



Article

# A New Residential Role for the Rural Environment in Extremadura, Spain

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Abstract: European rural spaces are assuming a new residential role. In some such as Extremadura (Spain), the low population density and the practice of an extensive primary sector has allowed the survival of large areas and natural spaces that are desirable for urbanites. The residential growth caused by economic changes and tourist attractiveness has generated a new paradigm in which recreational use competes with agricultural and livestock use (until now the sustenance of the local economy). To record this change, it is essential to spatially determine what the rural environment means in this specific regional context and quantify the number of new existing homes. First, we resorted to the future competent legislation (born of experience and local knowledge) and territorial and urban planning, while second, we used the potentiality of all of the available free series of orthophotography and aerial photography including other tools such as Google Street View. This methodological process led us to discover a recent and important advancement of the recreational residential function. On balance, the data showed that recreational residential use is a leading actor in the change of the landscape and productive model of rural areas.

Keywords: second homes; rurbanization; rural tourism; rural development; Extremadura

## 1. Introduction

The rurbanization process approximately began in Central Europe and North America between the 1970s and 1980s [1–3], but since then, this phenomenon has changed heavily, growing conceptually and spatially. In the beginning, the new model of urban expansion was the first sign of a change in migration directions [4]. This variation mainly affected the urban society and its rural environment in an Anglo-Saxon context. Cities became more and more dispersed and fragmented spaces and the produced new spaces reached their consolidation due to their permanent residential use. Then, the pattern moved to Mediterranean countries along with the triumph of neoliberal economic theories in the 1980s [5] and other defining elements of agrarian post-productivism such as diversification and economic tertiarization [6–8], losing its daily utility (appearing as second residences) and promoting banal urbanization [9].

The emergence of the tourism sector in rural environments in times of demographic and economic crisis has been conceived by many as a blessing [10,11], although there is no lack of contrary ideas, which has opened up a debate [12,13].

Either way, rural tourism and rurbanization have grown simultaneously, and are sometimes related. In fact, both share elements that encourage their existence, for instance, the search for spaces with better environmental conditions when compared to degraded urban spaces [14]. Tourism of second residences and tourism based on nature come together in well-preserved rural spaces [15,16]. For this same reason, protagonists of this phenomenon are sometimes coincident, although when this happens, we cannot speak exactly of neo-rurals. At least in Extremadura (Spain), they live on the

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territory like mere spectators, importing urban forms without the assimilation of rural characteristics or customs. This detachment and spatial de-contextualization has also occurred in tourist terms, which leads us to question: What is actually practiced, rural tourism or tourism in rural areas? [17].

Depending on the category and size of its settlements, Extremadura is a deep rural region (the only one in the country with a greater rural than urban population). This region lost most of its population during the economic development of the country [18] as working-age people migrated to the industrial poles, leaving a region that (still) remains in the last positions of economic indexes.

In addition, in this Spanish region, it is necessary to warn of the difference between recreational use and tourist use. The distinction lies in the previous relationship of the protagonists with the spatial context. In the first case, we are mainly talking about the return of rural emigrants or their descendants (social and familiar bonding). In the second case, nevertheless, the (occasionally or permanently) arrival of new foreign settlers is mainly caused by the territory values and attractions. Rural tourism has managed to maintain traditional values in a sustainable way thanks to the arrival of occasional urban tourists, attracted by these unknown ways of life [19,20].

This difference means the existence of an intermediate category in Extremadura that breaks the traditional dichotomy between permanent residents and second homes owners [21]. Furthermore, a part of the rural inhabitants, who also build new scattered houses by similarity and social aspiration, join this category (Table 1).

Urban/Rural Population	Previous Relationship with the Rural Environment	Category	Urban Transformation
Urban	No -	Occasional Tourist	Rural House (Tourist Industry)
		Foreign Second Homes Owners	New Scattered Single-Family House
	Potential	Returned Emigrants or Descendants	
Rural	Yes	Local Population	

Table 1. Scheme of actors in the residential/tourist urbanization of the rural environment in Extremadura.

The birth of a committed tourism industry to the local environment leaves clear evidence of the progress experienced by these areas [22]. However, only the more singular or iconic spaces have harbored a seasonal and recurrent residential tourism. This fact translates into a greater urban transformation of the territory. In a general tourist context, these examples are very evident for their promptness and magnitude in coastal areas [23], and their inclusion in the economic circuits of globalization [24], but not so much in the rural inland areas.

The changes in the economic and sociological variables determined a new role for the rural environment [25]. Technical improvements increased agricultural productivity and drastically reduced the smallholder subsistence crop around the towns as well as the population dedicated to the primary sector. The Spanish Primary Sector has gone from representing 18.6% of the active population in 1980 to only 4.55% in 2017. The increase in living standards and free time has also facilitated the recreational occupation of rural spaces by urbanites, especially the small abandoned and well-connected farming plots. Economic changes and real estate-tourist interest are effective allies of the diffuse urban model [26]. Besides, urban sprawl has been promoted by the introduction of the car and its massive usage by all social strata [27]. The new possibilities in terms of mobility allow an unplanned inoculation of the urban in rural areas. The combination of greater autonomous mobility, more income, and more free time has been key to this change.

