration, conservation and internal intervention are allowed (art.52, RLP). The plan provides a detailed identification and classification of existing buildings based on the age of the construction, the traditional and historic character and the impact on the context (in the case of recent buildings). It also assigns a judgement of historic and landscape value which reflects different degrees of transformability and specific rules for the intervention and focuses on the buildings that are classified by the plan as “new typologically incompatible”, for which actions to mitigate the negative impacts on the landscape are foreseen, where possible. Sometimes it is necessary to completely replace them, according to forms that are coherent with the historical urban pattern and compatible in terms of architectural features, heights and position in the lot. The incompatibility with the historic urban landscape is often due to the building size, which is not easy to solve without a reduction in volume, height or sometimes spatial relocation.

The study aims to provide a theoretical model for the assessment of the factors used for quantifying the rewarding development capacity required to ensure the cost-effectiveness of the redevelopment strategies.

### **Non-financial compensation as a tool for urban regeneration**

In the international context, the use of the so-called “non-financial compensation” is widespread, due to the progressive reduction in the available public funds. It is used by local authorities in place of other regulatory measures to compensate property owners for some constraints or to encourage the realization of the plan proposals (Colavitti and Serra 2017; Serra 2018; Janssen-Jansen et al. 2008; Spaans et al. 2010).

Non financial compensation is traditionally employed for the public acquisition of land, as an alternative to the compulsory purchase. Nowadays it is applied to a wide range of situations in which the public body intended to compensate an owner, for the loss of opportunities or constraint, and opted for additional development capacity instead of monetary compensation (Linkous 2016).

In several European countries (Germany, the Netherlands, Spain, France and Italy) and international ones (United States, Japan, Turkey, etc.) the experimentation of innovative market-oriented mechanisms has started, either in alternative or to support traditional regulatory and authoritative methods. They are based on public-private cooperation and on the concept of transferable and sometimes marketable development rights (Micelli 2011; Serra 2018; Nelson et al. 2012; Thorsnes and Simons 1999; Kocalar 2012).

In the legal comparison of the different Transfer of Development Rights (TDR) experimental contexts, the substantial differences between United States and European Union law should be taken into account. Although both pursue the protection of private property and the prohibition of public purchase without adequate compensation, the role of the Supreme Court of the United States of America in the defence of these rights is stronger than that of the EU Court of Justice, to which the single citizen is not able to refer directly (Ziller 2015).

The level of experimentation of market based tools is directly linked to the different views of property law in the national states. In the European countries that have been influenced by Roman law (e.g. Germany, Spain, the Netherlands and France), the right to the ownership of land is considered as absolute and indivisible. Therefore the potential for future development is a benefit that the landowner acquires on taking possession of land (Booth 2008). In the US context, the Anglo-Saxon concept of property ownership is embodied in a “bundle of rights”, with a clear separation of the right to build (Renard 2007). Also in the UK, the transfer of the ownership rights is partial and rarely definitive, resulting in a set of fragmented rights, rather than an unbundled portion of a comprehensive right. The ownership of development rights belongs to the state, which can impose restrictions through the land use plan, without any compensation (Nadin and Stead 2014; Nadin et al. 1997). Although in Europe the opportunity to development of land is allocated by the plan and considered indivisible from the ownership, the current political debate focuses on the idea of increasing the autonomy of the development right with respect to the ownership of land.

The main difference with traditional monetary compensation is that the administration does not compensate owners in financial terms for the loss of value. On

<sup>1</sup> The experimentation uses the data processed within the research agreement of the University of Cagliari for the drafting of the Detailed Plan for the recovery of the Historic Centre of Villasor.

the contrary, it grants them the right to develop a certain amount of building volume, which can be sold, used on site or transferred to another area suitable for building development, which then results in a financial value (Van der Veen et al. 2010).

In the United States, the broad and well-established experience of the so-called Transfer of Development Rights Programs (TDR) has inspired several applications in Europe. The owners of sending areas, which are subject to restrictions on building construction, can transfer the assigned development rights to the receiving areas, defined by the plan suitable for urban development. An example is the TDR program used to compensate for the financial losses caused by the restrictions on the monumental heritage in the city of New York, part of the 1968 Zoning Resolution, which allows to sell or transfer the so-called air rights of land subjected to constraints to be developed in neighboring properties (Machemer and Kaplowitz 2002).

The TDR methods have evolved over time: from a basic Zoning Lot Merger, in use since 1916, which consists of the simple union of two contiguous lots and the TDR within the sector (Benn and Infranca 2013), to more complex mechanisms such as the Landmark Transfer, a special permit for the sale of unused development rights, granted to the owners of monumental and historical buildings, also allowing a further transfer of the development capacity (Tomlan 2015).

In the city of Denver (Colorado), TDRs have been used since 1982 to compensate owners who voluntarily propose the inclusion of their building in the list of historical and cultural heritage to be preserved. On the same way is the 1985 plan of the city of San Francisco (California), which identified in the urban center 253 properties defined as “architecturally significant”, subjected to compulsory conservation constraints, and another 183 properties classified as “contributory buildings”, because of their architectural, historical and cultural value. The owners of contributory buildings, who voluntarily choose to keep them unchanged, can benefit from incentives in terms of transferable development rights, by subjecting the historic building under an integral conservation measure (Nelson et al. 2012). TDR programs have usually supported environmental protection policies and originally played a marginal role in the field of conservation and preservation of the built heritage, an issue that has been generally neglected by studies (Chan and Hou 2015).

Interesting suggestions for the redevelopment of historical fabrics are also offered by the TDR programs which, in pursuit of environmental protection goals, promote the demolition of existing incompatible buildings in natural and protected areas. Such is the case of TDR

program for Lake Tahoe, whose area includes 207.000 acres of land under the administrative control of several counties in California and Nevada, in addition to the city of South Lake Tahoe. It is a program designed to safeguard the Stream Environmental Zones and other environmentally sensitive areas by transferring unused development rights and removing existing structures located in unsuitable areas. The incentive consists in the allocation of transferable development rights, subject to approval by the local government and the Tahoe Regional Planning Agency.

In the instance of compensation for the demolition of the existing structures, the associated area must be returned to the natural conditions and made permanently unbuilt. Demolition may involve different kinds of buildings, from housing to accommodation, commercial or public services (Nelson et al. 2012). The program creates a local market for development rights that can also be transferred between different administrative jurisdictions, according to the needs of future development of each community. The program is often the only way to obtain the development capacity useful to carry out construction initiatives in the receiving areas, through the support of a TDR bank that helps the interaction between the supply and the demand of development rights in the market (Pruetz and Standridge 2009).

In Europe, the TDR pilot projects, although in an experimental stage, have been aimed at capturing the surplus value generated by planning choices, in the interest of the community, in a perspective of distributive justice and containment of anthropic pressure on the environmental and natural system (Spaans et al. 2011).

