

How to cite this work: Galacho Jiménez, F.B., & Reyes Corredera, S. (2022). The urban regulation of rural land from the perspective of the new Law for the Promotion of Territorial Sustainability in Andalusia (Andalusian Land Law). *Boletín de la Asociación de Geógrafos Españoles*, (94). <https://doi.org/10.21138/bage.3297>

The urban regulation of rural land from the perspective of the new Law for the Promotion of Territorial Sustainability in Andalusia (Andalusian Land Law)

La regulación urbanística del suelo rústico bajo la perspectiva de la nueva Ley de Impulso y Sostenibilidad del Territorio de Andalucía (LISTA)

Federico Benjamín Galacho Jiménez 

fbgalacho@uma.es

Sergio Reyes Corredera 

sergioreyes@uma.es

Departamento de Geografía

Universidad de Málaga (España)

Abstract

Since their inception, various urban planning laws have focused on meeting the growth needs of cities, with urban planning as a discipline paying minimal attention to rural settlement planning. It can, therefore sound clichéd to say that urban planning legislation has been mainly concerned with regulating urban and developable land, with residual or negative status being given to undevelopable or rural land. This has had major territorial impacts that continue to this day. The proposed subject of this paper is considered timely and topical, and its main objective is to analyse whether the planning instruments proposed in the Law for the Promotion of Territorial

Sustainability in Andalusia (LISTA, acronym in Spanish) for rural settlements and scattered buildings can help regulate rural land dynamics in Andalusia. To do so, we will first model the patterns of settlement formation and isolated dwellings on rural land using geostatistical methods, and then carry out an analysis of the provisions of these latest rural land management laws, which will affect the planning regulations of this land in the coming years.

Key words: urban planning; territorial planning; spatial analysis; urban sprawl; rural area.

Resumen

Desde sus inicios, las diversas legislaciones urbanísticas se han centrado en dar respuesta a las necesidades de crecimiento de las ciudades, siendo marginal en el Urbanismo, como disciplina, la preocupación por la ordenación de los asentamientos en el medio rural. Por ello, resulta ya un tópico decir que la legislación urbanística se ha ocupado básicamente de regular el suelo urbano y el urbanizable, otorgándole al suelo no urbanizable o rústico un carácter negativo y residual. Este hecho ha ocasionado notables impactos territoriales que actualmente perduran. Se considera que el tema propuesto en este trabajo resulta oportuno y de actualidad, siendo su objetivo principal analizar si los instrumentos para la regulación urbanística que se plantean en la Ley de Impulso y Sostenibilidad del Territorio de Andalucía (LISTA) para los asentamientos en el medio rural y las edificaciones dispersas pueden contribuir a un regular la dinámica del suelo rústico en Andalucía. Para ello vamos a modelizar primeramente las pautas de formación de asentamientos y agregados de viviendas aisladas en el suelo rústico con técnicas geoestadísticas, para posteriormente realizar un análisis de las disposiciones de este último ordenamiento legislativo para los suelos rústicos, lo que afectará a su regulación urbanística durante los próximos años.

Palabras clave: planeamiento urbanístico; planificación territorial; análisis espacial; urbanismo difuso; espacio rural.

1 Introduction

Rural spaces, those open territories that are to a greater or lesser extent either natural or transformed, have become commodified spaces. Political and economic forces are turning them one after another into an ever more artificial and exploited environment; nothing is left to the randomness of nature (Escudero, 2018). Production for production's sake is leading to the subordination of human goals to economic ones (Bookchin, 1978).

The relationship between power and space is evident in the different spatial configurations achieved by the various manifestations of power or, in Weberian terminology, the different types of domination (González Ordovás, 2000). By this we mean that rural space management acts as a form of rational-legal domination, driving territorial organization initiatives towards the homogenization of a social and spatial organism whose very essence is heterogeneity. Urban planning legislation and its instruments have been used for this purpose through the various land laws passed down over the years.

The Autonomous Community of Andalusia adopted with the entry into force of the Territorial Planning Plan of Andalusia (POTA -acronym in Spanish-) at the end of 2006, a decided position on the territorial model to be implemented in the region. This document opted for the compact city model, rather for compact urban space, for environmental balance and social cohesion. These postulates had to be reflected in the preparation of urban planning documents, and therefore, be effectively transferred to the territory. To this end, it included a normative body specifically aimed at establishing the determinations that, with the aforementioned purpose, should be applied to the model of urban space preferred by the regional administration and a series of guidelines to be developed by urban planning in order to reorient the existing urbanization processes in the region towards a model of urban sustainability. To this end, the POTA incorporated the so-called "Norm number 45" that directly obliged urban planning to establish limits in the urban growth of the municipalities. For the application of these precepts, the Law of Urban Planning of Andalusia (LOUA, acronym in Spanish) was promulgated: Law 7/2002, of December 17, of Urban Planning of Andalusia.

As can be assumed, this produced a frontal and generalized rejection of those responsible for local administrations, mainly for three reasons: one, for considering this norm as an interference of the regional government in the local competences for the development of the soils of the urban space; two, for being a very restrictive rule by combining preventive measures to avoid new implementations in Non-Developable Land and disciplinary measures on existing constructions; and, three, for being applicable at a time of real estate boom in which the municipalities provided large endowments of land to this process. As a consequence, there was a systematic breach of the most relevant precepts of the POTA and a manifest delay in the adaptation of the planning documents to the LOUA, fundamentally to avoid applying those articles that regulated the purposes of the urban activity, the object of the urban planning and the determinations to be developed by it for the establishment of the territorial model claimed by said documents (Górgolas Martín, 2017; Olmedo Pérez, 2016; De Santiago Rodríguez, 2020).

In this sense, it is significant that, since urban planning legislation has been biased legislation towards the regulation of population centres and their possible growth areas, it would not have paid a minimum attention to the forms of occupation of rural areas, which have been practically forgotten until some Autonomous Communities began to regulate them from the year 2000. At the moment in which the existence in the territory of other human settlements began to be recognized, different from urban population centers and that required a regulation consistent with their special characteristics.

The explanation for this lies in the fact that the urban planning legislation had always established a protectionist regime for non-developable land that excluded most building activities and expressly prohibited the construction of houses that could give rise to a population center, understood as an urban nucleus, in such a way that, consequently, the possibility of regulating in this type of land the sets of buildings already existing and linked to the rural environment was not conceived because it was considered that they could give rise to new population centers. In fact, according to article 46 of Law 7/2002 (LOUA), and it is similarly included in Article 14.1 of the LISTA, the Urban Planning could establish up to four categories of Non-Developable Land: the Non-Developable Land of Special Protection by the specific sectoral legislation, the Non-Developable Land of Special Protection by territorial or urban planning, the Non-Developable Land of natural or rural character, which would be equivalent to the one that in other Autonomous Communities is called Common Non-Developable Land and the Non-Developable Land of the Disseminated Rural Habitat. It is precisely in this last category, assimilable with the Common Non-Developable Land where the greatest controversies have occurred due to clandestine construction.

In the case of Andalusia, the regulation of existing settlements in rural areas is very recent, being Law 7/2002, of December 17, on Urban Planning of Andalusia (LOUA) which for the first time established a specific regulation on them, conceptualizing them, however, as "Disseminated Rural Habitat". In any case, this regulation was very meagre and imprecise so, subsequently, Decree 2/2012, of January 10, which regulated the regime of existing buildings and settlements on non-developable land, was approved, which deepened the regulation of these settlements and obliged all municipalities to identify, delimit and incorporate in the General Plans of Urban Planning the existing settlements on the non-developable land, differentiating the urban settlements and the areas of disseminated rural habitat. Almost simultaneously with the approval of Decree 2/2012, Law 2/2012, of 30 January, was also approved in Andalusia, which modified this concept, making the criteria for its identification more flexible. In principle, these legislative changes should have served to promote the management of existing settlements in rural areas.

However, the Urban Planning Law of Andalusia was subject to great legal uncertainty in such a way that it has been in many cases bypassed by the general urban planning plans or postponed pending a more precise and developed regulation. In addition, it had been verified from the municipalities, with their work of identification and delimitation of these settlements that the regulation established in the regulations applicable in Andalusia did not adapt to the urban reality of the same.

Consequently, we can affirm that urban planning practice has been unable to differentiate the diversity of rural land in such a way as to establish a basic recognition framework for dealing with the different types of occupation: traditional rural settlements, areas of scattered rural habitat, settlements in rural areas, etc., so as to address their management needs through urban planning. The following quote, taken from one typical general plan and found in many others, clearly summarises the conceptual approach taken by planners when classifying undevelopable or rural land in the municipality:

The remaining land in the municipality not included in either of the two previous classes (urban and developable) is classified as undevelopable land, and is intended for non-urban use, pursuant to the legislation in force, and therefore may not be subdivided, developed, or built upon, in keeping with the definition and regulation of urban and developable land. (General Urban Development Plan of Malaga (Spain), 2011)

The area of undevelopable or rural land is therefore calculated by eliminating or removing from the total municipal territory those lands that have not been designated as urban and developable land. This approach is extremely significant in practice because it determines how the land is treated, which is to say that within the municipal or supra-municipal framework it is not managed at all based on its essential conditions or characteristics. Urban planning documents for these areas have been developed using the regulatory standards laid down in previous legislation. As mentioned above, this focused solely on establishing guidelines for rural land to comply with the relevant part of the obligation imposed by higher-ranking urban planning legislation (state urban planning legislation). On an almost exclusive basis, this was done without regard to land management or land use. As a result of this approach, it is clear that the wording of the provisions affecting UL in the planning instruments could not be geared towards managing the types of occupation found on these lands, much less towards preserving their diversity and essence.

This is the starting point for this paper's first proposition, which is that the rural land occupation models developed to date have been at odds with the principles that should govern an urban planning system that is respectful of and in harmony with the characteristics of these rural areas. This has led to a situation of unchecked occupation dynamics, which has come about in a context of weak enforcement of urban planning discipline and disorganized occupation. Most local authorities, who have devolved responsibility for the regulation and application of urban planning, have been ignoring the phenomenon occurring on their rural land, with inaction on the part of the relevant bodies of their autonomous communities. As such, tacit consent has been given to the dynamics of changing uses and activities described above. The electoral dependence of many, if not all, local councils, as the bodies obliged to apply urban planning regulations in their territorial areas without widespread social support, has led to a mentality of "looking the other way". This has led to a lack of regulation on almost all rural land, as evidenced by the abundant scientific literature on the subject (Artigues & Rullán, 2007; Cebrían, 2007; Gaja-i-Díaz, 2008; Amat, 2011; Galacho, 2011, 2012; García & Carcelén, 2020).

It is therefore understandable that the urban regulation of rural land has become a recurrent source of legal, social, functional, environmental, and ecological problems at various levels. There has been no overall vision taking sustainability into account and no impact assessment on mitigation and resilience. No evaluation whatsoever has been made of the territories' capacity in terms of different activities and uses. This has meant the continuous failure of successive land laws and regulations in our country ever since the enactment of the Land and Urban Planning Act of May 12, 1956, as evidenced by the wealth of scientific literature seeking to explain all its various facets and consequences in different areas (García Bellido, 1986; Navalón García, 1994; Miguez Macho, 2011; Serra et al., 2014; Molina and Martínez, 2014; De Santiago, 2020).

Against this background, and with a view to promoting territorial sustainability in the region, the Andalusian Parliament passed (the) Law 7/2021, of December 1, 2021, which came into force on December 23, 2021. It repealed other provisions including Law 1/1994, of January 11, 1994, on Territorial Planning (LOTA, acronym in Spanish), Law 7/2002, of December 17, 2002, on Urban Planning (LOUA, acronym in Spanish), and other regulations that had governed urban and territorial planning in the Autonomous Community of Andalusia up to this point.

The second proposition behind this work is that the new Law must address the problems arising from "unimplemented" policies and, after years of occupation and crisis, steer the drafting of new planning instruments towards rural land management, which is currently disordered and

irrational and has led to a succession of occupied and empty spaces, marginal zones, and rehabilitated areas. In some cases, there are apparent concentrations of population and economic activity, and in others a haphazard scattering of occasionally abandoned dwellings and settlements such as small urban areas or traditional villages. Planning documents no longer regard rural land as a unique reservoir of natural resources or an area specializing only in traditional agricultural activities, where facilities and practices have been established with no thought as to the suitability of their location. Urban sprawl produces social, territorial, and environmental impacts, but also is an economically inefficient land use model, since developers do not shoulder the urbanization costs of low-density, highly scattered settlements (Muñiz & García-López, 2013; Andersen, 2011; Wassmer, 2001; Brueckner, 2000; Anas et al., 1998). However, the new land law does not conceptualize rustic soil types well. In fact, in Article 14.1 of the LISTA; in paragraphs a, b and c reference is made to "preserved rustic land" and only in paragraph d is reference made to a class that could give rise to a possible arrangement. Reference is made to the fact that it includes the rest of the rustic land of the municipality.

A wide variety of landscapes, forests, rural buildings, and crop concentrations, etc., are found in rural areas. It has a crucial role to play and should no longer be considered in terms of its capacity to generate economic profit, thereby forfeiting its sense of existence or heritage and its permanence, intangible but real values for society. It is exploited for capital purposes, with systems of production setting the agenda. By devising and deploying land actions, capital can impose or modify, as the case may be, the previously existing order through its appropriation of the land, thus being able to shape the territory to its convenience. (Lefebvre, 1976; Harvey, 2007; Christophers, 2011).

This paper's third proposition, which we believe is of the utmost importance, is that political forces use institutions to put rural land on the real estate market. This practice raises awareness of the possibilities offered by such power, whereby it is possible to control human activities and therefore, also conveniently shape the societies that inhabit or occupy the space, completing the cycle we outlined at the outset. The relationships between these factors are well known (Clark and Jones, 2008) and can be observed in many ways. Among them is the manipulation of voting intentions by political parties to attract votes by appearing to support whatever social or ideological demands relate to the rural environment (Rodden, 2010; AxarquíaPlus, 2019).

The relationships between the components of the phenomenon under analysis are complex and take various guises: urbanization, housing, financial business, land use change, and social

conflict, and the underlying economic mechanisms are controlled at the political level, as mentioned above. In the scientific literature, various concepts have been used to describe the different ways in which this phenomenon is expressed territorially: suburbanization y counterurbanization (Bauer & Roux, 1976; Indovina, 1998, 2006, 2016; Arroyo, 2001; Gargiulo et al. 2014; Larrubia, 2015; Orduña et al., 2018); dispersed or diffuse urbanism (Yus & Torres, 2010; Escudero, 2018; Andrés and González, 2019); urban sprawl (Ewing et al., 2003; Franz et al., 2006; Catalán et al., 2008; Salvati & Morelli, 2014; Rubiera et al., 2016), and rurbanization (Jiménez & Campesino, 2017; Ubilla, 2019), etc. This demonstrates a terminological inconsistency that fails to or only partially incorporates fundamental concepts of both urban and spatial planning theory.

In recent decades it has become clear that the occupation or abandonment of rural areas is a common process not only in our country but also in many others, and that it has important social, economic, and environmental implications (Salvati et al., 2012). In some cases, land use intensification processes linked to the escalation of human activity in rural areas close to the more dynamic urban spaces are causing significant shifts in traditional urban-rural relations (Żróbek-Róžańska & Zadworny, 2016). Others warn of the emergence of rural urbanization in the form of new mono-functional spaces, for services or accommodation, with the spurious intention of establishing links with metropolitan areas, springing up as they do at considerable distance and cut off from them, but in the shadow of the expectations generated by transport infrastructure and medium-sized cities (Olazabal & Bellet, 2019).