Thanks to this, an urban development adapted to a specific environment expanded into others where it has been strange and dangerous. Thus, the dispersed urbanization of the countryside came to

Spain from a consumerist and non-productive perspective (as it is traditional residential use linked to agricultural holdings). In this way, a contradiction appeared between the urban growth model and the physical-environmental constraints. The new model is particularly harmful for some regions, especially those strongly conditioned by the characteristics of the Mediterranean climate and its economic and demographic trends like Extremadura. The rescaled urban footprint, today even bigger, contributes to increase the unsustainability degree due to its implications for energy consumption, land use, climate, air and water quality, and the biodiversity of ecosystems [28].

The lack of harmony between the artificialization process and the environment reaches its peak when, in addition, there is no demographic and economic justification. Contrary to what other authors [29,30] defend for other contexts, in Extremadura, the proliferation of housing in the countryside does not imply rural rebirth, understood as a demographic and economic improvement. This is because the foreign population does not carry out the processes of rurbanization. In fact, the majority are local people and returnees (and their offspring) for short vacation periods. These groups of people, especially the older-groups, conceive the rural environment with a real estate and residential appeal [31].

In this sense, it is necessary to notice that Extremadura receives a large population return during the weekend, and that it is composed of groups of adult and advanced age, who emigrated during the 1970s and 1980s (working-age groups cited before).

Mainly for these reasons, Extremadura is one of the antithetical examples of sustainable urban development in Europe. As some authors have said [32] (p. 1935), "depending on the geographical area where the phenomenon has been studied, researchers have arrived at different definitions of sprawl". Thereby, the low socioeconomic indexes and the demographic and physical reality of Extremadura condition the valuation of this concept. In addition, the counterproductive effects on this environment prevent a positive conception of this phenomenon as in other contexts [33,34].

Additionally, the legal frameworks do not support rurbanization in Extremadura, although the lack of control over the urban discipline allows clandestine and even illegal urban expansion. However, during the last 25 years, the decisive government commitment to favor rural tourism in Extremadura has idealized the rural environment not only for the target public, but also for the inhabitants of the region [35]. This strategy, based on advertising the amenity and purity of nature, has boosted tourism supply and demand, but has also brought real estate interest to the countryside.

This Spanish region is located at the bottom of the national socioeconomic index. It is a unique recipient region of European Structural and Investment Funds (ESIF) in the country, therefore its particularity. As shown in the reports of the Observatory of Sustainability (2016) [36] with data based on government analysis and extracted from the CORINE Land Cover project, Extremadura is the least artificialized region of Spain in relative terms (Figure 1).

However, according to the same source, Extremadura has one of the largest increases in artificial surface in recent decades (+87.62 between the years 1987 and 2011). This fact, combined with the incessant demographic losses, places Extremadura at the head of the Autonomous Communities with the largest urban area in relation to the population (20.62 ha/inhab). Only Castilla-La Mancha and Castilla y León, which are also affected by rural depopulation (Figure 2), surpass it.

While the consolidated urban mesh increases the statistics of artificial occupation (despite being depopulated), the peripheral spaces suffer a dispersed and intermittent occupation. In spite of the validity of the data, CORINE Land Cover is a project designed to serve a representation scale of 1:100,000. For this reason, highly dispersed growth (the most unsustainable) is invisible within the statistics.

In summary, this study aimed to discover and investigate the characteristics of a phenomenon insufficiently studied in this region. For this, we examined the theoretical concepts in this present introduction as well as the particularities of the study area. In Section 2, the created and applied methodology is explained. Subsequently, this section allows us to achieve precise results on the new

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residential occupation of rural areas in Extremadura. Finally, some conclusions are presented to better understand the new residential role of the rural environment in this spatial context.

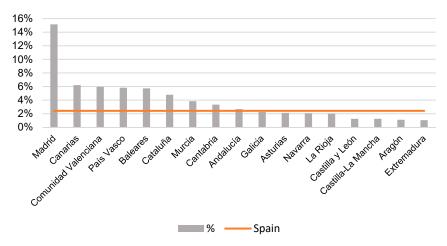
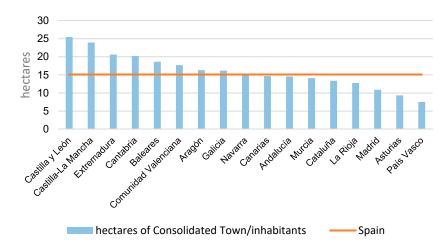


Figure 1. Level of artificialization (percentages) by the Autonomous Communities of Spain.



**Figure 2.** Relationship between the number of hectares classified as Consolidated Town and the number of inhabitants by the Autonomous Communities of Spain.