An example of European experience of market-oriented approaches and non-financial compensation measures is the Space to Space program in the Netherlands, in the province of Noord-Brabant, which aims to finance, through the TDR, the demolition of agricultural or disused buildings to achieve a high quality level of urban and rural space (Janssen-Jansen 2008).

Proposed by the provincial authority and then approved by the national government, the project involved several financial operators in the creation of a kind of development rights bank (TDR bank) to manage the whole operation, to be realized either autonomously or through the constitution of a partnership. The receiving areas, designated for the use of the assigned development rights, are not previously identified. They are then proposed by the private investor and approved by the municipality, following specific requirements. They can be located in the existing built-up area, on the edge of the urban district or in rural areas specifically designated by the plan.

Also in Italy the use of TDR has been observed in urban planning practice for decades, although only in

2011 a legislative act adopted by the national government legitimized the procedures for the transfer of development rights prescribing the transcription of the related agreements. The option of increasing the development capacity, within the framework of the urban planning regulations, for actions aimed at the realization of social housing, urban and building renovation, improvement of the environmental quality of the settlements, already emerges in the Financial Law of 2008, while today several regional laws have introduced mechanisms for the implementation of the urban plan based on a more or less broad circulation of development rights on the territory. In this direction, it is possible to create a real market for development rights, on a municipal or supra-local scale, in any case geographically limited to the territory on which the authority has jurisdiction in urban planning (Ziller 2015).

The transfer of development rights between different territorial areas requires the use of corrective measures in line with the differences in real estate quotations between sending and receiving areas, particularly if they are not predefined by the plan (Torre et al. 2011).

Recently, such public-private trading schemes have also been proposed for objectives directly related to the regeneration of historic centres in some regions of Italy, including Umbria,<sup>2</sup> compensating owners for the costs paid for the recovery of public and private historic heritage by granting development rights bonus to be developed outside the perimeter of the historic centre (Lazarotti 2010).

The non financial compensation is evaluated on the basis of the project cost, reduced for a minimum of 30%. It represents an economic bonus, properly balanced in the municipal plan according to factors such as the size of the historic centre, the land use, the parking facilities and the real estate prices (Falco 2012). The Veneto Region also recognizes a construction credit for the demolition of incongruous structures, the elimination of the elements of degradation, the improvement of urban, landscape, architectural and environmental quality.<sup>3</sup>

## Materials and methods

The database used for the research is made up of the information processed within the Detailed plan of Vилasor to analyse the type-morphological structure of the urban environment through the identification and analysis of all buildings. The knowledge and project framework of the plan has been managed through a Geographic

Information System (GIS), which allows to analyse the relevant data, to produce qualitative and quantitative surveys on the condition of the urban fabric and to elaborate future projections on the hypotheses of proposed requalification.

The methodology that has been adopted is based on a set of indicators and criteria that, thanks to a high degree of knowledge and awareness of the historical identity of the places, allows to express a common and shared value of incongruities of the recent buildings in the historical landscape examined.

In general, buildings that create imbalances with the surrounding and the global landscape are considered incompatible. These imbalances are shown in the irregular skyline, in the shape and chromatic contrast, in the loss of places identity, in the alteration of the type and size characteristics, in the formal inadequacy, in the density disproportion and in the lack of harmony with the context (Villari 2013).

The paper illustrates the results of the research applied to the case study. In particular, a simplified model has been developed for the evaluation of the financial feasibility of the proposals for building redevelopment or demolition and reconstruction, with or without a reduction in the building capacity.

The detailed assessment of the cost-effectiveness of each project and the option of granting development rights bonus to guarantee its realisation, properly determined for each property in the drafting of the plan, would be difficult for the planner and would probably lead to inequalities in the treatment of private property. Consequently, it is necessary to develop simplified models of evaluation which, placed at the bottom of the planning process, will allow to structure, in principle, a set of redevelopment actions that can be implemented and contribute to the achievement of the desired level of landscape quality.

The studied proposal involves the integration of a methodology for the quantification of development rights rewards for the replacement of incongruous buildings, with the GIS support.

The model for the assessment of development capacity, already codified in a previous work (Colavitti and Serra 2017), is based on the premise that the conditions of convenience of building replacement are linked to the development index attributed to an area, to the ratio between the value of existing and new buildings and to the incidence of the area, which reflects the location qualities of the property and leads to higher profitability conditions in demolition and reconstruction projects (Micelli 2014).

The model introduces some necessary simplifications, by considering that the conditions of the context allow for a coherent redistribution of the demolished volumes

<sup>2</sup> See R.L. 12/08 "Norme per i centri storici" and R.L. 13/09 of the Umbria Region.

<sup>3</sup> See R.L. 11/04 "Norme per il governo del territorio e in materia di paesaggio" of the Veneto Region.

within the same lot, in order to guarantee a landscape-compatible solution, even with a bonus increase in the development capacity assigned. Consequently, the formula overlooks the impact of the area in estimating the development capacity necessary to ensure the economic profitability of the intervention and assumes that the value of the new building is equal to or higher than the existing one and, at the same time, compensates costs of demolition and reconstruction, technical costs, concession charges, overheads, financial charges and business profit inclusive of taxes and duties:

$$Vm_P \geq Vm_E + Kd_E + Kc_P + S_T + O_C + S_G + O_F + P$$

where  $Vm_P$ : market value of the new building;  $Vm_E$ : market value of the existing property;  $Kd_E$ : demolishing costs of the existing property;  $Kc_P$ : construction costs of the new building;  $S_T$ : technical costs;  $O_C$ : licensors charges;  $S_G$ : overheads;  $O_F$ : financial expenses;  $P$ : profit before taxes.

In order to assess the economic feasibility of demolition and reconstruction projects, as well as the cost of the new constructions, additional factors must be taken into account, including the cost of demolition of the existing building,<sup>4</sup> the technical costs of project design and management of the works, licensing fees, overheads and any financial charges and profits. These factors are quantified in this study as 25% of the construction cost although, in the real market, they may significantly affect the outcomes of the operation and require a more extensive assessment than the one proposed, which may differ from the empirical experience.

The process is characterized by a variable complexity depending on the size of the intervention, on the possible transfer of the development rights outside the historical centre, on the time necessary for the project design, authorization and realization. This factors could have also a considerable effect on the fees and interest charges linked to the project financing.

The simplified appraisal of the value of the existing building, using a merit point procedure (D'agostino 2008), is based on the application of a depreciation coefficient, relating to the age and state of conservation of the building, to the market price of the new construction.

The development capacity will be the result of an increase in the existing volume with a premium coefficient  $p$  such as to guarantee the feasibility of the project:

**Table 1 Criteria for the assignment of the depreciation factor  $b$  according to the state of conservation and maintenance of the buildings**

State of conservation and maintenance	Depreciation factor $b$
Excellent	1
Good	0.8
Medium	0.6
Low	0.4
Ruin	0.2

$$p \geq b \left( \frac{v_u}{v_u - 1.25c_c} \right)$$

$b$ : depreciation coefficient for age and State of conservation of the building material;  $v_u$ : market value per square meters of new buildings;  $c_c$ : average construction cost per square metre.