We can see how certain land degradation processes caused by the abandonment of agriculture, and vice versa, have triggered or exacerbated changes in land use (Meléndez et al., 2014, Corbelle et al., 2012; Tomaz et al., 2013). Other studies have linked competition for land use and the deterioration of its physical or natural conditions. The deterioration of soil quality in areas with high agricultural capacity and the depletion of water resources are factors that trigger or favour the shift towards other uses and the incursion of urban uses in the medium or long term (Ferrara et al., 2014; Haregeweyn et al., 2012; Song & Liu, 2014; Obiahu & Elias, 2020).

We advocate an alternative location-based approach within a broader, increasingly urban, transformed landscape and wish to show how the pattern of urban growth in Andalusia over the last 30 years can be explained by increased mobility and easier access to real estate markets.

Based on the above propositions, our main objective is to compare the territorial reality of rural land with the management options provided by the Andalusian Land Law. The following

methodological approach has been used. Firstly, we will identify the patterns of occupation resulting from the urban process in three areas selected as being most representative for illustrating the magnitude of the phenomenon under analysis in rural Andalusia. Secondly, we will establish the distribution patterns of scattered buildings using geostatistical and geographic information systems (GIS) techniques to demonstrate that the dispersion of dwellings is giving rise to clustering patterns and dynamics more typical of rural settlements than isolated buildings per se. Thirdly, we will analyse the possible approaches to urban planning regulation based on the Law for the Promotion of Territorial Sustainability in Andalusia (LISTA, acronym in Spanish).

Spatial analysis tools and methods which help evaluate the territorial realities will be used to provide support for the diagnosis. Given the increasing complexities of the dynamics, alternative methodologies are required to analyse their spatial consequences. This line of research includes studies proposing robust methods for measuring the relationships between land use changes and the factors that trigger them (Luo et al., 2020; Serra et al., 2014; Laney, 2004). Some authors have proposed methods and proven procedures based on the set of quantitative methods used in spatial statistics aimed at detecting and describing geographic distribution patterns (Santos-Preciados et al., 2013, 2014). We believe that they can be useful tools for estimating patterns of association, finding tools for pattern analysis, cluster assignment, measuring geographic distributions, and for modeling spatial relationships. It is essential to use techniques and tools that help with the analysis (Chia-An Ku, 2016; Nagendra et al., 2004; Pan et al., 2004; Tian et al., 2011; Ralha et al., 2013; Tadese et al., 2020). We intend using them to identify geographic patterns in the distribution of rural buildings. We believe that this opens up the possibility of evaluating hypotheses about their behaviour and, above all, about the occupancy model that may have generated the observed pattern. Our initial premise is that the spatial heterogeneity resulting from the implantation of isolated rural dwellings will determine the territorial structure and coexistence of uses when clusters are formed, which usually occur randomly as a result of densification processes (Farrell, 1972; Silverman, 1986; Xie & Wu, 2014).

2 Methodological development

2.1 Characterization of the regional context and analysis of forms of rural land occupation in three selected areas of Andalusia

Andalusia is the autonomous community with the largest surface area in Spain, at 87,609.82 km² (17.31% of the national surface area) according to data from the Institute of Statistics and Cartography of Andalusia. The region was originally an eminently rural territory, but since the

1960s there have been major transformations as a result of the modernization of production structures and changes in the economic system, mainly due to the emergence of tourism and real estate activities in its provincial capitals and coastal areas. Consequently, the current system of production is clearly changing from an eminently rural-based economy to a mixed urban-rural economy. Although services can be considered the main sector, rural-based activities continue to be extremely important, and the urban process is in competition for all rural spaces.

Land use changes, settlement expansion, and the simultaneous proliferation of isolated buildings for second homes or properties for leisure and private recreation on rural land have been exponential, with a peak period between 1990 and 2007 (Hof & Blázquez-Salom, 2013; Navarro et al., 2020). Aside from leading to massive rural land loss, the urban pressure has curbed improvements and investment in farms due to the planning expectations created. This has resulted in an enormous and immediate revaluation of the land exposed to such pressure, given the potential capital gains to be had from land reclassification. This has had direct consequences for less profitable farms, which have become mere plots of land for sale or development. While not new, the situation brought about by the extraordinary change in rural land prices is of an intensity and magnitude never seen in Andalusia (Dige et al., 2010; The Property Finders, 2022).

It is possible to provide an idea of the magnitude of the problem addressed in this paper if, in addition to the problem itself, we consider the scale of agricultural and forested land in Andalusia, where most of the agricultural land is considered rural, and a large proportion of the forested areas are protected (see Table 1).

Table 1. Surface area (hectares) of agricultural and urban land at provincial level in Andalusia

PROVINCES	AGRICULTURAL USE			URBAN USE			TOTAL
	1956	1991	2020	1956	1991	2020	
ALMERIA	284,811.62	269,631.96	247,547.64	6,270.53	13,346.41	61,772.05	876,840.88
CADIZ	321,538.85	326,869.11	304,758.36	15,531.56	31,466.13	86,551.59	744,535.10
CORDOBA	679,493.08	759,103.38	780,529.00	7,377.13	16,606.59	64,754.22	1,376,898.76
GRANADA	629,071.61	666,750.80	551,799.85	7,239.56	13,276.79	65,526.68	1,263,798.73
HUELVA	167,359.10	166,580.84	201,459.85	10,766.78	21,655.81	69,002.41	1,015,074.47
JAEN	682,873.67	713,549.99	662,861.50	6,466.31	10,383.58	51,092.02	1,348,629.94
MALAGA	379,475.99	372,412.18	306,159.35	6,330.63	25,655.71	81,581.90	730,748.86
SEVILLA	824,594.53	912,065.81	840,906.42	10,820.17	33,617.63	115,669.46	1,404,455.37
ANDALUSIA	3,969,218.4	4,186,964.0	3,896,021.9	70,802.66	166,008.66	595,950.32	8,760,982.12

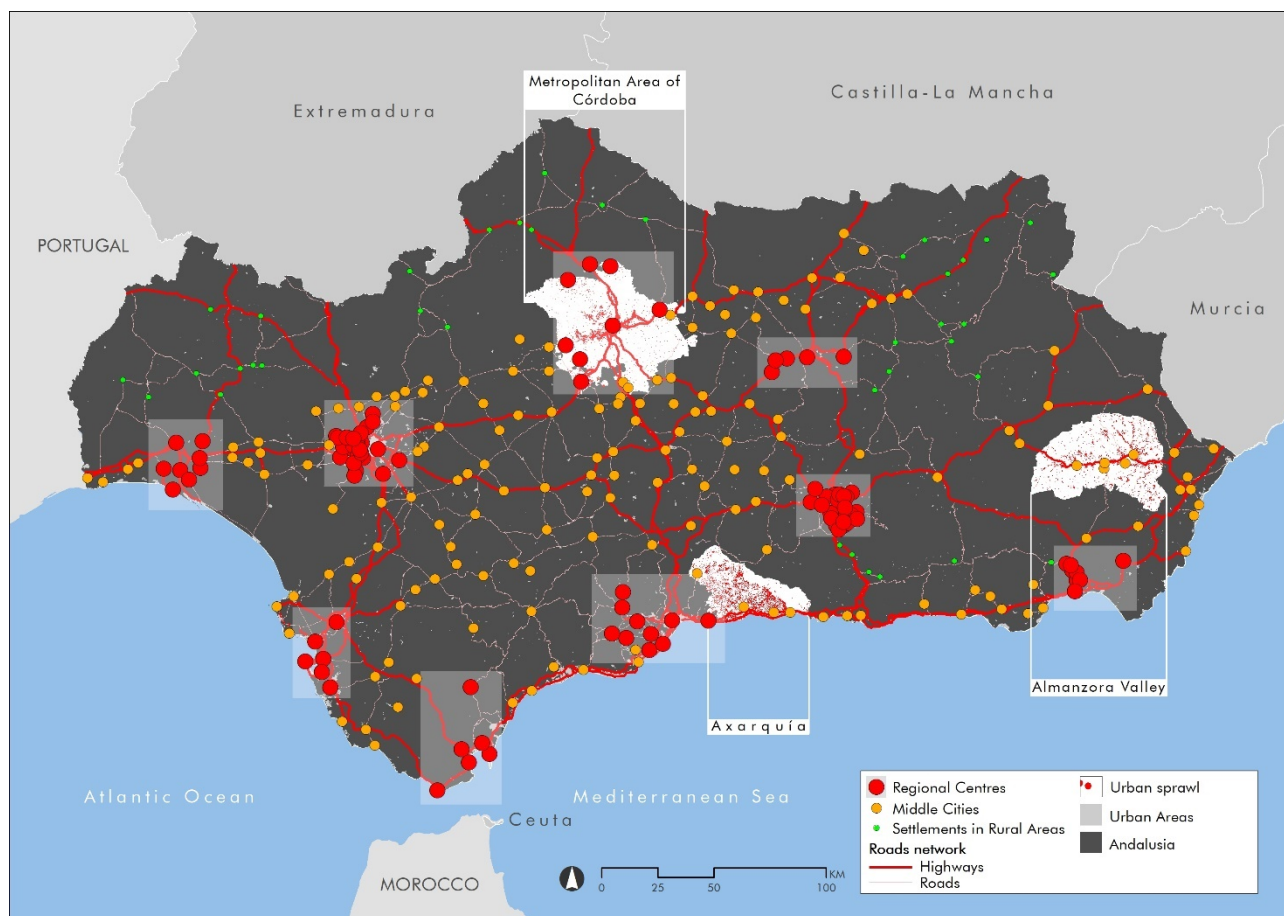
Source: own elaboration based on data from the Land Use and Vegetation Cover Maps E. 1:25,000 from the Department of Agriculture, Livestock, Fisheries and Sustainable

Development of the Andalusian Autonomous Government and the Geographic Information System of Agricultural Plots (SIGPAC) E. 1:10,000 of the Spanish Government's Ministry of Agriculture, Fisheries and Food (1956, 1991 & 2020)

In 2020, areas devoted to agricultural use in Andalusia represented 44.47% of the region's surface area (3,896,021.97 ha), forested areas 46.71% (4,091,905.35 ha), transformed areas related to the urban process 6.80% (595,950.32 ha), and wetlands 2.02% (171,104.48 ha). In 1956, agricultural areas represented 45.31% of the region's area (3,969,218.43 ha), forested areas 50.56% (4,429,969.73 ha), transformed areas related to the urban process 0.81% (70,802.66 ha), and wetlands 3.32% (290,991.30 ha). With respect to these data, it is worth highlighting the remarkable evolution of the so-called transformed areas, which have risen from 0.81% of the regional surface area in 1956 to 6.80% (an increase of 525,147.66 ha). However, these figures refer especially to areas transformed into urban areas or, in any event, to all consolidated settlements at the reference date, and do not include the different types of settlements on rural land that are scattered in agricultural and forested areas.

The territory of Andalusia is currently structured around the Andalusian City System (see Figure 1). A network of cities of between 100,000 and 700,000 inhabitants has been established. These cities have been transformed into metropolitan areas, in parallel with coastal urban expansion. The most important urban areas are those of the provincial capitals or urban environments with more than 100,000 inhabitants and include the territorial areas of Seville, Malaga, the Bay of Cadiz-Jerez de la Frontera, Granada, Cordoba, Almeria, Huelva, Jaen, and the Bay of Algeciras. Each of these, together with the capital or main city, includes a set of nuclei directly linked by common functions and activities, forming urban agglomerations which, in most cases, have an operating model typical of metropolitan areas. In these areas, the urban process extends to the rest of the territory under a disjointed and poorly planned urban dispersion model, precisely because of everything explained above. One example of this is the Spanish coastal areas, a subject that has been studied extensively (Luque-Revuelto, 2021, García-García, 2017; Capdepón, 2016, García-Sanabria et al., 2011).

Figure 1. Location of the selected areas of analysis in the territorial context of Andalusia



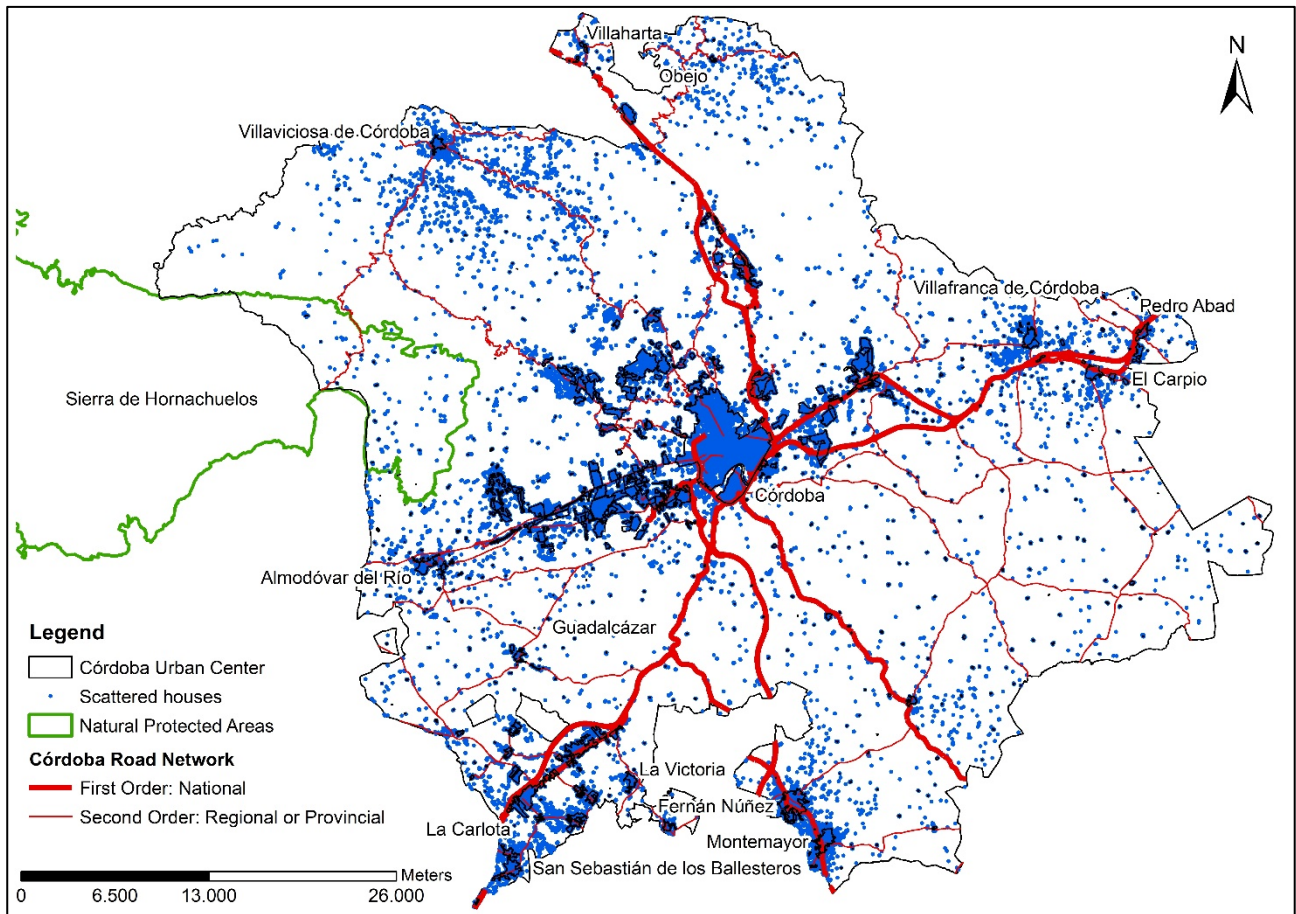
Source: own elaboration based on data from the National Cartographic Base (NCB) of the National Center for Geographic Information (CNIG) (National Geographic Institute - IGN) and Spatial Reference Data of Andalusia (DERA), Institute of Statistics and Cartography, Andalusian Autonomous Government, and Territorial Plan for Andalusia (POTA)

As mentioned above and shown in Figure 1, together with the large urban areas, the Andalusian coastal zones stand out as areas where important transformations have taken place, mainly due to the fact that they are home to tourism and very active intensive agriculture. In these areas, major land and environmental management problems call into question the sustainability of the development model, as evidenced by the successive economic crises that have shaken the country. At the same time, the coastal zones are characterized by rapid demographic growth and the consequent dynamics of urban sprawl. The intensity of this process has created exceptional competition between land uses and the extension of various functionalities to rural areas. This has largely resulted not only from the aforementioned processes, but also from the emergence of a growing and sustained demand for tourist accommodation: homes or second homes for both Spanish nationals and citizens of European Union countries.