The standard cost for the construction of new public residential buildings, established by the Region of Sardinia, is 906.48 euros per square meter.<sup>5</sup> The assessment of the depreciation coefficient is a key part of the appraisal of the value of the existing building based on the market price of new constructions. In this paper a set of coefficients, related to the data on the state of conservation and maintenance of the buildings identified in the detailed plan of Villasor, is adopted. However, this is an aspect that requires special attention in the planning practice and in the development of further theoretical reflections. For the purpose of the methodology, several tables included in some legislative acts have been taken into account, such as the directive of the Ministry of Public Works of 1949 and the Fair Rent Law n.392/1978, in addition to some formulas conventionally used in the estimation practice and in the handbooks (Cipollotti 2013).

Table 1 shows the criteria used to convert the rating of the state of conservation and maintenance of the real estate assets into a depreciation factor  $b$  that allows the value per square metre of a hypothetical new building to be compared to the specific conditions of the existing building. In particular, it applies:

- $b=1$  in the case of buildings of recent construction and in a very good state of maintenance
- $b=0.8$  for buildings in good state of conservation, usually realized in the last 20 years;

<sup>4</sup> The total cost of demolition of buildings with reinforced concrete and brick-work structure is estimated at EUR 28.85 per cubic metre in 2009 (Regional price list for public works, available at <https://www.regione.sardegna.it/j/v/572?s=1&v=9&c=4365&va=x&esp=1>).

<sup>5</sup> Resolution of the Sardinia Region Department of Public Works 2014.

$b = 0.6$  for buildings in a medium state of conservation, which can be inhabited although they require some maintenance works;

$b = 0.4$  for buildings that are obsolescent and require restoration.

$b = 0.2$  for buildings in a state of ruin.

For what concerns the value per unit of new buildings, on which the appraisal is based, no specific quotations are provided by the Italian Revenue Agency (Agenzia delle Entrate) because the amount of purchases and sales is not sufficient to allow an estimate to be made. Reference is therefore made to the quotations relating to the zone “Central area and historic centre” in the first semester of 2019, which register a maximum value of civil houses in a standard state of conservation of 950 Euro per square meter. The properties traded on the market, to which the quotation refers, are mainly linked to the category of residential buildings in medium conservation state. It is therefore considered that the price of new buildings can probably be quantified with an increase of 30% of this value, i.e. 1200 Euros per square metre.

### **The historic centres in the Sardinian landscape planning**

The 2006 Regional Landscape Plan (RLP) of Sardinia puts under protection the areas characterized by historical settlements, i.e. the development patterns of the historic centres that can be identified from the historical cartography (Art.51, RLP). The boundaries of the historic centres are defined by the Region and checked by the municipality through an in-depth survey of the factors that testify the “historicity” of the urban fabric and the road network (Colavitti and Serra 2013). The RLP establishes rules and specific guidelines to include in the updating of municipal urban plans, before which only interventions of maintenance and conservation are allowed. The adoption of a detailed plan is a requirement for the realization of building and urban transformations. The drafting of the plan includes a detailed survey of the environmental, physical, social and cultural features of the historical settlement, in particular the buildings characteristics, the state of conservation of the historical heritage, the critical issues in progress and the emerging problems of recovery and reuse.

The key principle of the RLP is the innovative approach to the transformation of the historical fabric, according to the current use, with respect for the priority of the context values and the identity of the buildings, even in the case of minor constructions, often affected by degradation, damage or alteration. In this way, the restrictive view of the historical centre as the storage of a range of identity values to be protected is overcome, sometimes

neglecting the process of continuous modification of the historical fabric to adapt to changeable and mutable social and economic demands.

The main objective of the regional and municipal planning tools is the preservation of the historical stratification of the settlement, in order to allow the interpretation of the evolutionary steps of the urban fabric and the enhancement of the distinctive features of each historic centre, including the margins between the adjacent centres.

The widespread changes in the historic fabric, resulting from some recent interventions of new developments or building renovations, often makes it difficult to recognize the historic and identity features, the typological and structural characteristics of the building, the layout of lots and blocks. In this direction, renovation is promoted in the search for the original urban pattern, also through the replacement of incongruous and incompatible parts (art.53, RLP).

The Sardinia Region is particularly interested in the policies for the redevelopment of the historic settlements, aimed at restoring high levels of landscape value to the environmental, historical and cultural context also through the reduction or mitigation of negative impacts generated by the presence of incongruous buildings and works, with no aesthetic value and not integrated into the context, resulting in a loss of identity and quality of places.

The traditional approach is characterized by the use of detailed plans for the recovery of historical centres, in which a comprehensive analysis of the urban fabric is carried out, the levels of transformability are defined and redevelopment projects are proposed by replacing the incongruous buildings that act as landscape destroyers in the historical urban fabric.

The detailed urban plan has the task of establishing a set of regulations to promote the conservation of the residual identity elements and the reconfiguration of the damaged fabric, through building and urban renovation that are coherent and compatible in terms of density, ratios between the solids and the voids, heights, alignments and elevations with the historical landscape context.

New development projects may be planned only in the case of limited addition of new buildings to complete the existing urban fabric, as well as in the case of lots historically unbuilt or affected by the progressive deterioration of the existing buildings. It is possible to demolish, with or without reconstruction, existing buildings regularly authorized but considered incompatible with the traditional character of the historical environment (art.52, RLP). Any reconstruction may take place within the same lot or on a different location. The detailed planning

of historic centres have often failed due to the lack of a strategic vision, the static nature of the regulations and the low profitability and convenience of the investment, which have oriented the private operators towards areas external to the old centre (Wallach 2000).

The structure and the methodology used to draw up the detailed plans are characterized by a strong analytical component to support a strictly conservative approach, which results in a highly prescriptive regulatory framework that restricts the transformation of the urban fabric also in the parts without historical and cultural elements to be preserved.

The detailed plan is ineffective on the imposition of conservation constraints on the surviving historical heritage, but shows unsatisfactory performance in the achievement of redevelopment objectives for the compromised settlements.

The past experience shows very few cases in which the private owners are willing to carry out demolition and reconstruction work of incompatible buildings, given the lack of economic advantages and the voluntary nature of the operation when they are legitimately built. Any approach taken by the planner conflicts with the owner's low agreement. An excessively impositive and rigid approach can paradoxically lead to the maintenance of the status quo and also discourage ordinary maintenance, which results in a deterioration of the building conditions. The feasibility of the planned redevelopment projects is directly linked to the real economic advantage for the private owner, which is reflected in his consent.

The recognition of a financial incentive, that could encourage the initiatives, clashes with the difficult economic conditions of the local authorities. It may be replaced by a volume bonus, consisting in the allocation of development rights, as compensation for economic losses resulting from the intervention, to be used on site or transferable.

At the moment, the recognition of the incompatibility of an existing building is a priority in urban planning practice, without any assessment of the real possibility of carrying out measures to mitigate the impacts or eliminate such environmental negative effects. On the contrary, national and regional legislation allows the increase in building volume, through an exception, even in cases where the incompatibility is due to an excessive size of the construction, giving less importance to the urban scale than to the building one (Colavitti and Serra 2017).

In fact, for the redevelopment of the existing building stock, the Sardinia Region has adopted the national directives by granting development rights incentives, up to 30%, to be used on site for upgrading, extension, demolition and reconstruction of existing buildings (with Regional Law no. 4 of 2009). Such rewards have been

confirmed by Regional Law no. 8 of 2015, which introduces further incentives for the transfer of existing volumes from areas with high landscape and environmental value or hydrogeological risk.

The city council, also upon direct request of the private investor, can grant a bonus up to 40% of the existing building by identifying a suitable location, even within the same zone A (historic centre), if allowed by the urban plan in force.

### **A symptomatic case study: the historic centre of Villasor (Sardinia, Italy)**

The historic centre of Villasor covers an area of about 26.33 hectares, including about 3.83 hectares of streets and squares. The development of the settlement has been historically conditioned by the relationship with the watercourse, that represented a primary resource for water supply and, at the same time, a natural boundary to the expansion of the urban fabric.

The Municipal Urban Plan identifies 46 blocks, within the perimeter of the matrix centre (extensive historic centre), that fall within different homogeneous zones: zone A (restricted historic centre) for 7.55 hectares; zones B0 (Residential completion and restructuring) and B1 (residential internal completion), characterized by a compact urban pattern and immediately close to the old city centre for 14.33 hectares; zones G3 and S (services) for 0.61 hectares.

The composition of the built-up area and the road network of the historic centre is the result of the integration of the basic building units along the main roads and around the civil and religious hubs, according to additive criteria (Baldacci 1952; Le Lannou 1979; Sanna and Atzeni 2009).

The block is the elementary part of the urban fabric which, until the Thirties, had been bounded by the road network and surrounded on the outside by a continuous curtain of wall fences and buildings. The continuity of the building alignments is connected to the need to limit the view on the neighbouring properties and to the practice of orienting the residential buildings along the heliothermic axis that allows to maximize the benefits of solar radiation.

The blocks of the historical fabric are mainly made up of lots with a lengthened shape and with one or more gates on the street. The residential building is generally located in a central position with respect to the courtyard, according to the typological scheme of the double courtyard house, which is typical of central-southern Campidano. However, there are also houses with a front courtyard and houses on the roadside, which produce a more irregular configuration of the lots. The typologies of courtyard houses create a pattern of opposing blocks



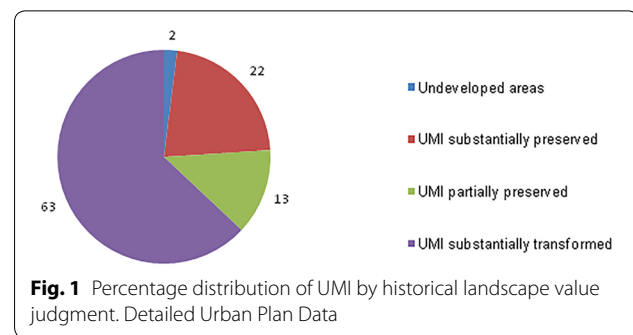
with backward buildings in the lot and, in some cases, with street-level buildings. In addition to the purely residential spaces, the courtyard houses have rustic attached structures for processing and storing the agricultural production and for gathering domestic animals (cellars, oil mills, food stores, sheds and shelters for animals), usually located in adherence to the fence wall (Baldacci 1952; Le Lannou 1979; Sanna and Atzeni 2009).

Until the 1950s, urban morphology was characterized by a low building density with a prevalence of the empty space over the built one. The demographic increase, after the Second World War, produced deep alterations in the urban structure, due to the interventions of subdivision, elevation, demolition and reconstruction with obstruction of the courtyards, with a significant increase in building density without a change in the urban boundaries. The road system was also enriched with new alleys that ensured access to the numerous building units, originally through the sharing between several owners of a private area, until its complete acquisition to the public domain.

The first step is represented by the study and interpretation of the spatial relationships and the particular type of building that characterize the specific historical settlement. The plan analyses also the transformations that have often led to phenomena of “typological degradation”, caused by the inclusion of incompatible models in an historical context. In the drafting of the plan it has been proceeded with the investigation, study and classification of the buildings by referring to methodologies codified in the type-morphological analysis, such as those of Minimum Intervention Unit (UMI) (Caniggia 1979; Wallach 2000; Giambruno 2007).

The detailed urban plan subdivides the urban fabric into Minimum Intervention Units (UMI), clusters of areas and buildings that constitute uniform zones to be subjected to conservation, requalification and/or transformation actions. In the plan, the Minimum Intervention Unit (UMI) represents a homogeneous reference area for planning, relevant from a landscape point of view, which guarantees the achievement of reasonable standards of internal distribution, landscape quality and urban decorum, in compliance with hygienic, health and civil construction requirements.

Usually UMI is the same as the complex of open spaces and buildings, typologically and constructively homogeneous in the original morphological layout, which represent a functional unit of the urban fabric. The historical-typological and landscape analysis of the plan has been carried out on the single UMI, inside of which the different constitutive components (buildings, roofs, courtyards, uncovered area and ruins) are cartographically identified and classified.