We will study three cases of spaces under strong urban pressure, see Figure 1 for the contextualization of these areas. The first of these is the municipal district of Cordoba, an area close to a large urban center which is the province's capital. The second, the Axarquía area, is similar with respect to the city of Malaga and its metropolitan area. Here however, despite the massive influence of an urban agglomeration of this magnitude, there is an added nuance in that this area has itself developed economically due to intensive agriculture of products with high market value, such as subtropical crops, and the presence of a type of tourism with permanent residency in the area. The third is the Almanzora Valley in the rural inland part of eastern Andalusia, with relatively difficult access to the main regional infrastructure and suffering from agricultural and population decline. The area has, however, been able to develop a multifunctional production base driving models of rurality for leisure purposes and economic activity that is increasingly linked to global markets through rural tourism and services to the urban population. Thus, land stewardship has been added to the traditional function of agriculture, with hints of environmental and landscape protection, as well as the preservation of traditional ways of life. These three areas share the common link that urban occupation has taken place spontaneously and independently of planning.

A first model of occupation is restricted to the rural spaces in the area surrounding the city of Cordoba, where the large provincial capital acts as a space for the diffusion of the urban process, bringing us closer to an extensive model towards the urban periphery and the scattered occupation of the rural space (Figure 2). It basically corresponds to the municipality of the same name and has an area of 1,950.21 km². This is an inland area of Andalusia, linked to a large city, whose differentiating feature with respect to other urban agglomerations in the region is that it has not yet become a metropolitan area in the strictest sense, although new urban phenomena in its territory would make it necessary to qualify this statement. (López Casado, 2021). It also highlights the strengthening of complementary relationships with other urban areas and the presence of new forms of territorial occupation, where we can observe processes such as the territorialization of the city and the appearance of new centralities, facilitated by the mobility generated by new infrastructure.

Figure 2. Distribution of rural buildings in the first model of territorial occupation: Cordoba



Source: CNIG National Cartographic Base E. 1:25.000 (2020)

and Spatial Reference Data of Andalusia (DERA). Institute of Statistics and Cartography of Andalusia, Council of Economic Transformation, Industry, Knowledge and Universities.

Andalusian Autonomous Government (2020)

This new organizational structure, spreading out from the compact city over an extensive territory, could be defined as a diffuse city model. This model comprises a fragmented and discontinuous territory. The clash between this spontaneous and contradictory arrangement and the forecasts of planning instruments means that there is a dual process of spatial production: one part of the territory is developed within planning guidelines, while the other part lacks the density, functional intensity, continuity, and physical demarcation characteristic of urban fabrics. Here, the nearby rural space is now home not only to the expansion of single-family detached residences and the siting of different types of residential enclaves, but also to public, productive, commercial, leisure, infrastructure, and service spaces. This mix of uses and functions is characterized, on the one hand, by the scattered nature of the various elements of a fragmented and discontinuous

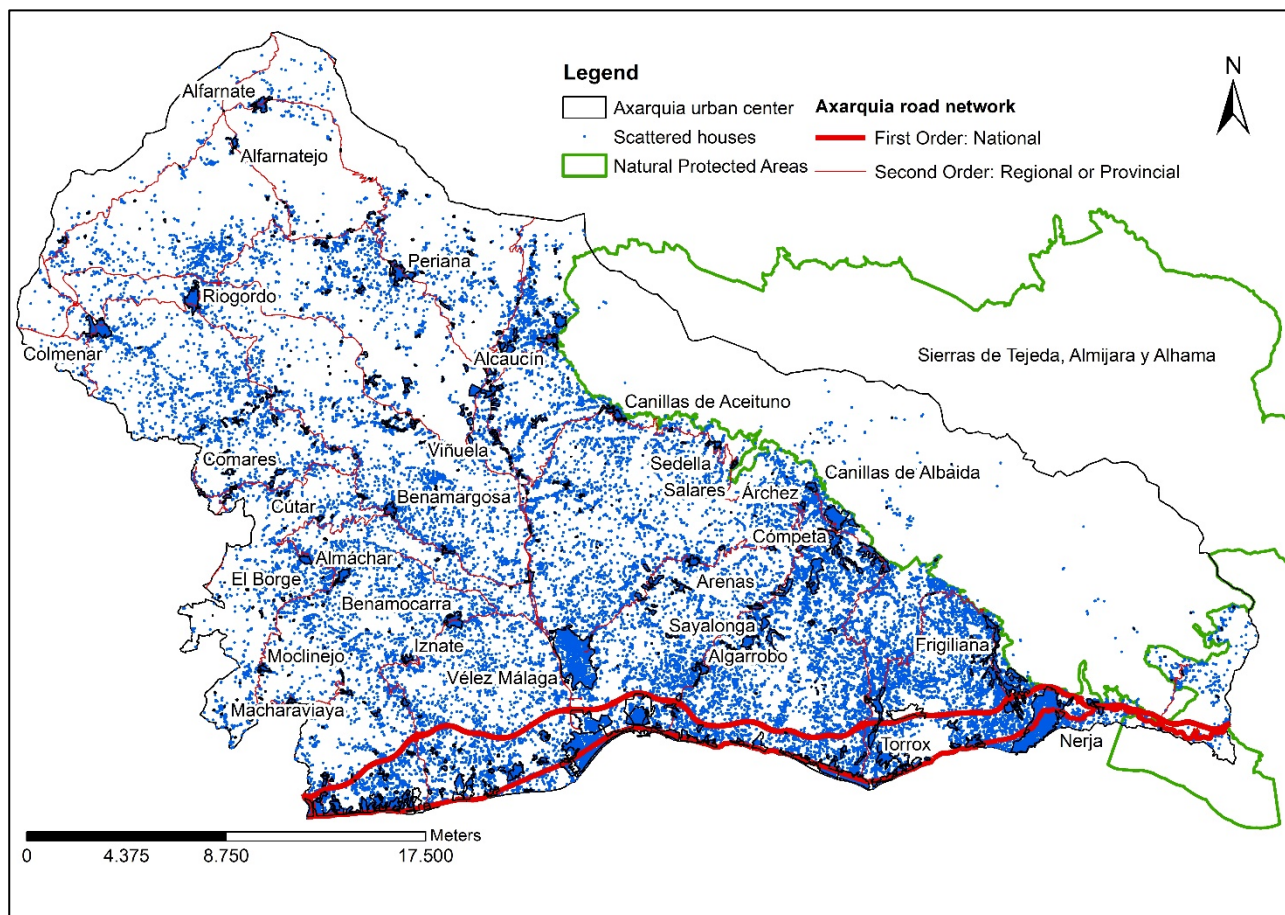
territory and, on the other hand, is the spontaneous and contradictory result of a series of individualized decisions made with no logical strategy for territorial planning.

Two dynamics are at play here: firstly, the extension of residential occupation to areas where there are still natural values, such as the foothills of the Sierra Morena; and, secondly, the transformation of the agricultural areas of the Vega of the Guadalquivir River into a peri-urban environment. The first is characterized by the proliferation of illegal subdivision on rural land, which occurs outside the planning process and with considerable territorial scope. It is in fact a highly dynamic urban process, but one that goes against any planned territorial development. In 1997 there were already a total of 75 plots occupying 3,255 hectares on which some 4,250 dwellings had been built, according to data from the 2000 Cordoba General Urban Development Plan. The second is made up of a combination of actions that transform agricultural land: equipment, services, and infrastructure packages, and agricultural, residential, and industrial construction. Both models involve these rural spaces being occupied by non-conforming uses and the abandonment of productive land, generating transitional spaces between the city and its area of influence, which inevitably means balanced territorial development is severely curtailed.

The second model of rural occupation is the Axarquía area in the province of Malaga (Figure 3). This area is situated in the eastern part of Malaga province and is an example of a dynamic rural area in a coastal environment. It covers 1,023.72 km² of coastal and inland areas and includes 31 municipalities, encompassing both the rural intensively farmed areas on the coast and the inland areas of the region where rain-fed agriculture is predominant. In both areas, agro-tourism activities coexist under a high demand model of isolated dwellings on agricultural plots and intensive agriculture of high productive value. Spatially, there has been a continuous increase in the number of new buildings, either in the form of rural scattered areas or small new developments (mainly in the areas closest to the coast), which, from an economic activity standpoint, has led to a significant rise in construction. In this space, regarded as a rural-urban transition area but with a predominantly rural functionality, a spontaneous and unplanned urban process has taken hold, based on a model of diffuse urban planning on rural land. The origin of this phenomenon is to be found in the territorial occupation process of the Malaga coastline since the arrival of tourism. This has now spread inland, affecting both the most productive agricultural and non-agricultural land, as well as other areas with scenic value or a forestry vocation. Rural municipalities provide the land for the development of this model and thus compensate for having been excluded from the coast's economic development process in recent decades. The

region's local councils view these new initiatives as the only source of activity providing employment for local people and generating income for the municipal purse, something they believe could lead to long-awaited economic stimulation and regeneration.

Figure 3. Distribution of rural buildings
in the second model of territorial occupation: Axarquia



Source: CNIG National Cartographic Base E. 1:25.000 (2020)

and Spatial Reference Data of Andalusia (DERA). Institute of Statistics and Cartography of Andalusia, Council of Economic Transformation, Industry, Knowledge and Universities.

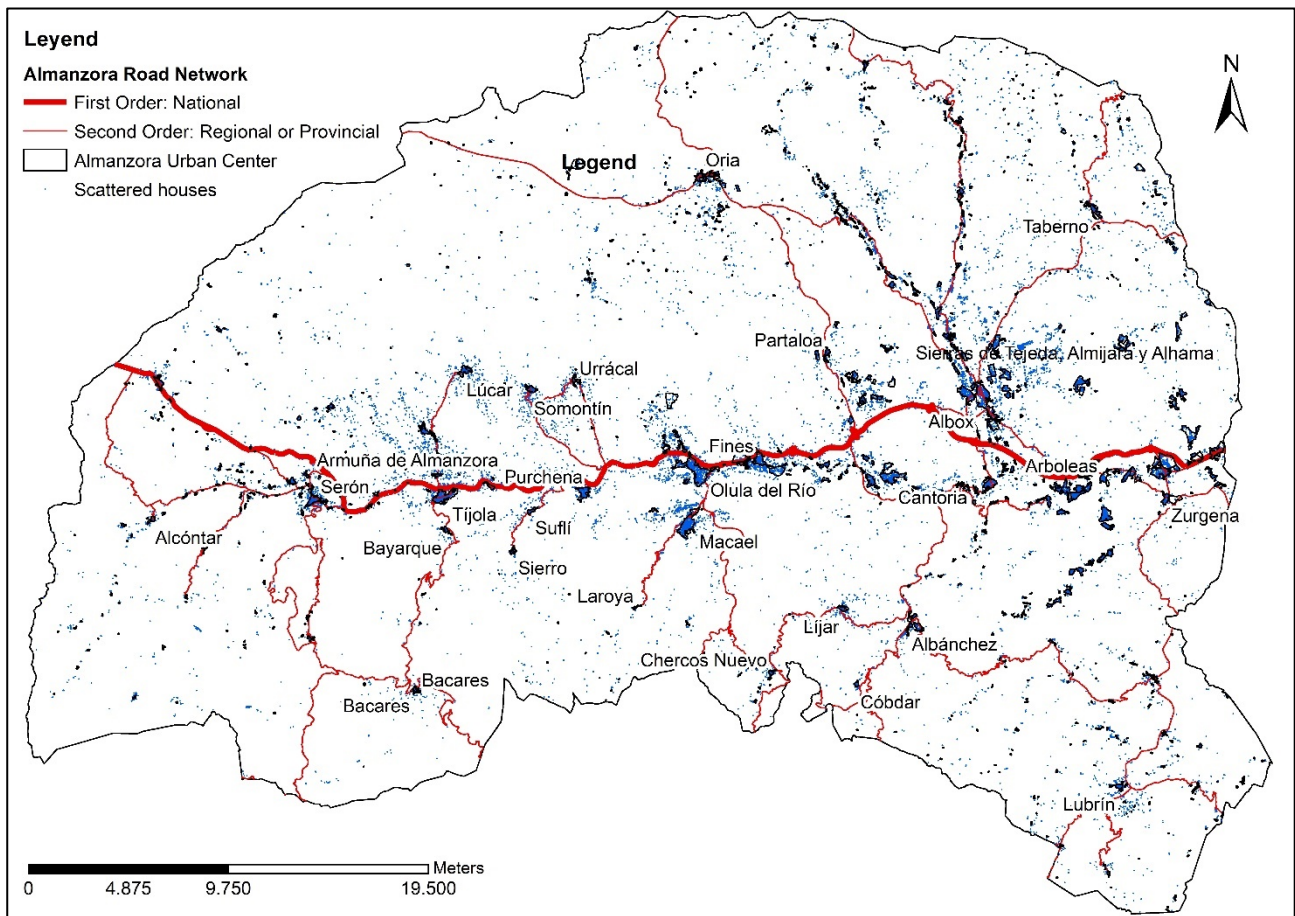
Andalusian Autonomous Government (2020)

The territorial problem addressed here is exacerbated by the very nature of urban planning formulation until recently. Of the 31 municipalities in the region, 10 had no planning documents until recently, neither a General Urban Development Plan nor Subsidiary Regulations based on the various land laws. In addition, six municipalities only had Urban Land Delimitation. Land without planning covered an area of 370.51 km² (36.19% of the district's surface area), comprising 16 municipalities with no planning in place at all. In 2011, in the midst of the housing boom on rural land, not one municipality had yet brought its planning into line with the various

land laws that had entered into force. Such is the case of the planning adjustments that should have been made in compliance with Law 7/2002, of December 17, 2002, on Urban Planning in Andalusia (LOUA), which we recall was intended, among other things, to regulate the urban occupation of rural land. The fact that none of the region's municipalities with existing planning had adapted it at the time to the Andalusian Urban Planning Law as required highlighted important differences in opinion on how planning management has been carried out in recent years and how the law intended it to be done. This exercise was mandatory and should have been done from that date onwards. Moreover, it coincided with the high point of rural space occupation by non-agricultural dwellings. Given this state of affairs, it was only natural that the outcome would be territorial disorder, illegal construction and developments, and numerous cases of corruption. The absence of urban planning instruments was to directly affect the population's general interests, since there was no instrument to tackle fundamental issues such as the provision of general systems and equipment, funding reserves for subsidized housing, recovering for the community the capital gains generated by urban development, the lack of substantive rules applicable to undevelopable land, or proper planning for the urban center and its expansion areas. This all led to a problematic situation where urban planning was not in compliance with the legislation in force, resulting in a high rate of litigation.