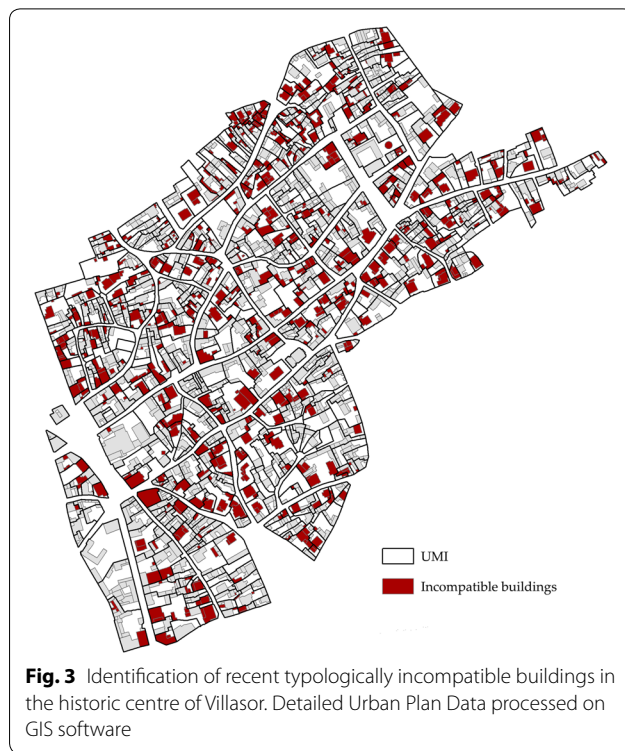
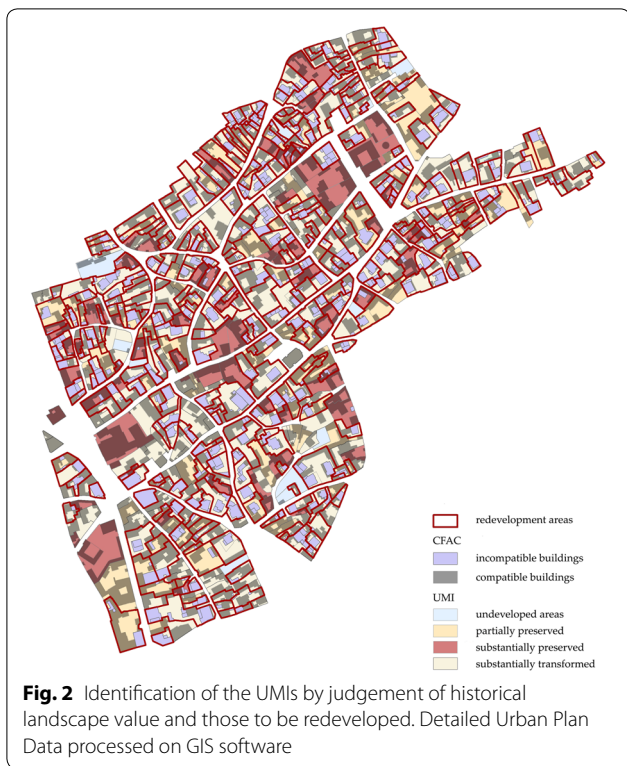
The following categories are used for the classification of UMIs:

- UMIs consisting of undeveloped areas, never built or resulting from the demolition of the original building;
- UMIs consisting of substantially preserved building structures, in which the typology, most of the original buildings and open spaces are still preserved;
- UMIs consisting of partially preserved building structures in which the original typology is still unchanged and part of the original buildings and open spaces have been modified;
- UMIs consisting of substantially altered building structures, in which the original type, buildings and open spaces are modified.

Figure 1 highlights the prevalence of “substantially transformed UMIs” (63%), which currently do not include landscape values to be preserved but, in most cases, require the adoption of actions for the redevelopment and elimination of landscape detractors. This is followed by “substantially preserved UMIs” (22%) and “partially preserved UMIs” (13%), characterized by the presence, more or less relevant, of elements of traditional historical value to be preserved, although in many cases altered by additions and new buildings incompatible with the context.

Figure 2 illustrates the overview of the UMIs classifications based on the assessment of the historic landscape value, in which the buildings are identified, clearly differentiated between compatible (historical and recent) and non-compatible buildings. The red perimeter highlights the 367 UMIs interested by a proposal for the reconfiguration of incompatible volumes.

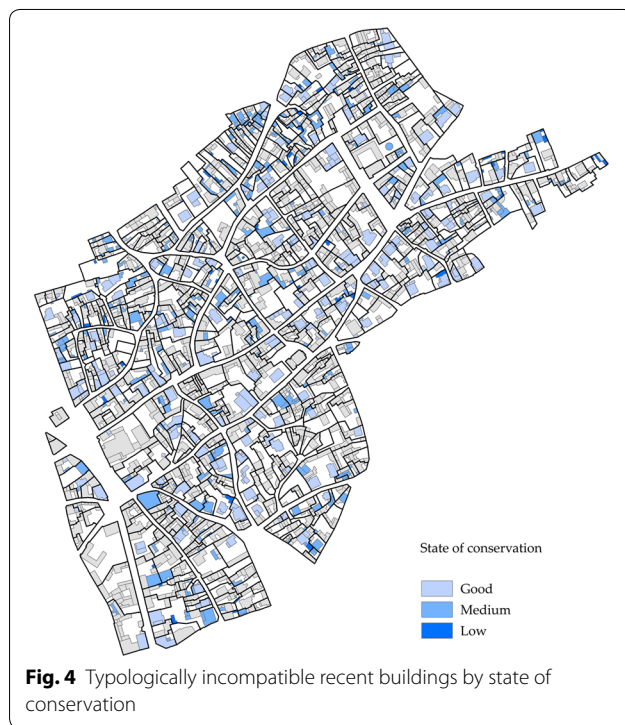
The results of the survey focus on the degree of alteration of the historic fabric caused by the phenomenon of the replacement of significant parts of the historic heritage, also due to the weakness and ineffectiveness of the protection policies, in particular in those parts of the



urban areas considered by the planning instruments as residential completion B zones.

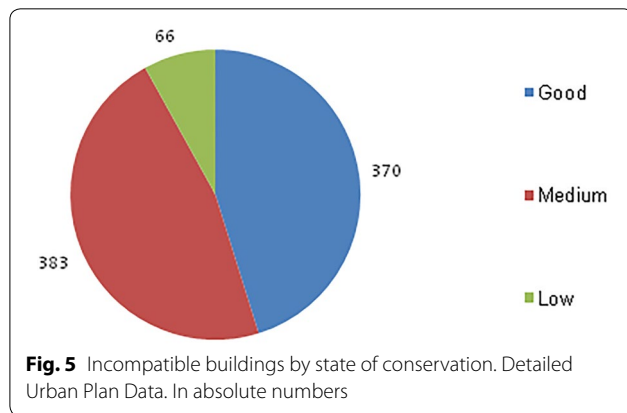
The urban fabric is particularly compromised, with few surviving cases of fully preserved historical courtyard houses in an acceptable state of conservation. It is more frequent to find the presence of abandoned or secondary buildings in the courtyard, which was built in a later period. Further alterations of the original pattern include some isolated buildings in the centre of the lot and multi-level buildings facing the street. They interrupt the continuity of the curtain wall and make it difficult to read the identity pattern. The presence of incompatible buildings is particularly widespread in the historic fabric, sometimes irreversibly changing the original layout of the blocks.

Figure 3 identifies the buildings classified in the plan as “new typologically incompatible”, for which a voluntary private initiative of demolition and reconstruction is planned, according to criteria of harmonious integration and coherence with the identity of the fabric. The demolition of the existing buildings cannot be imposed if they are regularly designed in accordance with the legislation and planning tools in force at the time of their construction. Further restrictions on the building transformation, limiting the allowed interventions only to extraordinary maintenance, are not sufficient to promote voluntary operations of demolition. In general

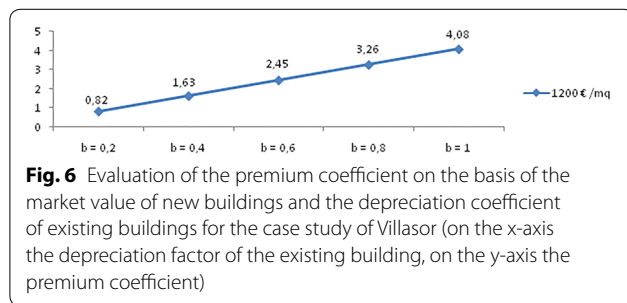


the incompatible buildings stock, that dates back to the second half of the Twentieth century, has a good level of conservation and maintenance, finding an adequate position and appreciation in the real estate market.