The third and final model of rural land occupation discussed in this paper is the Almanzora Valley in Almeria (Figure 4), an example of inland rural spaces with their own dynamics. This third example of urban expansion into rural areas stands out for its dynamism despite not being linked to any metropolitan area or urban center. It is a spontaneous model of rural space occupation due to urban diffusion from various municipal capitals. These are inland agricultural areas of the most agrarian part of Andalusia. In terms of productive systems, the traditional agriculture practiced is evolving into a more commercial, technified, and specialized agriculture with a high demand for water resources (Gil Meseguer and Gómez Espín, 2018). In this area there is a large group of small and medium-sized towns (between 5,000 and 20,000 inhabitants) that form the basis of a traditional system of agro-towns and tend to be demographically stable because of their economic dynamism.

Figure 4. Distribution of rural buildings
in the third model of territorial occupation: the Almansora Valley



Source: CNIG National Cartographic Base E. 1:25.000 (2020)

and Spatial Reference Data of Andalusia (DERA). Institute of Statistics and Cartography of Andalusia, Council of Economic Transformation, Industry, Knowledge and Universities.

Andalusian Autonomous Government (2020)

2.2 Application of geostatistical tools for the analysis of scattered housing distribution patterns

In this section geostatistical techniques with GIS are used to perform the spatial analysis of the aforementioned forms of occupation. The objective is to show the different urban morphologies of the three above cases, based on the dissemination of isolated dwellings on rural land. It is assumed that, despite a tendency towards heterogeneity, there should also be aggregate patterns across the three zones.

This analysis begins with the basic information shown in Figures 2, 3, and 4, taking an inventory of the dwellings linked to rural land and obtaining their x and y coordinates, which were then recorded as a vector layer of points. The resultant sampling range covered an area of 1,250.21

km² in Cordoba, resulting in a total of 57,933 points corresponding to different buildings: an area of 1,023.72 km² in Axarquia with 56,234 points, and 1,767.47 km² in the Almanzora Valley area with 32,166 points.

Before applying this methodology, a series of considerations directly related to spatial statistical techniques will be explained. These techniques in general and point pattern analysis techniques, have three fundamental characteristics that have been taken into account during the method design, since they can affect its configuration: stationarity, isotropy, and edge effect (Rozas & Camarero, 2005; De la Cruz, 2006). The concept of stationarity implies that the entities (the points representing the layout of the buildings) should be normally distributed in the study area, with the same mean and variance, so that the process is homogeneous or invariant to translation. As previously mentioned, if the distribution of single-family dwellings tends towards heterogeneity, the corresponding heterogeneous pattern should show different density patterns in different areas. Isotropy refers to the fact that an isotropic spatial pattern shows the same intensity in all directions (e.g. equal distribution of housing on an irrigated plot of land, as is the case of the first model, Cordoba). The process would therefore be rotationally invariant, whereas an anisotropic spatial pattern (e.g. housing distributed along a stream or a line of roads or paths, as is the case of the third model, Almanzora Valley) varies according to the direction of rotation. Finally, the above parameters may be affected by the edge effect, which will be determined by the spatial scale and, therefore, may have a direct influence on the results of the point pattern analysis. The main reason for this is that the analysis is based on the measurement of the distance between dwellings and, therefore, underestimates may occur near the edges that will need to be corrected.

Next, the definition of the spatial pattern to be analysed is considered. As is known, both simulated and real spatial patterns can be selected. Both options can be useful, but in this case, we have opted for the latter, given that the territorial reality analysed provides the logic of the model. In any case, it is expected that point pattern analysis techniques will reveal the structures generated from the spatial pattern analysis (the arrangement of the entities) and, taking into account their variations in space and time, it will be possible to observe the dynamics of occupation.

Before presenting the methodology, we pause again to reflect on an issue that seems important for the further development of the method. We have realised that to understand spatial statistics it is necessary to understand the concept of random pattern generation, according to which any

area of the plane has the same probability of containing a point, namely a Poisson distribution. It is therefore assumed that if the pattern of points is randomly distributed, this will be the null hypothesis for the analysis, the other alternative hypotheses being that the distribution is aggregated or regular (Rozas & Camarero, 2005). In the case of aggregated patterns, the probability of finding a point in the vicinity of another is higher, while in a regular pattern the opposite is true. This can be determined by the point pattern analysis process used. It can be based on either first-order properties of the entities, the expected number of points per unit area based on their location, or second-order properties, the possible relationships between pairs of points, e.g. the probability of finding nearby points (Galacho & Reyes, 2015).

The spatial point process theory is built based on the previous samples contained in Figures 2, 3, and 4. It is the simplest stochastic mechanism for the generation of a spatial point pattern and is an ideal model for a completely random process, useful as an approximate representation of the pattern observed.

Thus, once the points in the sampling area were recorded, it was determined statistically whether the expected pattern was random (a homogeneous Poisson distribution) or if it differed from a Poisson distribution of the same intensity (Upton & Fingleton, 1985). For this purpose, two tests were performed: a goodness-of-fit test that provided the first signs of randomness, considered to be a rigorous test, and a randomness test using Monte Carlo simulation. The latter consists of generating n pairs of random coordinates, where n is equal to the number of points in the sample, in this case, dwellings. The statistical value is calculated for each series of random coordinates, with the process being repeated a certain number of times. The resulting maximum and minimum values will define the upper and lower limits of the statistical confidence interval (Rozas and Camarero, 2005), which in turn will be taken into account in the calculation.

For the statistical analysis of the spatial pattern, multi-distance spatial cluster analysis, based on Ripley's K -function (Ripley, 1977, 1981), was used. To a certain extent, this method is a cumulative distribution function, since, at each scale or distance r , all pairs of points separated by a distance less than r are used to estimate the value of the corresponding function. At the same time, it is based on the distribution of distances between points that should form a homogeneous Poisson pattern. Ripley's K -function, in addition to working with the second-order properties in which the possible relationships between pairs of points (the probability of finding nearby points) are analysed, estimates them at each distance and summarizes the spatial dependence (clustering or dispersion of entities) over a range of distances. Thus, if a group of points is randomly distributed

in a Poisson process with density λ and the expected number of points on a circle of radius d is $\lambda \pi d^2$, the deviation from randomness can be quantified by Ripley's K -function, which determines whether entities, or values associated with entities, exhibit statistically significant clustering or dispersion over a range of distances, i.e., it reflects the type, intensity, and extent of the spatial pattern by analysing the distances between all points. The function used in this case is a transformation of Ripley's K -function, where the expected outcome at a set of random points equals the input distance. The following equation is used for the $L(d)$ transformation:

$$L(d) = \sqrt{\frac{A \sum_{i=1}^n \sum_{j=1, j \neq i}^n k(i, j)}{\pi n(n-1)}}$$

Where:

A is the area; n is the number of points; d is the distance; $k(i, j)$ is the weight, which (whether or not there is correction) is 1 when the distance between i and j is less than or equal to d , and 0 when the distance between i and j is greater than d . When edge correction is applied, the weight of $k(i, j)$ is modified slightly.

Based on the above, the application of the K -Function was performed with the ArcGis program, which includes the Multi-Distance Spatial Cluster Analysis command (Ripleys K -Function) in the Spatial Statistics Tools module. A total of 25 tests with different configuration options were performed, with the most satisfactory result, in our opinion, resulting from applying the following parameters:

- 1) The number of distance bands. Ten were set (higher values do not seem to produce better results). This parameter determines the number of times that the neighborhood size is increased when analysing the set of points for clustering, and is used to specify the size of the starting distance and/or distance increment. It was observed that it is necessary to select an appropriate scale of analysis, requiring a distance band or a threshold distance for the analysis. In each case it is also necessary to explore spatial patterns at multiple distances and spatial scales to see how the patterns change and whether they may reflect the dominance of particular spatial processes. Ripley's K -function can be used to illustrate how the distribution pattern changes: the spatial clustering or dispersion of the points, when the value of the neighbourhood range distance is modified. This estimator makes it possible to specify the distance to be evaluated and, optionally, to set either a starting distance or a distance increment, or both. With this information, the average number of neighbouring points associated with each point is calculated, with the neighbouring points being those closest to

the distance being evaluated. As the distance specified in the evaluation increases, each point will generally have more neighbours. If the average number of neighbours for a given evaluation distance is greater than the average concentration of points in the study area, it is considered an aggregated distribution at that distance (Mitchell, 2005).

- 2) Statistical confidence is given by what is known as the confidence envelope. The spatial randomness hypothesis provided by Ripley's K -Function was tested by 100 Monte Carlo simulations. The K -function always evaluates the spatial distribution of the points in relation to complete spatial randomness (CSR) where the general assumption that the pattern of points has a random distribution will be the null hypothesis for the analysis. A minimum of 99 permutations were performed to ensure the statistical confidence range for each calculation of the random distribution of the points. For this purpose, the set of points was randomly distributed 99 times in each iteration, coinciding with a level of 0.05 in the Monte Carlo significance test. Although 99 permutations are the minimum recommended to give the model statistical confidence (99 permutations being equal to a statistical confidence of 99%), some believe that it is better to perform 999 permutations, which would result in a statistical confidence of 99.9% (Marriot, 1979; Besag & Clifford, 1989).
- 3) There is an option to set a weight field representing the number of matching entities at each location point. Here it has been preferred to perform the unweighted K -function because it was considered that the assignment of weights could determine the expected results, since those in the weighted K -function will always be more clustered than when applying the unweighted K -function. Setting a weight field also influences the calculation of the confidence envelope or statistical confidence. Since no weight field was specified, the weight field was derived from the random distribution of points in the study area and $L(d)$ was calculated taking this distribution into account. Each random distribution of the points is closely related to the number of permutations specified in the previous point. This does not interfere with the process subjectively or with the intention of directing it toward a particular goal.
- 4) Other parameters that can be included are the distance from which the cluster analysis will start and the incremental distance from each iteration. The value entered must be in map units, i.e., they must be numerical values corresponding to the map's coordinate system, typically a projected coordinate system as a geographic coordinate system would not be valid. The particularity of applying these parameters is that the pattern is aggregated with greater significance if the distances included are greater. Or alternatively, at smaller distances if the

pattern is aggregated, it is observed with less evidence. Here, three distances have been tested: 1,500, 2,500 and 5,000 meters, with varying increments and the amounts determined by the sample size used.

- 5) As mentioned earlier, the edge effect must be taken into account when refining the final results. Based on the wide literature on the treatment of the edge effect in forest ecology the following method (Getis & Franklin, 1987; Goreaud & Pélissier, 1990; Haase, 1995) and Ripley's edge correction formula have been tested. For all points (j) in the vicinity of point i , this method checks whether the edge of the study area is closer to i,j or closer to i . If j is closer, additional weight is given up to point j . All points that are farther away from the point in question are overestimated with respect to the previous ones. Thus, all neighbouring points that are farther away from the point in question than the edge of the study area are assigned an extra weight. Admittedly, this method is more appropriate for rectangular or square areas, which is only partially true for these areas of application.
- 6) Another parameter is the definition of the study area by specifying a layer with the boundary of the study area. It is important to take this parameter into account since the K -function is sensitive to the size of the study area, giving more homogeneous results at smaller scales and vice versa. It is convenient to introduce a layer with the boundary of the study area because it significantly improves the results. Otherwise, the tool uses a minimum enclosing rectangle that encompasses all points of the study area, which will not necessarily produce the necessary alignment with the x and y axes.
- 7) Finally, the $L(d)$ transformation is applied to linearize the function and stabilize the results.

The aim now is to show the magnitudes of the areas where clusters may occur. Kernel and Point Density estimates are non-parametric estimation methods where density function formation does not impose such rigid assumptions on the data as in the parametric approach and are a useful way of locating point concentrations using density estimates. If the spatial pattern of distribution tends to be aggregated, it should show different densities in different areas, since this type of spatial analysis calculates the density of points per unit area. On this basis, spatial models of distribution patterns can be represented from the sampling information that is established, based on the aforementioned descriptors and by applying cluster assignment tools such as Point Density maps (Khosrow-Pour, 2018).

2.3 Analysis of the main propositions of the Law for the Promotion of the Territorial Sustainability in Andalusia (LISTA) with respect to the urban regulation of rural land settlements

As is well known, the rural environment is a geographical area juxtaposing many activities (agricultural, forestry, hunting, residential, commercial, industrial, etc.) that have not been properly covered by the limited legal concept of undevelopable or rural land. It is thus significant that, while successive land laws have been biased towards the regulation of urban space and its potential growth areas, not the slightest attention has been paid to the forms of rural land occupation and settlement processes. Aside from the areas protected for their natural, cultural, or other values, and those affected by obvious natural hazards, other parts were virtually forgotten until some autonomous communities began to regulate them three decades ago using their own criteria. Andalusia is a case in point, where various laws and regulations have been passed culminating in the law referred to here.

Without going into detail, until the new Law was enacted a key issue was the recognition of the existence of rural land settlements other than traditional urban population centres, and which required regulations in keeping with their special characteristics. In Andalusia, the regulation of rural land settlements is relatively recent, with Law 7/2002, of December 17, 2002, on Law of Urban Planning of Andalusia (LOUA) being the first to specifically regulate them and, paradoxically, define them as Scattered Rural Habitat. Nevertheless, this regulation turned out to be very vague and imprecise so Decree 2/2012 of January 10, 2012, regulating the regime of existing buildings and settlements on undevelopable land in the Autonomous Community of Andalusia, was later approved. This Decree strengthened the regulation of these settlements and obliged all municipalities to identify, delimit, and incorporate in their General Urban Development Plans all settlements on undevelopable land, distinguishing between urban settlements and Scattered Rural Habitat areas. At almost the same time that Decree 2/2012 was passed, Law 2/2012, of January 30, 2012, amending Law 7/2002, of December 17, 2002, on Urban Planning in Andalusia, was also enacted. Among other provisions, this Law modified the concept of Scattered Rural Habitat, introducing more flexible criteria for its identification. In principle, all these legislative changes were aimed at supporting the management of existing rural land settlements. Since the LOUA (now repealed by the LISTA) came into force, such planning had been subject to great legal uncertainty, in such a way that in many cases it was circumvented by the PGOU or postponed pending more precise and developed regulation. However, once the work of identifying and delimiting these settlements had been carried out by many

municipalities, it became clear that the regulations established in the applicable legislation in Andalusia up to that time were not suited to the urban and territorial reality of these settlements.

Three very important issues are of interest for our analysis and are contextualized in Law 7/2021, of December 1, the Law for the Promotion of the Territorial Sustainability in Andalusia. The first is that it standardizes urban and territorial planning in Spain's most populated autonomous community (repealing Law 1/1994, of January 11, 1994, on Territorial Planning (LOTA), and Law 7/2002, of December 17, 2002, on Urban Planning (LOUA). Secondly, it once again classifies land as urban or rural, thus eliminating the category of developable land, something that had already been in place with the passing of State Law 6/1998, of April 13, 1998, on Land Regime and Valuations. Thirdly, the new regulation seeks to legally incorporate in rural land regulations those buildings that were built illegally and whose illegality is now subject to the statute of limitations.