In the third phase of the research, a preliminary appraisal of the existing buildings to be redeveloped was made using the data on their state of conservation and maintenance. Figure 4 shows the framework on the state of conservation of incompatible buildings, according to the qualitative levels defined in Table 1 (excellent, good, medium, low, ruin).



**Fig. 5** Incompatible buildings by state of conservation. Detailed Urban Plan Data. In absolute numbers



**Fig. 6** Evaluation of the premium coefficient on the basis of the market value of new buildings and the depreciation coefficient of existing buildings for the case study of Villasor (on the x-axis the depreciation factor of the existing building, on the y-axis the premium coefficient)

As illustrated in Fig. 5, the state of maintenance and conservation of the incompatible buildings is mainly good (45%) and medium (47%), while a small percentage is in low condition (8%). The substantial absence of buildings in an excellent state of conservation is due to the restrictions on new developments in the historic centres, introduced by the RLP in 2006, waiting for the adaptation of the municipal planning tools. The condition of ruin is generally found in buildings with historical and cultural value that require the conservation of the original construction components that have survived or the partial reconstruction.

Figure 6 shows some indicative values of the premium coefficient, calculated on the basis of the proposed formula, to be used in the definition of the development capacity to be assigned to each minimum unit of intervention in case of a proposal for demolition and reconstruction of the existing building, in order to ensure its feasibility. The line expresses the value of the premium coefficient according to the depreciation factor of the existing building resulting from a specific market quotation of new construction (1200 euro per square metre). In this case, the depreciation coefficient, which falls in the range from 0.4 to 0.8, makes it essential to increase the development capacity in order to allow for the voluntary participation of private owners in the demolition and reconstruction of the existing building.

Table 2 summarizes the experimental results of the application of non-financial compensation measures, which are structured in accordance with the premium coefficients defined in Fig. 6, in the framework of the urban redevelopment actions provided in the Villasor detailed urban plan. The results of the analysis are organized into three different classes of historical landscape value of the UMIs, which show remarkable differences in terms of amount and average state of conservation of incompatible buildings. In fact, there is a correlation between the average value of the depreciation coefficient of the incompatible buildings and the time of

**Table 2 Results of the hypothesis of application of non financial compensation for demolition and reconstruction of incompatible buildings**

	UMI substantially preserved	UMI partially preserved	UMI substantially transformed
Number of UMI	30	77	260
Incompatible buildings volume	3.551 mc	24.296 mc	182.085 mc
Average of the state of conservation	0.56	0.63	0.70
Development rights compensation	8.270 mc	66.775 mc	551.372 mc
Premium coefficient	2.29	2.57	2.85
Residual development capacity after demolition	3.542 mc	12.215 mc	101.841 mc
Development rights to be transferred	4.728 mc	54.560 mc	449.531 mc

construction and the degree of conservation of the building typology and the historical layout of each UMI. The expected scenario of prevalence of incompatible buildings in the transformed UMI is also confirmed. Finally, the data on the premium development capacity and the residual one resulting from the demolition of the incompatible buildings are projected, on the basis of the indices of suitability for building foreseen for each UMI, as part of the general design of the plan. In the case of substantially preserved UMI, 43% of the replacement development capacity could be realized on site, while in the other categories of UMI (partially preserved or transformed) this percentage is reduced to 18–19%.

## Discussion

The proper assessment of the economic advantage of each plan intervention and the possible allocation of a development rights reward to support its implementation, adapted to each property, appears to be difficult for the political and technical decision-makers, as well as unfair in the treatment of private property.

The development of simplified assessment models, on which it is possible to inform the planning process, makes it possible to program planning actions for the recovery and redevelopment that can be really feasible and practicable, contributing to the achievement of the desired level of landscape quality.

The simulation of a non financial compensations system in the detailed urban plan of Villasor highlights the difficulties of an indistinct application on the whole historic centre. The redevelopment of all the transformed UMI, which have more recent buildings in good conditions, requires the attribution of an excessive increase in development capacity, which cannot in any way be justified in local contexts with limited or almost no demographic growth. It therefore needs to be balanced according to certain priorities that the municipal authority must define with the input of the planner: for example, the elimination of incongruous elements, which alter the original structure of the substantially preserved UMI, is certainly a priority action to re-establish the quality of the historic urban landscape.

The reconfiguration of buildings in a poor state of conservation, with an increase of at least 63% of development capacity, has fewer effects in the overall assessment of the development capacity within the general framework of the plan.

In the case of a real estate asset in medium or good condition, the required non financial compensation is more than 100%, which has a significant impact on the total development capacity of the plan and reduces the chance of reconstruction on site.

It is therefore indispensable to transfer part of the development rights in areas external to the historic centre, leading to further critical issues for the planner and the municipal administration in relation to the process of estimation and management. The planning of urban transformation projects through the demolition and reconstruction of existing buildings is clearly critical with respect to the transfer of development rights to undeveloped soils.

In built-up areas it is necessary to convert the existing building into development rights by assessing its consistency, state of conservation, conditions and use (Stanghellini 2013).

A possible transfer of development rights inevitably involves the assessment of conversion parameters that take into account the different values of the volumes in the transition from the sending area to the receiving one (Micelli 2011).

The methodology adopted in the paper did not consider the impact of the area on the value of the existing building and on the final value, because this aspect is negligible in the case of a complete redevelopment in the original lot. The transfer requires the acquisition of a suitable area or the identification of another owners' property that is willing to receive the premium development rights. In both cases, this represents an additional burden for the purchase or compensation of the surface right to the owner of the receiving area.

As a compensatory right, a careful evaluation of the value of the alternative monetary compensation is necessary. If the value of the development capacity granted is lower than the value of the existing building, the owner would have no interest in joining the proposed project. Conversely, if the development capacity granted is excessive, it would have some questionable, or even negative, economic and urban planning consequences (Micelli 2012). The identification of the receiving area with equivalent real estate values is therefore essential in order to quantify the development rights to be attributed.

The choice can fall on a private owned area, requiring an additional bonus to compensate for the impact of the area on the project cost, or on a public owned area, acquired as an additional contribution in real estate development activities.

The elaboration of a detailed knowledge framework on the settlement fabric, the morphological characteristics and the state of conservation of the buildings, supported by the use of GIS tools that allow the constant updating of data, does not result in a higher quality and effectiveness of the strategies and actions of the plan. The study highlights the lack of effectiveness of the incentives provided for by regional laws that provide for an arbitrary assessment of rewards, in the absence of detailed studies

and evaluations. It also shows that the increase in the development capacity, which is necessary to make the demolition of the existing building volume economically attractive, is inversely proportional to the market value of the property.

Part of the development capacity may be developed in compatible forms within the perimeter of the historic centre in order to restore, where possible, the original urban layout, while the surplus capacity may be transferred to areas suitable for transformation external to the old centre, privately owned or offered by the local government.

### Conclusions

The above simulation is a model that can be reproduced and adapted to different urban and landscape contexts, of particular historical or environmental value, to promote spontaneous regeneration actions on private initiative. The proposed incentive scheme is more effective in areas characterized by high real estate prices, which allow a greater appreciation of the built volumes on the market (Colavitti and Serra 2017). The model can therefore be updated according to the specific conditions and trends of the real estate market, also with the support of the GIS system.

The case study of the Sardinia Region has enabled the formulation of solutions that are applicable in national and international contexts, which have been for a long time the subject of intense debate on the need to take advantage of market balance mechanisms to make more effective administrative action through urban planning activities. In this direction, the redevelopment of historic centres certainly represents an interesting field of research, still today characterized by traditional approaches strictly conformative and regulatory that introduce strong limitations to the action of the private investor. The rational and comprehensive character of the Italian planning system is excessively rigid and unable to reflect the ongoing evolution of the urban and social context. It sometimes results in the imposition of rules and proposals for major interventions that are not shared by the local communities, given the lack of evaluation of the effects on the legitimate interests of the owners, which lead to processes of abandonment and degradation or, even worse, to illegal building activity. This consideration can be extended to the various levels of the regulatory and binding system aimed at protecting the territory from an environmental, landscape, historical, cultural and identity point of view.

The hypothesis of transferring the additional development rights to alternative transformation areas, identified in the municipal urban plan, has opened the way to the possibility of providing for a series of non financial

compensations for the demolition of incompatible buildings, for the restoration and redevelopment of public spaces, for the energy efficiency and for the elimination of environmental negative effects (Stanghellini 2013; Verones 2015). These premium development rights, often referred to as development credits in regional laws, are distinguished by their juridical independence from the soils that generated them and their free use in areas destined for transformation. An improper use of the incentive scheme could result in a failure on the plan's effectiveness or even in deep inequalities in the distribution of surplus value.

A system of non financial compensation can certainly be effective in urban areas with a substantial increase in the value of real estate. Conversely, in smaller centres, low real estate prices may sometimes require an excessive increase in development capacity or may be insufficient to guarantee real demand for new buildings, completely affecting the purpose of the plan. A preliminary survey aimed at verifying the presence of a real estate market able to ensure the effectiveness of the incentive program is therefore an essential step.

In addition, the effect of mechanisms based on the allocation of compensatory and rewarding development rights on the overall urban planning load should be taken into account. These are development rights which the administration grants as compensation that must be guaranteed, otherwise undermining the local authority's right to amend town planning forecasts for reasons of public interest (Trapani 2014).

The need to innovate forms and practices in the planning of historic centres should be part of a broader framework of reform of municipal planning tools, which opens up a series of issues related to the governance of urban rent, which have been debated for decades.

There is no doubt that the plan is often conceived by local communities as an opportunity to collect rents, in the form of development capacity, against a culture of recovery and redevelopment.

The new planning perspectives, which are set out by a new idea of development right separated from land ownership, allow us to hypothesize its exclusive use for purposes related to urban and environmental regeneration, to be applied not only to historical and consolidated fabrics but also to coastal, natural or hydrogeological risk areas. For example, development rights could be assigned as a reward for the demolition of buildings considered incompatible in areas of high historical, cultural and environmental value and reconstruction in a suitable location, in support of policies for the recovery and landscape requalification of historic centres. This also provides an effective mechanism for the capture of rents, minimized for new expansion areas, and largely transformed into

## incentives for urban regeneration projects and for the recovery of the existing stock of buildings.

### Abbreviations

RLP: Regional Landscape Plan; TDR: Transfer of Development Rights; GIS: Geographic Information System; RL: Regional Law.

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### Authors' contributions

The manuscript is the result of a joint research. All sections are jointly written by the authors, except to "Introduction" section and "The historic centres in the Sardinian landscape planning" section, written by AMC, "Non-financial compensation as a tool for urban regeneration" section and "A symptomatic case study: the historic centre of Villasor (Sardinia, Italy)" section, written by SS. Both authors read and approved the final manuscript.

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### Competing interests

The authors declare that they have no competing interests.