On the first point, the LISTA duly regulates the urban transformation actions applicable to each land class, but its regulatory scope will also make provision for territorial planning, coastal protection, and landscape preservation. At the same time, it develops a system of secondary planning instruments, including the Partial Management Plan for new planning actions on rural land and the Special Plan for interior reform on urban land. To understand the significance of these provisions, it is worthwhile briefly recalling the recent history and territorial evolution of urban planning legislation in Andalusia, since analysis of some of the existing effects could shed light on the future application of the new Law. This background analysis leads to the obvious conclusion that the attempt to merge the Law of Urban Planning of Andalusia (LOUA) with the Territorial Planning Law (LOTA) was a success and that a joint overview of both spheres was necessary for rethinking territorial development, not only for planning future urban spaces, which will inevitably be on both an urban scale and territorial scale. However, in this new context, urban and territorial planning should consider the urban and territorial scales as a whole, without one taking precedence over the other (historically the urban over the territorial), so as to avoid repeating the same mistakes of the past. For us it is clear that the territorial scale, the unresolved issue of municipal planning, must be considered entirely if the problems of municipal planning are to be overcome, whether from a supra-municipal perspective or with specific reference to rural land, which has no regard for municipal administrative boundaries. This should also require local councils to consider other issues arising from new modes of strategic land use and related infrastructures on a supra-municipal scale, forcing them to seek solutions outside their own

municipal areas and, therefore, outside their own jurisdictional frameworks, which could lead to problems of compliance.

The above detailed analysis of the Law's explanatory memorandum and its contents suggests that it has little to do with a desire to make urban planning more flexible by establishing clear and simple rules tailored to the current situation in order to streamline urban development instruments, nor is it possible to achieve this, however well-intentioned its objectives or the urgency surrounding its drafting. This is because the discussion around city and territorial physical planning has been replaced by an endless legal and administrative debate which, albeit necessary for the development of planning, is neither sufficient nor capable of single-handedly solving the territorial problems that are currently hanging over urban planning.

In our opinion, many territorial intervention initiatives on rural land have not succeeded because political and economic interests prevailed over decision-making guided by territorial and environmental rationality, or by the resources' actual capacity to support economic development, the main one being land. It is therefore hoped that the urban-territorial planning instruments drafted in its wake will address issues such as functional conflicts arising from new economic strategies and needs, the new types of emerging functions, and the redefinition of the old methods of distributing land use on rural land. By this we mean that the concept of territory needs to be revised. It calls for a different approach and for territory to become the predominant subject driving understanding of how the urban process extends from the cities. Urban sprawl and the displacement of uses and ways of doing things to the rural environment cannot happen as a pretext for the mere extension of the diffuse economy. Although it is a matter for planning and not for the Law itself, the latter does not support the territorial planning that Geography demands today, and which goes beyond the bureaucracy of metropolitan planning, so completely out of touch with the reality of the rural environment. The territory's role in city construction must be taken into account and not vice versa, with the city building the territory.

The second issue mentioned above is the reclassification of land into urban and rural, thus eliminating the category of developable land, something that State Law 6/1998, of April 13, 1998, on Land Regime and Valuations, had already established. Given its basic nature, this provision had a profound effect on regional legislation on urban planning and land, as it had an immediate impact on the classification of land. It also significantly reduced the Autonomous Communities' power under their own land and planning policies to determine which land should be preserved from the urbanization process. This state regulatory framework was pushed to the

limit by the subsequent Royal Decree-Law 4/2000 on urgent measures for liberalizing the real estate sector, which clearly stated the reduced nature of undevelopable land by defining it only as land eligible for protection and thereby extending the remainder of the primary category (common undevelopable land) to the category of developable land. The LISTA establishes the categories of common rural land and specially protected land. The latter category will only include those lands that require the application of the principle of irreversibility clause imposed by sectorial legislation, and which state legislation establishes for those spaces whose values make permanent protection advisable. In order to make this distinction, the law includes the concept of preserved lands. These are lands that, due to their values or circumstances, urban planning itself deems necessary to temporarily preserve from transformation or those others that involve certain risks, while such risks remain.

Finally, the third point concerns the fact that the new regulations will enable the legal integration into rural land regulation of those buildings that were built illegally and whose illegality is now subject to the statute of limitations. This means once again the de facto legalization of all those isolated buildings, which may even have formed compact settlements, that came into being illegally or irregularly without urban services and that occupy spaces indiscriminately, that is to say, not in accordance with the planning criteria in force. We believe that this is the main rural land management problem to be addressed by the new Andalusian land law, now also territorial in its scope and not just urban, namely finding a solution to illegal housing, which in Andalusia stands at some 300,000 dwellings. At this time, it is impossible to give a more exact figure. It is stated that the regulation will reinforce territorial and urban planning discipline, the environmental and territorial integration of those buildings whose illegality has become subject to the statute of limitations, and the regulation of rural land, although how this will be done has not been spelled out. This may be because it is not its purpose, although it would have been helpful to outline the mechanisms.

The only stated goal is to put an end to the proliferation of illegal buildings on rural land, which does not mean management via urban planning mechanisms, which is why the Corps of Sub-Inspectors for Land Planning, Urban Planning, and Housing of the Andalusian Autonomous Government was created to support the Corps of Inspectors for Land Planning, Urban Planning and Housing. It is understood that these bodies will enforce the legal urban planning regulations but will not be able to arbitrate measures for the environmental and territorial adaptation of illegal buildings, given their defining nature. We assume that there will only be measures to minimize or reduce the impact of such actions, which are particularly serious in the case of groups of illegal

buildings, through the application of a special regime for illegal buildings considered on an individual basis. This will involve special environmental and territorial adaptation plans for groups of illegal dwellings and the possibility of incorporating such buildings into the city model through a new urban development action.

On this issue, we believe that a clear distinction must be made between what can be considered as scattered or dispersed settlements and the other concepts mentioned at the outset. Some authors call this dispersed or diffuse urbanism, the former being a historical and very characteristic mode of settlement in many rural areas of Andalusia and Spain and, as such, is neither punishable nor harmful but should be studied and regulated in accordance with its special characteristics. The latter is a recent phenomenon that is totally removed from the morphologies and architectures typical of rural settlements and has created significant territorial imbalances in many areas, as we have observed in the areas analysed above: the metropolitan area of Cordoba, the Axarquía region of Malaga, and the Almanzora Valley in Almería.

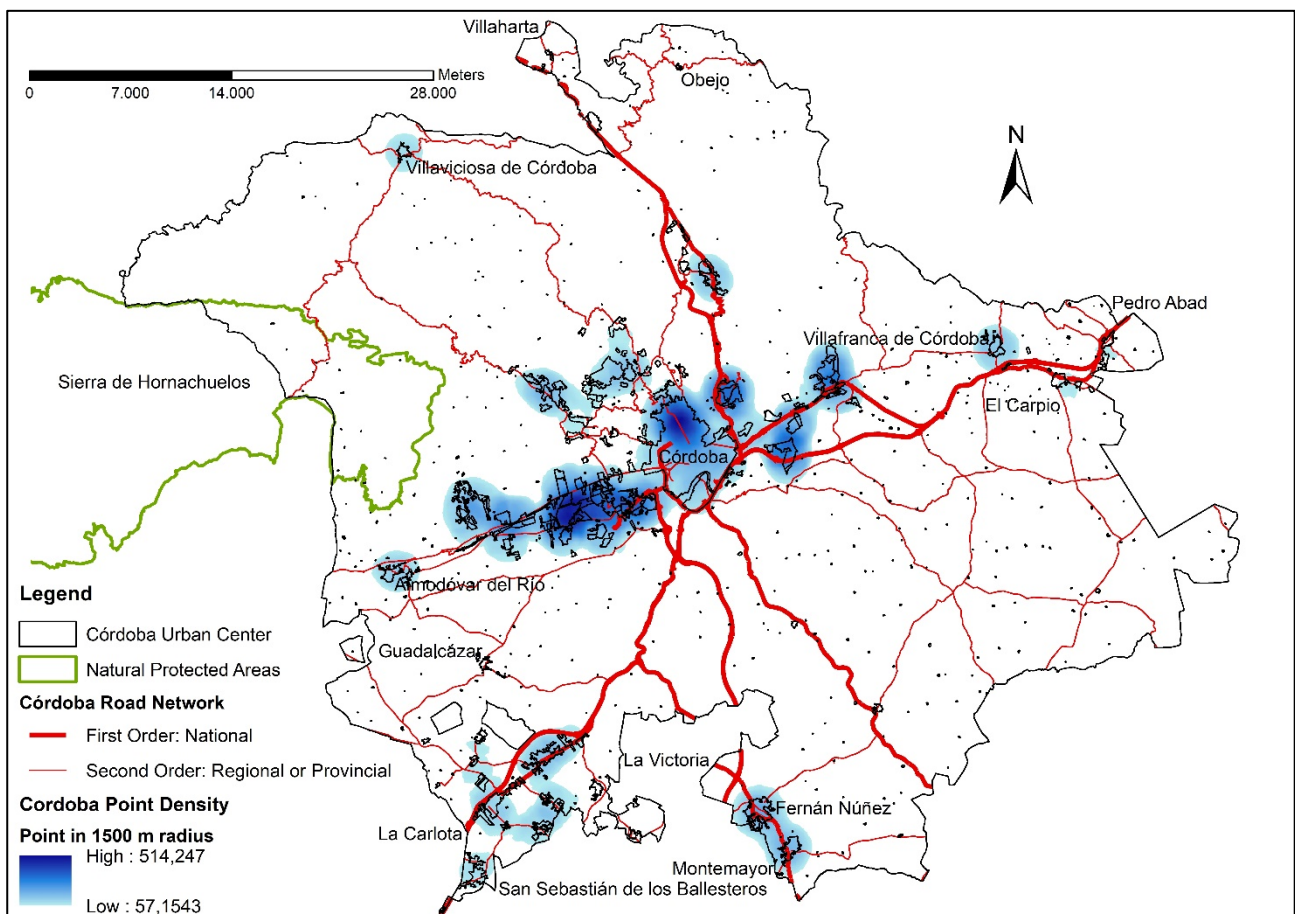
3 Results

Our intention has been to propose a method to identify geographic distribution patterns of rural housing, as we think that such a method can help us to evaluate hypotheses about their behavior and, above all, about the occupancy model that may have generated the observed pattern. The hypothesis is that the spatial heterogeneity stemming from the isolated implantation of rural housing conditions the territorial structure and coexistence of uses when agglomerations or settlements are formed, which tend to arise under random processes of densification. From this operational perspective, we could analyse the characteristics of the implementation process in areas where the spatial statistical estimators and functions used indicate that there is a higher probability of housing concentration on an individual or isolated basis. The knowledge gained from the areas studied confirms the accuracy of the predictions made and raises the possibility of new spatial analyses that could be carried out with the spatial analysis tools provided by the GIS.

At the same time, the results obtained show that the distribution pattern in the areas studied tends more towards a grouped or aggregated distribution. This confirms our initial hypothesis, which stated that the massive implantation of rural housing in recent decades is producing a spatial pattern of aggregated distribution, with the formation of housing agglomerates that originate from individual implantation. With the results from the application of the geostatistical techniques we were able to detect the distribution pattern in a statistically reliable way and with an easy to interpret graphical representation as shown in Figures 5, 6 and 7.

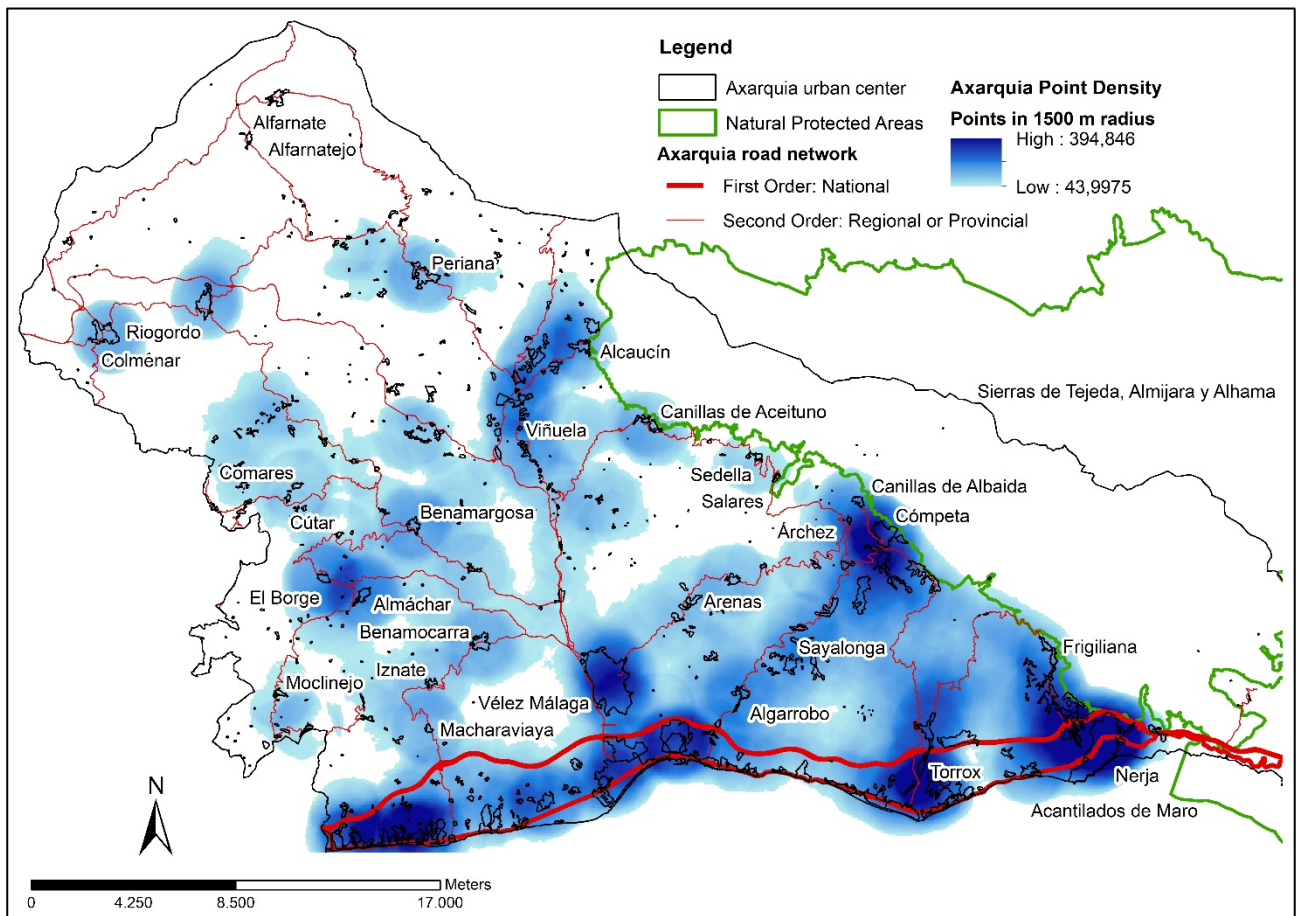
Likewise, the use of the aforementioned techniques reveals the territorial problem we are dealing with. The first step in the analysis is to clarify the typification of the patterns: regular - Cordoba area; random - Alanzora Valley area; aggregated - Axarquia area. A more detailed and multidimensional description based on functional statistics or the formulation of explicit models of the underlying process can be made later, and would require a separate text. Furthermore, it is shown that cluster mapping tools are useful for showing the territorial distribution of the analysed phenomenon. These tools are especially useful when it is necessary to show the location of one or more clusters, following statistical analysis of the distribution patterns. The result of the application of this function is shown in Figures 5, 6 and 7. The value of these maps is contingent on the fact that the design of the municipal spatial planning to be carried out in the Municipal Development Plan (PGOM, acronym in Spanish) envisaged in the development of the LISTA must not ignore the territorial trends shown, namely trends towards the concentration of isolated dwellings, which may form settlements and clusters in the areas shown on these maps.

Figure 5. Concentrations of rural buildings according to density estimates in the first model of territorial occupation: Cordoba



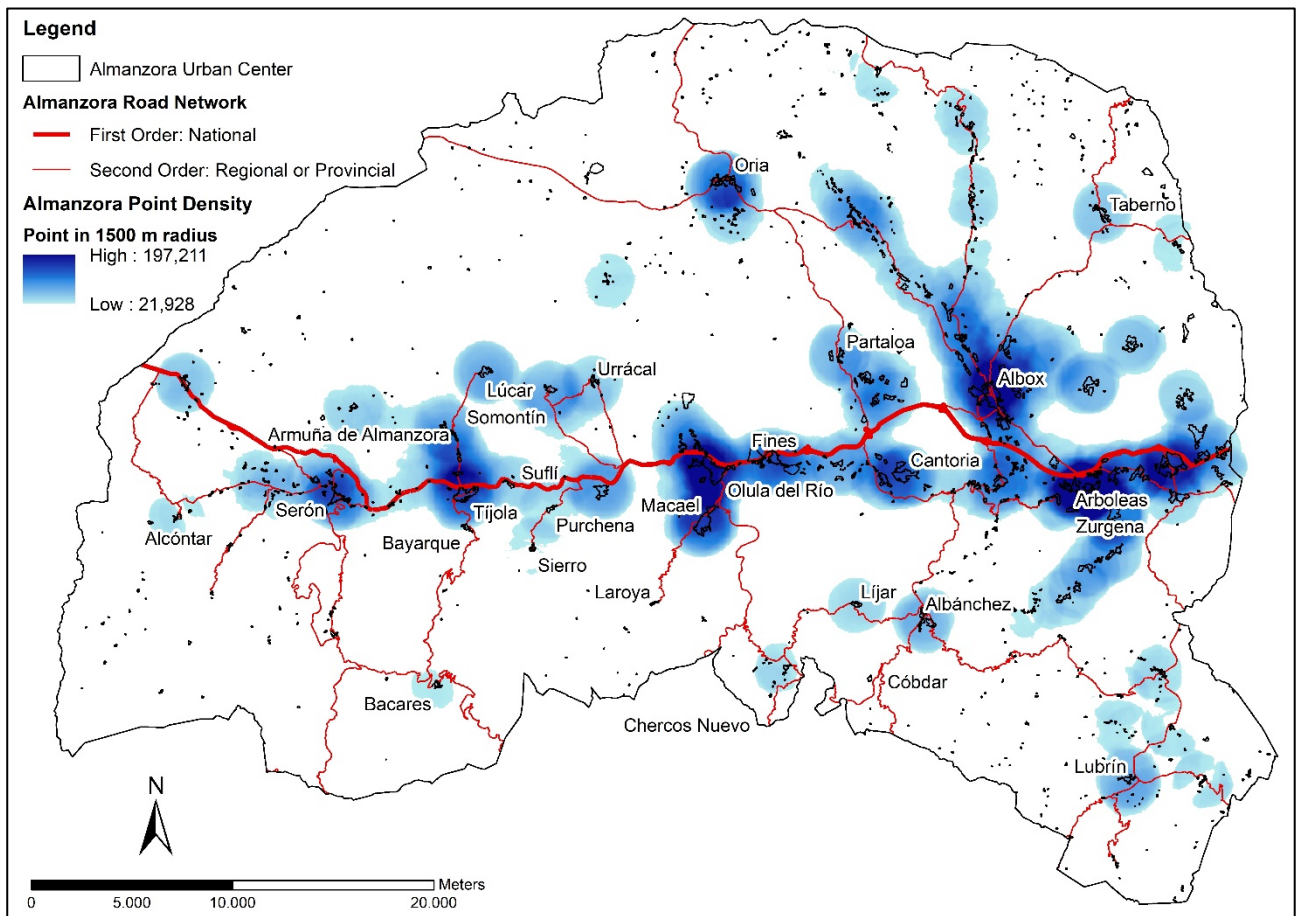
Source: own elaboration

Figure 6. Concentrations of rural buildings according to density estimates in the second model of territorial occupation: Axarquía



Source: own elaboration

Figure 7. Concentrations of rural buildings according to density estimates in the third model of territorial occupation: Almazora Valley



Source: own elaboration

4 Discussion

In the introduction of this paper, we started from three issues that have governed this research: 1) The models of occupation of rustic land have been inconsistent with the postulates that should govern an urban regulation that seeks to be respectful and harmonious with the peculiarities of these rural spaces. 2) The new Law must address the social and territorial problems derived from the "not" policies carried out, and after years of occupation and crisis, it must direct the drafting of the new planning instruments towards the effective management of rustic land, and 3) The real estate market of rustic land should not be done using institutions through political power.

Regarding the first question, in the previous section we have made an analysis of the territorial reality that we have shown in the previous section and the options for urban regulation that the Andalusian Land Law proposes for the rural land of these areas. Two factors must be considered. In the first instance, one of the main goals of these legislative changes should be to facilitate the

management of existing and future settlements on rural land. It must be pointed out that the new Law's postulates lean towards replacing the territorial model that the Andalusian Autonomous Government had been developing, which was based on the compact city model established in the Territorial Planning Plan of Andalusia (POTA), with a dispersed city model. Now local councils will be responsible for recording rural settlement processes in their areas, identifying, and setting the boundaries of rural settlements, as well as the clustering of scattered rural buildings that have a tendency to form settlements. Secondly, to all intents and purposes, the planning processes for the grouping of isolated dwellings that could form settlements must be ascertained and a determination must be made as to whether the regulations established in the applicable legislation will be effective for their proper management. In many cases, these settlements will be of different origins, ranging from historical origin in some cases, to scattered origin and contemporary growth in many others, so management of them should be differentiated.

The Draft Decree enacting the Regulations of Law 7/2021, of December 1, for the Promotion of the Territorial Sustainability in Andalusia, aims to finalize the Autonomous Community's regulatory provisions on urban planning within the legal framework of the Andalusian Land Law, and establishes that, among other matters, it will regulate the following (Andalusian Autonomous Government, 2022): unique settlements, actions on rural land, land-use planning instruments, the equal distribution of burdens, and the approach to illegal buildings.

With regard to unique settlements, we believe our analysis shows that clear criteria should be established for the delimitation of the scattered rural habitat and traditional urban nuclei in order to decide on appropriate planning and management. Figures 5, 6, and 7, which give an overview of the settlements and trends in building concentration, indicate a major problem in terms of delimitation because neither the LOUA nor Decree 2/2012 established criteria for settlements, and because the Administrative Regulations for the drafting of the advances provided for in Article 4 of Decree 2/2012 established a criterion that was inappropriate for the delimitation of the Scattered Rural Habitat, requiring the existence of at least 15 dwellings. With respect to this minimum number, we can see that in some of these settlements there are fewer than 15 dwellings, but they have a clear functional relationship. Furthermore, the nature of a rural settlement is not undermined by there being fewer than 15 dwellings, a parameter which, nonetheless, is indicative and lacking in any justification whatsoever. In these cases, the criterion should be the verification of their historical origin and link to the rural environment, as well as the existence of a minimum grouping of buildings that, regardless of their total number, requires a

planning approach that is not covered by the regime applicable to isolated buildings due to their grouped nature. A further problem for the identification and delimitation of rural settlements in Andalusia that raises some questions is the permissible number of buildings that can be integrated into a settlement, without being of traditional character or having a link to rural land. This situation has already been examined by the Autonomous Government in some of the advances prepared for the identification and delimitation of existing settlements on undevelopable land in accordance with the requirements of the Order of March 1, 2013, approving the Administrative Regulations for Urban Planning in development of Articles 4 and 5 of Decree 2/2012, of January 10, which regulates the regime of existing buildings and settlements on undevelopable land in the Autonomous Community of Andalusia.

Local councils have been questioning the provisions established in this order because of the types of housing included and even because of the very criteria, for being too rigid and in many cases not in accordance with the territorial reality of each case. For this reason, they have been drafting guidelines for the identification and delimitation of the existing settlements in the undevelopable land within their municipalities. Above all, this is to clarify the actions to be taken when an illegal building is detected on undevelopable land (Romero, 2016).

There are no clear precepts on the procedure for the implementation of ordinary and extraordinary actions on rural land and the determination of the conditions that regulate the processes leading to the formation of new settlements. In order to at least partially speed up all these provisions and avoid any delays in completing the review of the future General Municipal Planning Plans, specific planning advances have been drafted to identify and catalogue isolated buildings and existing settlements in the municipalities' rural land. This is so that the legalization of isolated buildings can be applied for as soon as this advance is approved. Although these measures are a step forward in the approach and planning criteria to be followed in general planning, they create greater uncertainty when it comes to establishing the criteria for the detailed planning of the settlements to be legalized, and for the subsequent and necessary management and development of these areas, including the basic urban planning services that they must have.

In this sense, the new Law assumes the territorial planning instruments, so the contents and provisions, approval procedure, and development of them must be clarified. This is especially so because it is necessary to recognize that the construction of housing and other buildings on rural land in recent decades has been partially linked to second home and leisure purposes. Historically, however, this land has been used intensively for residential purposes, originally

consisting of isolated dwellings linked to agricultural activity and which, at present, is still a social demand that has not been addressed by urban planning legislation. This is because the housing built in recent years has no such connection, except partially in some cases, because agricultural activity is no longer a relevant sector in the economy of the municipalities of the selected areas and in Andalusia in general.

This has led to the proliferation of buildings intended for housing on rural land without the required construction license, or it being null and void in many cases, which has become a major problem for those responsible for planning management in Andalusia. This situation is aggravated by the fact that many of them are in agricultural areas of high productive value, in areas exposed to natural hazards, flooding in particular, and in natural areas of great scenic value.

Regarding the second question that has been raised in this investigation, it is worth mentioning that the new Law still must satisfactorily resolve the enormous social and territorial problem of illegal buildings on rural land. Such regulation is still to be examined or finalized. In the case of isolated dwellings, it has been decided to adopt the Assimilated to Out of Order (AFO) regime. For this purpose, a specific procedure is established for granting AFO status, which is the route to legalizing isolated buildings (Jordano et al., 2015). This AFO status is mainly applied to isolated buildings for which the time limit for adopting legal protection measures for urban development and the reestablishment of the infringed legal order has expired.

In any case, it was Decree 2/2012 of January 10, regulating the regime of existing buildings and settlements on undevelopable land in Andalusia, which classified and differentiated the situations of the buildings both by their form of implantation (isolated, urban settlements, scattered rural habitat) and by their compliance or otherwise with the provisions established by the territorial and urban planning of the time. This distinction established the rules and procedures applicable in either case, about their integration or not into the urban planning system, or their regularization as Out of Order. Integrating these settlements, when appropriate, would mean legalizing them, although it was stipulated that this must be at no cost to the administration. This proved to be a serious contradiction that is still present in the new Law. This integration had to be carried out during the review of the General Plan, through its classification as unconsolidated urban land, or as developable land, which in our opinion created a major problem. It impeded compliance with the provisions that gave meaning to its regulation, since urban services were not taken over by the administrations, which would justify consideration of the intended land qualification. The

classification of urban settlements as developable land was generally more of an exception, which was emphasized in the case of those disconnected from existing nuclei.

In this context, the new Law covers these points, but by stipulating the rural and urban land classifications and removing developable land, and bearing in mind that the regularization processes may not imply any cost for the administration as mentioned above, it must now be approached not only as a social problem but also a territorial one. How will land affected by settlement formation processes be classified, as rural land or unconsolidated urban land? Does unconsolidated urban land assume the functions of developable land? As might be expected, the land classification will directly affect how the land is managed. It must be understood that settlements that are considered as unconsolidated urban land must be developed within a reasonable time frame and, consequently, the local council, as the planning management body, must make a commitment to ensuring this happens, for example, by completing the urbanization works. In this sense, the relationship between the equal distribution of burdens and benefits in urban development and urban transformation is established, making it necessary to draw up the instruments to guarantee fair distribution. In some cases, the homeowners' associations, which must be constituted beforehand, will have the economic capacity to connect the homes to the municipal water supply and sewage networks, for example, but not always. In other cases, the costs will be unaffordable privately for different reasons: distance to the main network, technical complexity, and the extent to which the buildings are scattered, among others. In short, the geographical and economic characteristics of many territorial areas will make it impossible for the duties assigned to them by the Law to be fulfilled. A determining factor will therefore be the land's geographic position. If certain rural areas should gradually be incorporated into the urban space, planning should consider them as newly formed fabrics that can therefore be connected to existing ones. For this, a necessary condition would be that they are in places where the coordination between the new and existing areas can be achieved under optimal conditions. Surely this would be a territorial approach?

On the other hand, the maintenance of the rural status of land should reflect the fact that it fulfils an important role that should not be displaced by urbanization. Designating land as rural should therefore be seen as a positive act of delimitation. Current usage and characteristics would be preserved, given that they should have sufficient value to overcome the possibility of urbanization, and they should not be subject to the demands and possibilities of urban growth. It is clear that, in principle, this respect for single-family housing should be applied differently in those lands that remain rural land due to their inherent qualities as opposed to others that do so

because they are not necessary for urbanization. On the other hand, dwellings located on land of agricultural or landscape interest, etc., may require specific protection regulations, which should be provided in general planning or possibly covered by special plans.

Finally, with regard to the third question we have raised: the real estate market of rustic land should not be done using institutions through political power, the new Law is faced with the territorial problems described above, and it is clear that the path towards proper territorial management is not smooth, since economic activity and the occupation of rural land is currently still being channelled through the mimesis of traditional urban planning, as Gómez Moreno has already highlighted with reference to Malaga's current 2011 General Urban Development Plan (Gómez Moreno, 2020). This has been a historical trend and is a problem that has not yet been solved. In its most recent phase, the evolution of the urban process is shaped by the will of certain social, political, and economic forces, which persist in imposing the same system of territorial occupation in urban spaces that has prevailed until now, even though the current situation calls for different environmental and social aspects to be considered. This paper therefore questions the continued adherence to traditional urban analyses based on individual urban spaces and the rural-urban dichotomy.

The incursion of the urban process has created considerable tension in Andalusia's rural municipalities, in some cases in spatial frameworks of traditional isolation, weakness, and vulnerability, and in other cases, accepting a mix of urban and non-urban uses that cannot be easily accommodated by the territory. As a result, they have been facing strong urban pressure that has manifested itself in the dispersion of isolated or individual dwellings. In this regard, it is worth considering the thematic antecedents related to the dispersion of housing in forest areas (Badia et al., 2021) as an example. It is also reflected in the demand for land for residential uses in settlements, in the scheduling of spaces for large renewable energy production plants, in new agro-industrial facilities such as large livestock farms, more recently known as macro-farms, and in spaces for leisure and recreation based on natural resources, among others.