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### References

- Angiuli A (2015) La genesi urbanistica del centro storico: dalla "Carta di Gubbio" alle nuove problematiche del risanamento. In: Aedon, Proceedings of the conference "I centri storici tra norme e politiche", Gubbio, 6–7 June 2014
- Aristone O, Palazzo AL (2000) Città storiche. Interventi per il riuso. Il Sole 24 Ore, Milano
- Baldacci O (1952) La casa rurale in Sardegna. Centro di studi per la geografia etnologica, Firenze
- Bandarin F, Van Oers R (2012) The Historic Urban Landscape. Managing Heritage in an Urban Century. Wiley Blackwell, Oxford
- Benn V, Infranca J (2013) Transferable Development Rights Programs. Post-Zoning? Brooklyn Law Review 78:435–465
- Bonfantini BG (2012) Planning the historic centres in Italy: for a critical outline. Planum. J Urbanism 2:1–19
- Booth P (2008) Property, law and non-financial compensation. In: Janssen-Jansen L, Spaans M, van Veen M (eds) New instruments in spatial planning. An international perspective on non-financial compensation. IOS Press, Amsterdam, pp 213–227
- Caniggia G (1979) Lettura dell'edilizia di base. Marsilio, Venezia
- Cervellati PL (1991) La città bella. Il recupero dell'ambiente urbano. Società editrice Il Mulino, Bologna
- Chan EHW, Hou J (2015) Developing a framework to appraise the critical success factors of transfer development rights (TDRs) for built heritage conservation. Habitat Int 45:35–43
- Cipollotti GB (2013) Il criterio del costo nella stima immobiliare. Aestimum 62:111–127
- Clementi A (ed) (1990) Il senso delle memorie: in architettura e urbanistica. Laterza, Roma
- Colavitti AM (2018) Urban heritage management: planning with history. Berlin, Springer
- Colavitti AM, Serra S (2013) Il piano particolareggiato per il recupero del centro storico di Cagliari. Prime considerazioni critiche alla proposta di piano. Archivio di Studi Urbani e Regionali 107:74–106
- Colavitti AM, Serra S (2017) Historical center planning in Sardinia: the replacement of the inconsistent building fabric for the renovation of the historic landscape. Valori e Valutazioni 19:79–90
- D'agostino A (2008) Estimo immobiliare urbano ed elementi di economia. Fondamenti, criteri, metodi. Società editrice Esculapio, Bologna
- Falco E (2012) Transferable development rights in regeneration schemes for historic city centres. Legislation in the Umbria Region. Italian J Plan Pract 2:4–14
- Gabrielli B, Gastaldi F (2004) Politiche "integrate" di recupero dei centri storici: riflessioni generali e considerazioni sul caso Genova. In: Deplano G (ed) Politiche e strumenti per il recupero urbano. Edicom Edizioni, Udine, Monfalcone, pp 37–46
- Giambruno MC (ed) (2007) Per una storia del restauro urbano. Piani, strumenti e progetti per i Centri storici. Città Studi edizioni, Novara
- Indovina F, Savino M (1997) I vantaggi dell'integrazione tra città storica e città moderna. La ciutat històrica dins la ciutat, D'humanitats, Girona
- Janssen-Jansen L (2008) Space for Space, a transferable development rights initiative for changing the Dutch landscape. Landsc Urban Planning 87:192–200
- Janssen-Jansen L, Spaans M, Van Der Veen M (2008) Non-financial compensation in international comparative research. In: Janssen-Jansen L, Spaans M, van der Veen M (eds) New instruments in spatial planning: an international perspective on non-financial compensation. IOS-press, Amsterdam
- Karrer F, Moscato M, Ricci M, Segnalini O (1998) Il rinnovo urbano. Programmi integrati, di riqualificazione e di recupero urbano: valutazioni e prospettive. Carocci editore, Roma
- Kocalar AC (2012) The Transfer of Property and Development Rights in Turkey. Megaron vol. 7 (EK 1):27–38
- Lazzarotti R (2010) Strategia e premialità per valorizzare i centri storici dell'Umbria. Urbanistica 142:8–12
- Le Lannou M (1979) Pastori e contadini in Sardegna. Della Torre, Cagliari (original edition Pâtres et paysans de la Sardaigne, Arrault & Cie, Tours 1941)
- Linkous ER (2016) Transfer of development rights in theory and practice: the restructuring of TDR to incentive development. Land Use Policy 51:162–171
- Machemer PL, Kaplowitz MD (2002) A framework for evaluating Transferable Development Rights Programmes. J Environ Planning Manage 45(6):773–795
- Mazzoleni C (1991) Dalla salvaguardia del centro storico alla riqualificazione della città esistente. Trent'anni di dibattito dell'ANCSA. Archivio di studi urbani e regionali n.40
- Micelli E (2011) La gestione dei piani urbanistici. Perequazione, accordi, incentivi. Marsilio editore, Venezia
- Micelli E (2012) Diritti edificatori e crediti edilizi nella gestione dei piani. In: Stanghellini S (ed) Il negoziato pubblico privato nei progetti urbani. Principi, metodi e tecniche di valutazione. DEI editore, Roma, pp.83–98
- Micelli E (2014) L'eccezione e la regola. Le forme della riqualificazione della città esistente tra demolizione e ricostruzione e interventi di riuso. Valori e valutazioni 12:47–56
- Nadin V, Stead D (2014) Spatial planning in the United Kingdom, 1990–2013. In: Getimis P, Blotevogel H (eds) Reimer M. Routledge, Spatial planning systems and practices in Europe. A comparative perspective on continuity and changes. New York, pp 198–214
- Nadin V, Shaw D, Hawkes P, Cooper S, Westlake T (1997) The EU compendium of european planning systems and policies: overview volume. OOEPC, Luxembourg
- Nelson AC, Pruetz R, Woodruff D (2012) The TDR Handbook. Design and implementing successful Transfer of Development Rights Programs. Island Press, Washington
- Pruetz R, Standridge N (2009) What makes transfer of development rights work?: success factors from research and practice. J Am Plan Assoc 75(1):78–87. <https://doi.org/10.1080/01944360802565627>
- Regione Autonoma della Sardegna, Direzione generale della pianificazione urbanistica territoriale e della vigilanza edilizia (2013) Le politiche di riqualificazione urbana e recupero degli insediamenti storici in Sardegna. TIEMME Officine Grafiche, Assemini
- Renard V (2007) Property rights and the 'transfer of development rights' Questions of efficiency and equity. Town Planning Review. 78(1):41–60

- Rodwell D (2007) Conservation and sustainability in historic cities. Blackwell Publishing, London
- Sanna A, Atzeni C (ed) (2009) Manuali per il recupero dei centri storici della Sardegna. Architettura in terra cruda dei Campidani, del Cixerri e del Sarabus. DEI, Roma
- Savino M (2005) L'intervento nei centri storici in una complessa realtà territoriale e normativa. In: Savino M (ed) Pianificazione alla prova nel Mezzogiorno. Franco Angeli editore, Milano
- Semi G, Tonetta M (2020) Marginal hosts: short-term rental suppliers in Turin, Italy. *Environ Planning A Econ Space*. <https://doi.org/10.1177/0308518X20912435>
- Serra S (2018) Diritti edificatori e consumo di suolo. Governare il territorio in trasformazione. FrancoAngeli, Milano
- Spaans M, Van Der Veen M, Janssen-Jansen L (2010) The concept of non-financial compensation: what is it, which forms can be distinguished and what can it mean in spatial terms? *Planum* 1:21
- Spaans M, Janssen-Jansen L, Van Der Veen M (2011) Market-oriented compensation instruments: lessons for Dutch urban redevelopment. *Town Planning Rev* 82(4):425–440
- Stanghellini S (2013) Perequazione, compensazione, fattibilità. Inu edizioni, Roma
- Tallon A (2010) Urban Regeneration in the UK. Routledge, London and New York
- Thorsnes P, Simons Gerald P W (1999) Letting the market preserve land: the case for a market-driven transfer of development rights program. *Contemporary Econ Policy* 17(2):256–266
- Tomlan MA (2015) Historic Preservation. Springer International, Cha, Caring for Our Expanding Legacy. <https://doi.org/10.1007/978-3-319-04975-5>
- Torre CM, Balena P, Zito R (2011) An automatic procedure to select areas for Transfer Development Rights in the Urban Market. In: Murgante B et al. (ed): ICCSA 2012, part I, Lecture Notes in Computer Science 7333, Springer –Verlag Berlin Heidelberg, p. 583–598
- Trapani G (2014) I diritti edificatori. Wolters Kluwer, Milanofiori Assago
- Van Der Veen M, Spaans M, Janssen-Jansen L (2010) Using compensation instruments as a vehicle to improve spatial planning: challenges and opportunities. *Land Use Policy* 27:1010–1017
- Verones S (2015) Riqualificare energeticamente la città oltre i premi volumetrici. *Scienze Regionali* 2:69–87
- Villari A (2013) Definire l'incongruo nel paesaggio. In: Campus E, Cillis M, Ercolini M, Francini S, Villari A (eds) Qualità del Paesaggio e opere incongrue. Osservatorio della Pianificazione Urbanistica e della Qualità del Paesaggio, Editrice Taphros, Olbia, pp 43–50
- Wallach R (2000) L'ambiente costruito storico. La conservazione come trasformazione. Gangemi Editore, Roma
- Ziller J (2015) Perequazione urbanistica e mercato dei diritti edificatori: cenni di diritto comparato ed europeo. In: D'Orsogna D (ed) Perequazione urbanistica. Materiali per la comparazione giuridica, Giappichelli Editore, Torino, pp 279–295

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