The occupation of rural areas by housing and buildings has progressively increased in recent decades in Andalusia and has had and continues to have very different ways of implanting itself and a variety of purposes. The urban model has been moving away from the typical patterns of compact, medium-density Mediterranean cities in favour of diffuse cities, with a blurring of the rural-urban boundaries. In rural areas, the profusion of urban uses not linked to the rural environment has transformed landscapes, to the extent that rural land is no longer simply the

environment in which agricultural economic activity is carried out, but also supports other uses, linked above all to residence and leisure. The often irreversible and cumulative territorial repercussions have been extremely diverse and of varying degrees of intensity, leading to a transformation, if not deterioration, of the environment and landscape. Above all, however, what is noticeable is the territorial disorder that is the natural consequence of the spontaneity of the process and lack of control over it.

Despite the wide-ranging regulatory repertoire, most of the settlements that are scattered on rural land throughout Andalusia, having sprung up on the margins of urban planning legality and on which the possibility of action via urban planning mechanisms (reinstatement operations, demolition orders, penalties, etc.) has been imposed, remain unregulated, with the consequent problems that this pose. For this reason, the purpose of this paper is to provide a reflection on the legislative approach to illegal settlements in Andalusia. Based on the basic scenario set forth in the LISTA, which separates the characteristics of land in a simple rural situation from land considered to be urbanized, we have examined the different territorial models that will be encountered when implementing the legislation in question. This paper shows that tackling this problem in the Autonomous Community of Andalusia will be crucial to coherent and structured territorial development, and that opting for legalization alone will not solve this issue. It is clear that the solutions are specific to each case and to the urban circumstances of each settlement, meaning that Andalusia currently has no clear legalization model that could be transferable or applicable to territorial planning.

The outcome of all the above is that the Law must address a territorial reality that is increasingly complex and needs to be addressed by urban planning. That said, there is a need for imaginative, but not risky, thinking that integrates the social, environmental, and economic objectives and systems of action. In our opinion, in the public management of the territory through the implementation of the Andalusian Land Law, care must be taken to ensure that the ideological forms inherent to urban space theory, which has been gaining ground since the end of the last century, do not end up legitimizing the private ownership of rural land and land speculation. On this basis, planning documents should be drafted that will affect many seriously dysfunctional areas, otherwise the future socio-economic context of the municipalities will be jeopardized. We start from the premise that a re-evaluation of the current trend of occupation and allocation of uses on rural land in Andalusia is required, fundamentally in those areas that can be classified as dynamic, and that their transformation into new territories with functionalities that are more acceptable than the current ones should be rethought. When drafting their

planning documents in accordance with the LISTA, municipal authorities must therefore consider the changes introduced by the urban process within the socio-cultural, environmental, and economic context of their rural areas, which should be duly analysed to identify the impacts on their rural nature and assess the possibility of resurgence and revaluation of rural land towards a return to a framework that is as non-artificial as possible.

5 Conclusions

The legislative changes that should serve to promote the management of existing settlements in rural areas which, since the entry into force of the LOUA, has been subject to great legal uncertainty in such a way that it has been in many cases bypassed by urban plans or postponed pending a more precise and developed regulation. This has given rise to a problem of spatial planning and management that must be addressed by the LIST, once pragmatism and surrender to a reality that cannot be redirected: in the end, the new legislative framework is nothing more than a great massive regularization of the irregularities existing in Non-Developable Land.

With these premises in mind, we would like to end this paper by taking a closer look at the concepts of resilience and regeneration (Amado et al., 2016), as theoretical concepts with which to approach the design of the precepts to be implemented in this field. As the results of the application of spatial analysis techniques have shown, the trend towards the concentration of scattered housing and the formation of new settlements must be carried out with sufficient certainty to ensure that measures and procedures that are inconsistent with the dynamics of the territorial reality, which can be observed through the application of these techniques, are not being adopted.

The use of resilience in the rural environment requires a reworking of the concept, as we should not forget that it is one that has been applied mainly in the urban environment. Therefore, the nuances that occur in the rural environment must be incorporated conceptually. Resilience then takes on an attractive and hopeful perspective with respect to its application in this field, often theorized as an adaptive system. Its use in this research is considered opportune because it allows for the conceptual inclusion of the tensions in rural spaces with sufficient flexibility for it to be adopted from a variety of perspectives. At the same time, it is a dynamic concept that provides an overview of the various characteristic components of the rural space: endurance, transition, and transformation. In addition, it allows us to consider the importance of the temporal scale.

We will prepare a definition of resilience of the rural environment, starting from the definition of resilience given by various authors for urban environments, as in the case of Meerow et al. (2016, p. 39):

Urban resilience refers to the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.

Based on the analysis carried out on the areas under study, a complex current reality has been observed that requires urban planning regulations that go hand in hand with the Law to Promote the Sustainability of the Territory of Andalusia (LISTA). In this respect, despite the negative conceptualization and residual treatment stemming from it, rural land should be regarded as an area of strategic importance in the urban planning that emerges under the new Law. Its regulation should not only be exhaustive but should also include the development of positive and effective interventions on such land.

Acknowledgements: To José Ortiz García, geographer and expert in urban planning for his comments on the text.

Authorship statement: The authors declare no conflict of interest. The participation of the authors in the article is as follows. Benjamín Galacho: literature review, geostatistical analysis, methodology and discussion. Sergio Reyes: literature review, methodology, cartographic analysis, results and conclusions.

References

- Amado, M.P., Ramal hete, I., Amado, A.R., & Freitas, J.C. (2016). Regeneration of informal areas: An integrated approach, *Cities*, (58), 59-69, <https://doi.org/10.1016/j.cities.2016.05.015>
- Amat-Montesinos, X. (2011). The urbanizing expansion in the interior of Alicante. Indicators and uncertainties. In *Expansive Urbanism. From Utopia to Reality* (pp. 29-40). Proceedings of the XXII Congress of Spanish Geographers. Alicante (Spain), October 26-29.
- Andersen, H.T., Møller-Jensen, L., & Engelstoft, S. (2011). The End of Urbanization? Towards a New Urban Concept or Rethinking Urbanization, *European Planning Studies*, 19(4), 595-611. <https://doi.org/10.1080/09654313.2011>
- Andrés-López, G., & González-González, M.J. (2019). Diffuse urbanisation and irregular urban growth: processes and trends in medium-sized cities in the Castilla y Leon region (Spain). *Finisterra*, LIV(112),3-26. <https://doi.org/10.18055/Finis17100>
- Arroyo, M. (2001). Counter-urbanization: a methodological and conceptual debate on the dynamics of metropolitan areas. *Scripta Nova*, (97). <http://www.ub.edu/geocrit/sn-97.htm>
- Artigues-Bonet, A.A., & Rullán-Salamanca, O. (2007). New model of residential production and dispersed urban territory (Mallorca, 1998-2006). *Scripta Nova*, XI(245). <http://www.ub.edu/geocrit/sn/sn-24510.htm>.
- AxarquíaPlus, Redacción (2019, May 19). SOHA reports on the statement of the Andalusian Governing Council on homes in an irregular situation in the Axarquía. *AxarquíaPlus*. <https://www.axarquiaplus.es/soha-informa-sobre-el-comunicado-del-consejo-de-gobierno-andaluz-sobre-las-viviendas-en-situacion-irregular-en-la-axarquia/>
- Badia, A., Cebollada, À., Vera, A., Gisbert, M., Mendizábal, E., & Tulla, A.F. (2021). Land occupation in a municipality of the Metropolitan Region of Barcelona: challenges and opportunities. *Boletín de la Asociación de Geógrafos Españoles*, (89). <https://doi.org/10.21138/bage.3087>
- Bauer, G., & Roux, J.M. (1976). *Rurbanization or the scattered city*. Éditions du Seuil. <https://gallica.bnf.fr/ark:/12148/bpt6k4813790r/f11.item.textelimage>
- Besag, J., & Clifford, P. (1989). Generalized Monte Carlo significance tests. *Biometrika*, (76), 633-642. <https://doi.org/10.1093/biomet/76.4.633>

Bookchin, M. (1978). *The city limits*. H. Blume Ediciones.

Capdepón-Frías, M. (2016). Environmental conflicts derived from urbanization tourist-residential. A case applied to the Alicante coastline. *Boletín de la Asociación de Geógrafos Españoles*, (71), 31-57. <https://doi.org/10.21138/bage.2273>

Catalán, B., Saurí, D., & Serra, P. (2008). Urban sprawl in the Mediterranean? Patterns of growth and change in the Barcelona Metropolitan Region 1993–2000, *Landscape and Urban Planning*, (85), 174-184. <https://doi.org/10.1016/j.LANDURBPLAN.2007.11.004>

Cebrián-Abellán, F. (2007). Cities with limits and cities without limits. Manifestations of the diffuse city in Castilla-La Mancha. *Boletín de la Asociación de Geógrafos Españoles*, (43). <https://bage.age-geografia.es/ojs/index.php/bage/article/view/589>

Clark, J., & Jones, A. (2008). The spatialities of Europeanisation: territory, government, and power in 'Europe'. *Transactions of the Institute of British Geographers*, (33), 300-318. <https://doi.org/10.1111/j.1475-5661.2008.00309.x>

Chia-An, K. (2016). Incorporating spatial regression model into cellular automata for simulating land use change. *Applied Geography*, (69), 1-9. <http://dx.doi.org/10.1016/j.apgeog.2016.02.005>

Christophers. B. (2011). Revisiting the Urbanization of Capital. *Annals of the Association of American Geographers*, 101(6), 1347-1364. <https://doi.org/10.1080/00045608.2011.583569>

Corbelle, E., Crecente, R., & Santé, I. (2012). Multi-scale assessment and spatial modelling of agricultural land abandonment in a European peripheral region: Galicia (Spain), 1956-2004. *Land Use Policy*, (29), 493-501. <https://doi.org/10.1016/j.landusepol.2011.08.008>

De la Cruz, M. (2006). Introduction to analyzing mapped data or some of the (many) things I can do if I have coordinates. *Ecosistemas (Revista Científica y Técnica de Ecología y Medio Ambiente)*, 15(3), 19-39. [https://rua.ua.es/dspace/bitstream/10045/7701/1/ECO_15\(3\)_03.pdf](https://rua.ua.es/dspace/bitstream/10045/7701/1/ECO_15(3)_03.pdf)

De Santiago-Rodríguez, S. (2020). A review of the Andalusian regulation on housing on Non-Developable Land: the management of disseminated rural habitat and the fight against irregular buildings. *Urban Practice*, (167).

https://www.researchgate.net/publication/347694886_Un_repaso_a_la_regulacion_andaluza_sobre_las_viviendas_en_Suelo_No_Urbanizable_la_ordenacion_del_habitat_rural_diseminado_y_la_lucha_contra_las_edificaciones_irregulares

Dige, G., Interwies, E., & Zamparutti, T. (2010). *Land in Europe: prices, taxes and use patterns*. In European Environment Agency Technical report No 4/2010). https://www.researchgate.net/publication/282975510_Land_in_Europe_prices_taxes_and_use_patterns

Escudero-Gómez, L.A. (2018). Diffuse urbanization of the secondary circuit of capitalist accumulation: Toledo (Spain). *Ería*, (3), 327-343. <https://doi.org/10.17811/er.3.2018.327-343>

Escudero-Gómez, L.A (2018). Diffuse urbanization processes and fragmented urban structures: the case of Toledo (Castilla-La Mancha, España). *Ciudad y Territorio. Estudios Territoriales*, L(197), 517-538.

<https://recyt.fecyt.es/index.php/CyTET/article/download/76680/46996/>

Ewing, R., Pendall, R., & Chen, D. (2003). Measuring Sprawl and Its Transportation Impacts. *Transportation Research Record*, 1831(1), 175-183. <https://doi.org/10.3141/1831-20>

Farrell, R.H. (1972). On the Best Obtainable Asymptotic Rates of Convergence in Estimation of a Density Function at a Point. *The Annals of Mathematics and Statistics*, (43), 170-180. <http://dx.doi.org/10.1214/aoms/1177692711>

Ferrara, A., Salvati, L., Sabbi, A., & Colantoni, A. (2014). Soil resources, land cover changes and rural areas: Towards a spatial mismatch? *Science of the Total Environment*, (478), 116-122. <https://doi.org/10.1016/j.scitotenv.2014.01.040>

Franz, G., Maier, G., & Schröck, P. (2006). Urban Sprawl. How useful is this concept? https://www.researchgate.net/publication/23731910_Urban_Sprawl_How_Useful_Is_This_Concept

Gaja i Díaz, F. (2008). The "urbanizing tsunami" on the Mediterranean coast. The cycle of real estate hyperproduction 1996-2006. *Scripta Nova* XII(270). <http://www.ub.edu/geocrit/sn/sn-270/sn-270-66.htm>

Galacho-Jiménez, F.B. (2011). Territorial implications and social aspects of diffuse urbanism in areas of rural-urban transition. His analysis in the province of Malaga (Spain). In *Expansive Urbanism. From Utopia to Reality* (pp. 267-278). Proceedings of the XXII Congress of Spanish Geographers. Alicante (España), October 26-29.

Galacho-Jiménez, F.B. (2012). The irruption of the urban process in rural spaces. Reflections on the characteristics of a new form of relationship between territory and economy. In C. Delgado, J. Juaristi & S. Tomé (Coords.), *Cities and Urban Landscapes in the XXI Century* (pp. 297-314). Ediciones de Librería Estvdio.

Galacho-Jiménez, F.B., & Reyes-Corredera, S. (2015). Estimation of association patterns and distribution patterns of isolated buildings in rural spaces using GIS and techniques based on specific processes. In J. de la Riva, P. Ibarra, R. Montorio & M. Rodrigues (Eds.), *Spatial analysis and geographical representation: innovation and application* (pp. 601-610). Proceedings of XXIV Congress of Spanish Geographers. Zaragoza (España), October 28-30.

García-Bellido, J. (1986). The rural question: an inquiry as to the urban production of rural space. *Ciudad y Territorio Estudios Territoriales*, (69), 9-51. <https://recyt.fecyt.es/index.php/CyTET/article/view/82085>

García-García, M. (2017). The Spanish coast: More than a quarter of a century adrift. *ZARCH, Cities and Urban Forms*, (8), 274-286. <https://papiro.unizar.es/ojs/index.php/zarch/article/download/2161/1955>

García-Martín, F.M., & Carcelén-González, R. (2020). Territory and tourism on the Costa Cálida. From a ravenous consumption to a non-coastal tsunami, 1960-2020. Evolution and dynamics of the forms of tourism in the Region of Murcia. *Investigación e Innovación en Arquitectura y Territorio*, 8(2). 31-50. <https://doi.org/10.14198/i2.2020.2.03>

García-Sanabria, J., García-Onetti, J., & Barragán-Muñoz, J.M. (2011). *The Autonomous Communities and the integrated management of the coastal areas of Spain. Materials for a governance debate*. Universidad de Cádiz. <https://doi.org/10.13140/2.1.1295.5203>

Gargiulo, V., Rontos, K., & Salvati, L. (2014). Between suburbanisation and re-urbanisation: revisiting the urban life cycle in a Mediterranean compact city. *Urban Research & Practice*, (7), 74-88. <https://doi.org/10.1080/17535069.2014.885744>

Getis, A., & Frankiln, J. (1987) Second-order neighborhood analysis of mapped point patterns. *Ecology*, (68), 473-477. <https://doi.org/10.2307/1938452>

Gil-Meseger, E., & Gómez-Espín, J.M. (2018). *The transfer of water from the Negratín reservoir (Granada) to the Cuevas de Almanzora reservoir (Almería). The connection Negratín – Almanzora (C N-A)*. Ediciones de la Universidad de Murcia.

Gómez-Moreno, M.L. (2020). Territory, town and city in 2011 Malaga Urban Planning: farming and urban planning in Málaga Hills. *Ciudad y Territorio. Estudios territoriales*, LII(204), 229-246. <https://doi.org/10.37230/CyTET.2020.204.03>

González-Ordovás, M.J. (2000). *Urban policies and strategies. The distribution of private and public space in the city*. Editorial Fundamentos.

Goreaud, F., & Pélissier, R. (1999). On explicit formulas of edge effect correction for Ripley's K-function. *Journal of Vegetation Science*, (10), 433-438. <https://doi.org/10.2307/3237072>

Górgolas Martín, P. (2017). Sub-regional territorial planning on the coast Andalusian: of "condescension" with general planning in force to the "adulteration" of the city model regulated in the Territorial Planning Plan of Andalusia. *Urban Practice*, 147. <https://dialnet.unirioja.es/servlet/articulo?codigo=6054703>

Haase, P. (1995). Spatial pattern analysis in ecology based on Ripley's K-function: Introduction and methods of edge correction. *Journal of Vegetation Science*, (6), 575-582. <https://doi.org/10.2307/3236356>

Haregeweyna, N., Fikadub, G., Tsunekawaa, A., Tsuboa, M., & Mesheshaa, D.T. (2012). The dynamics of urban expansion and its impacts on land use/land cover change and small-scale farmers living near the urban fringe: A case study of Bahir Dar, Ethiopia. *Landscape and Urban Planning*, (106), 149-157. <https://doi.org/10.1016/j.landurbplan.2012.02.016>

Harvey, D. (2007). *Spaces of capital. Towards a critical geography*. Akal.

Hof, A., & Blázquez-Salom, M. (2013). The Linkages between Real Estate Tourism and Urban Sprawl in Majorca (Balearic Islands, Spain). *Land*, (2), 252-277. <https://doi.org/10.3390/land2020252>

Indovina, F. (1998). Some considerations about the "diffuse city". *Documents d'Anàlisi Geogràfica*, (33), 21-32. <https://raco.cat/index.php/DocumentsAnalisi/article/view/31661>

Indovina, F. (2006). The sustainable city: we sustain the city. *Documents d'Anàlisi Geogràfica*, (46), 15-39. <https://raco.cat/index.php/DocumentsAnalisi/article/view/55381>

Indovina, F. (2013). Towards a new metropolitan dimension. *Treballs de la Societat Catalana de Geografia*, (75), 149-164. <https://raco.cat/index.php/TreballsSCGeografia/article/view/268047>

- Jordano, J., Arteaga, C., Cortés, Á., Díaz, A., Garrido, F.J., Gutiérrez, V., Gamero, E., & Sánchez, A. (2015). *The urbanism of the crisis: the regularization of illegal buildings and the regime of assimilation to out of order*. Tecnos.
- Jiménez-Barrado, V. & Campesino-Fernández, A.J. (2017). Relocation of the urban and impact on the rural world: rururbanization in "bedroom villages" of Cáceres capital. *Cuadernos Geográficos*, 57(3), 243-266. <http://dx.doi.org/10.30827/cuadgeo.v57i3.6239>
- Junta de Andalucía (2022). *Draft Decree approving the Regulation of Law 7/2021, of December 1, on the promotion of the sustainability of the territory of Andalusia in the Junta de Andalucía*. <https://www.juntadeandalucia.es/servicios/participacion/normativa/consulta-previa/detalle/234847.html>
- Khosrow-Pour, M. (2018). *Advanced Methodologies and Technologies in Engineering and Environmental Science*. IGI Global's. <http://doi.org/10.4018/978-1-5225-7359-3>
- Ku, C.A. (2016). Incorporating spatial regression model into cellular automata for simulating land use change. *Applied Geography*, (69), 1-9. <http://dx.doi.org/10.1016/j.apgeog.2016.02.005>
- Laney, R.M. (2004). A process-led approach to modeling land change in agricultural landscapes: a case study from Madagascar. *Agriculture, Ecosystems and Environment*, (101), 135-153. <https://dx.doi.org/10.1016/j.agee.2003.09.004>
- Larrubia Vargas, R. (2015). The rural space. Concept and geographical reality. *BAETICA. Studies of Modern and Contemporary History*, (20), 77-95. <https://doi.org/10.24310/BAETICA.1998.v0i20.509>
- Lefebvre, H. (1976). *Reflections on the politics of space*. Ediciones Península.
- López-Casado, D. (2021). An urban phenomenon embedded in the paradigm shift of informal urbanisation: illegal allotments in the municipality of Cordoba. *Boletín de la Asociación de Geógrafos Españoles*, (90). <https://doi.org/10.21138/bage.3082>
- Luo, Y., Lü, Y., Liua, L., Liang, H., Li, T., & Ren, Y. (2020). Spatiotemporal scale and integrative methods matter for quantifying the driving forces of land cover change. *Science of the Total Environment*, (739), 139622. <https://doi.org/10.1016/j.scitotenv.2020.139622>
- Luque-Revuelto, R.M. (2021). Territorial transformations of coastal areas: analysis of the Costa Malagueña in the second half of the twentieth century. *Estudios Geográficos*, 82(290), e062. <https://doi.org/10.3989/estgeogr.202074.074>

- Marriott, F.H.C. (1979). Barnard's Monte Carlo tests: how many simulations? *Annual Review of Statistics and His Application*, (28), 75-77. <https://www.jstor.org/stable/i316073>
- Meerow, S., Newell, J.P., & Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, (147), 38-49. <https://doi.org/10.1016/j.landurbplan.2015.11.011>
- Melendez, I., Hernández, E.I., Navarro, J., & Gómez, I. (2014). Socioeconomic factors influencing land cover changes in rural areas: The case of the Sierra de Albarracín (Spain). *Applied Geography*, (52), 34-45. <http://dx.doi.org/10.1016/j.apgeog.2014.04.013>
- Miguez-Macho, L. (2014). The application of regional urban planning legislation within the framework of the consolidated text of the Land Law: the case of Galicia. *Dereito* (Monográfico: Estudios sobre la modernización administrativa), 275-396. <https://minerva.usc.es/xmlui/bitstream/handle/10347/9960/08-Miguez.pdf?sequence=1>
- Mitchell, A. (2005). *The ESRI guide to GIS analysis*. California (US): Environmental Systems Research Institute Inc. https://ingenio.upm.es/primoxplore/fulldisplay/34UPM_ALMA2161249730004212/34UPM_VU1
- Molina-de-la-Torre, I., & Martínez-Fernández, L.C. (2014). The regulations of territorial planning in rural areas of low population density: a review from the Geography. *Polígonos* (26), 277-320. <http://revpubli.unileon.es/ojs/index.php/poligonos/article/download/1707/1367>
- Muñiz, I., & García-López, M.A. (2013). Anatomy of urban sprawl in Barcelona. *EURE*, 39(116). 189-219. <http://dx.doi.org/10.4067/S0250-71612013000100008>
- Nagendra, H., Munroe, D.K., & Southworth, J. (2004). From pattern to process: landscape fragmentation and the analysis of land use/land cover change. *Agriculture, Ecosystems and Environment*, (101), 111-115. <https://doi.org/10.1016/j.agee.2003.09.003>
- Navalón-García, R. (1994). Notes on the urban regime of the rural environment: the treatment of non-developable land in the planning of the tourist municipalities of Alicante. *Investigaciones Geográficas* (Spain), (12), 133-146. <https://dialnet.unirioja.es/descarga/articulo/111607.pdf>
- Navarro Cerrillo, R.M., Palacios Rodríguez, G., Clavero Rumbao, I., Lara, M., Bonet, F.J., & Mesas-Carrascosa, F.J. (2020). Modeling Major Rural Land-Use Changes Using the GIS-Based Cellular Automata Metronamica Model: The Case of Andalusia (Southern Spain). *ISPRS International Journal of Geo-Information*, 9(7), 458. <https://doi.org/10.3390/ijgi9070458>

- Obiahua, O.H., & Elias, E. (2020). Effect of land use land cover changes on the rate of soil erosion in the Upper Eyiohia river catchment of Afikpo North Area, Nigeria. *Environmental Challenges*, (1), 100002. <https://doi.org/10.1016/j.envc.2020.100002>
- Olazabal, E., & Bellet, C. (2019). From the compact city to the sprawling city. Recent urbanization processes in Spanish urban areas articulated by medium cities. *Anales de Geografía de la Universidad Complutense*, 39(1), 149-175. <http://dx.doi.org/10.5209/AGUC.64681>
- Olmedo Pérez, S. (2016). Reflections on clandestine buildings on non-developable land in Andalusia and the attempts of the Autonomous Community of Andalusia for redirection. *Urban Practice*, 139. <https://dialnet.unirioja.es/servlet/articulo?codigo=5615804>
- Orduña Giró, P., Pesa, M., & Sabaté, J. (2018). Representations of rural land metropolitan in Italian planning during the twentieth century: the case of Bologna. *Cuadernos Geográficos*, 57(1), 219-238. <http://dx.doi.org/10.30827/cuadgeo.v57i1.5831>
- Pan, W.K.Y., Walsh, E.J., Bilsborrow, R.E., Frizzelle, B.G., Erlien, C.M., & Baquero, F. (2004). Farm-level models of spatial patterns of land use and land cover dynamics in the Ecuadorian Amazon. *Agriculture, Ecosystems and Environment*, (101), 117-134. <https://doi.org/10.1016/j.agee.2003.09.022>
- Ralha, C.G., Abreu, C.G., Coelho, C.G.C., Zaghetto, A., Macchiavello, B., & Machado, R.B. (2013). A multi-agent model system for land-use change simulation. *Environmental Modelling & Software*, (42), 30-46. <https://doi.org/10.1016/j.envsoft.2012.12.003>
- Ripley, B.D. (1977). Modelling Spatial Patterns. *Journal of the Royal Statistical Society*, 39(2), 172-212. <https://www.jstor.org/stable/i349764>
- Ripley, B.D. (1981). *Spatial Statistic*. Wiley & Sons. <https://doi.org/10.1002/0471725218>.
- Rodden, J. (2010). The Geographic Distribution of Political Preferences. *Annual Review of Political Science*, (13), 321-340. <https://doi.org/10.1146/annurev.polisci.12.031607.092945>
- Romero-Jiménez, G. (2016). Urban discipline versus regularization of buildings on the non-developable land of Andalusia. *Práctica urbanística: Revista mensual de urbanismo*, (141). <http://urbaweb.blogspot.com/2015/10/entrada-2.html>
- Rozas, V., & Camarero, J.J. (2005). Spatial analysis techniques of point patterns applied in forest ecology. *Investigación agraria. Sistemas y recursos forestales*, 14(1), 79-97. <https://dialnet.unirioja.es/servlet/articulo?codigo=1128433>

- Rubiera, F., González, V.M., & Rivero, J.L.P. (2016). Urban sprawl in Spain: differences among cities and causes. *European Planning Studies*, (24), 207-226. <https://doi.org/10.1080/09654313.2015.1080230>
- Salvati, L., Munafo, M., Gargiulo-Morelli, V., & Sabbi, A. (2012). Low-density settlements and land use changes in a Mediterranean urban region. *Landscape and Urban Planning*, 105(1-2), 43-52. <https://doi.org/10.1016/j.landurbplan.2011.11.020>
- Salvati, L., & Morelli, G. (2014). Unveiling Urban Sprawl in the Mediterranean Region: Towards a Latent Urban Transformation? *International Journal of Urban and Regional Research*, (38), 1935-1953. <https://doi.org/10.1111/1468-2427.12135>
- Santos, J.M., Azcárate, M.V., Cocero, D., & Muguruza, C. (2013): Measurement of urban dispersion, in a GIS environment. Application to the study of urban development in the Community of Madrid (1990-2006). *GeoFocus*, 13(1), 48-75. <https://www.geofocus.org/index.php/geofocus/article/view/261>
- Santos, J.M., Azcárate, M.V., Cocero, D., García, F.J., & Muguruza, C. (2014). The procedures of spatial disaggregation of the population and its application to the analysis of the model of the dispersed city. The case of the urban agglomerations of Madrid and Granada. *GeoFocus*, (11), 91-117. <https://www.geofocus.org/index.php/geofocus/article/view/214>
- Serra, P., Vera, A., Tulla, A.F., & Salvati, L. (2014) Beyond urban–rural dichotomy: Exploring socioeconomic and land-use processes of change in Spain (1991–2011). *Applied Geography*, (55), 71-81. <https://doi.org/10.1016/j.apgeog.2014.09.005>
- Silverman, B.W. (1986). *Density Estimation for Statistics and Data Analysis*. Chapman & Hall. <http://dx.doi.org/10.1007/978-1-4899-3324-9>
- Song, W., & Liu, M. (2014). Assessment of decoupling between rural settlement area and rural population in China. *Land Use Policy*, (39), 331-341. <https://doi.org/10.1016/j.landusepol.2014.02.002>
- Tadese, M., Kumar, L., Koech, R., & Kogo, B.K. (2020). Mapping of land-use/land-cover changes and its dynamics in Awash River Basin using remote sensing and GIS. *Remote Sensing Applications: Society and Environment*, (19), 100352. <https://doi.org/10.1016/j.rsase.2020.100352>
- The Property Finders (2022). In *Andalucía Property Market*. <https://www.thepropertyfinders.com/andalucia-property-market/>

- Tian, G., Ouyang, Y., Quan, Q., & Wub, J. (2011). Simulating spatiotemporal dynamics of urbanization with multi-agent systems. A case study of the Phoenix metropolitan region, USA. *Ecological Modelling*, (222), 1129-1138. <https://doi.org/10.1016/j.ecolmodel.2010.12.018>
- Tomaz, C., Alegria, C., Massano, J., & Canavarro, M. (2013). Land cover change and afforestation of marginal and abandoned agricultural land: A 10-year analysis in a Mediterranean region. *Forest Ecology and Management*, (308), 40-49. <https://doi.org/10.1016/j.foreco.2013.07.044>
- Ubilla-Bravo, G. (2019). Rururbanization, suburbanization and reconcentration of the earth: spatial effects of rural instruments in the peri-urban areas of Chile. *AGER: Revista de Estudios sobre Despoblación y Desarrollo Rural*, (28), 75-106. <https://doi.org/10.4422/ager.2019.07>
- Upton, G.J.G., & Fingleton, B. (1985) *Spatial Data Analysis by Example. Point Pattern and Quantitative Data*. Chichester/New York/Brisbane/Toronto/Singapore: Wiley & Sons. <https://doi.org/10.1002/bimj.4710280603>
- Xie, X., & Wu, J. (2014). Some Improvement on Convergence Rates of Kernel Density Estimator. *Applied Mathematics*, (5), 1684-1696. <http://dx.doi.org/10.4236/am.2014.511161>
- Yus Ramos, R., & Torres Delgado, M.A. (2010). *Diffuse urbanism on rustic land: environmental deterioration and corruption in the province of Malaga (the case of the Axarquía)*. GENA-Ecologistas en Acción.
- źróbek-Róžańska, A. & Zadworny, D. (2016). Can urban sprawl lead to urban people governing rural areas? Evidence from the Dywity Commune, Poland. *Cities*, (59), 57-65. <https://doi.org/10.1016/j.cities.2016.06.003>