# 2. Materials and Methods

The main purpose of the used methodology was to detect, locate, and quantify the new and scattered residential use in rural areas. The capital sources and methodological steps have already been described in a previous and more generalist research [37], so in this case, we focused our attention on the definition of the rural area for this specific work and the discrimination of residential use in these environments.

"The rural" or "the rural environment" is a spatial and geographical category that does not determine or limit the type of economic activities [38]. However, it has always been resorted to delimit this concept under statistical criteria related to the predominant economic activity and/or population figures. Spain (particularly its National Institute of Statistics) defines the division between the urban and the rural in 10,000 inhabitants. This means that within the state context, population centers below this threshold will count as belonging to the rural environment. However, there are specific regional contexts in which this limit does not fit or well define the functionality and characteristics of the settlements.

In Extremadura, the draft Law on Territorial and Urban Planning has created a new threshold that better defines the nature of settlements. According to this legal text in process, population centers of less than 5000 inhabitants mean the rural environment base of the region (Figure 3).

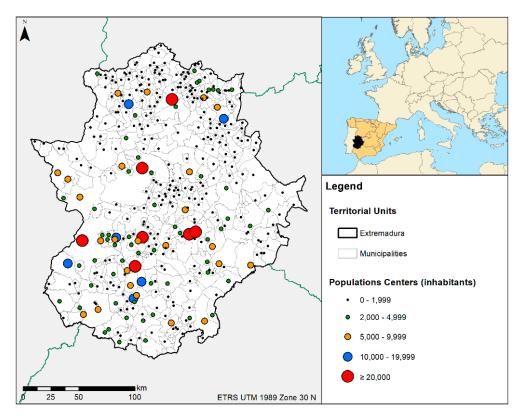


Figure 3. Current population hierarchy of human settlements in Extremadura.

Therefore, according to the official population figures in the 2011 Census, in this Autonomous Community, there are 350 towns in that situation (90.21% of the total). This choice allows us to avoid, with greater probability, situations that refer to processes of periurbanization and daily pendular movements between main dwellings in rural areas and work centers in cities.

Once again, in accordance with territorial and urban legislation, we delimited a study area within this group of municipalities. Thus, we selected only those spaces not classified as urban land or developable land (high building density zones or areas prepared for it). The purpose of this decision was to determine the dispersed residential growth outside the towns, that is, the one that occurs in the Undevelopable Land (UL). This urban category of land has traditionally been associated in Spain with agricultural use, although nowadays it admits other very varied uses among which residential use is also found (with restrictions).

The definition of this study area required the geo-referencing and the digitalization of every single municipal urban plan. This meant the conversion of plans in analog formats (paper) or not spatially referenced (PDF, JPEG) to a new vector format, territorially positioned (shapefile).

Once this step was completed, we used three sources of information to identify the residential use of buildings. All of them showed, at a visual level, several "informers" of the use of buildings as dwellings (building typology, roofing, auxiliary elements such as garages, television antennas, etc.). In fact, within the context of Extremadura, there are other examples that also indicate the recreational use of plots and homes (gardens, swimming pools, play areas). This evidence was added to the external location of buildings in the peripheral zone of Consolidated Towns (traditional urban Mediterranean form), although it is true that each of these sources offers a different perspective and level of detail from the "informers". For this reason, the use of the three sources did not occur simultaneously, but progressively and complementarily.

In the first place, we handled the aerial orthophotography series of the National Aerial Orthophotography Plan (PNOA, Spanish acronym) belonging to the National Geographic Institute. This source of information offers three main advantages: easy and fast free access, total coverage

of the territory of Extremadura, and an acceptable pixel resolution (which depending on the zones, was between 0.25 m/pixel and 0.50 m/pixel). In addition, the existence of different time series (1981, 1998, 2002, 2005, and 2011) allowed us to date the residential constructions and check the transition from agrarian patches to plots (process in progress). The two main control points were the years 1981 and 2011, coinciding with the Population Censuses (Figure 4). The distance between these two dates allowed us to register the accelerated residential growth in rural areas for three decades (one of the stages with the greatest urban transformation in the country).



**Figure 4.** Productive change in the rural environment of Extremadura. Spatial competition between agricultural use and new residential and recreational use: (a) 1981 and; (b) 2011.

Second, we used the satellite images from Google, which through its Google Maps and Google Earth Pro services offers information with the same three benefits as the previous source. It has only been used in those cases where the worst resolution of the orthophotos (0.50 m/pixel) prevented clearly discerning some of the detailed elements of information (Figure 5).



**Figure 5.** Aerial orthophotography from the National Aerial Orthophotography Plan (PNOA) service (a) and an aerial image from the Google Earth Pro service (b).

In this way, the Google aerial images, served by the Digital Globe Company through its satellite "WorldView-4", manage to reach a resolution of up to 0.31 m/pixel for certain areas. These data are an obvious improvement when detecting the informers of residential use.

Third, only when these two steps were not enough to determine residence use, we used another approach. Taking into account the importance of savings in terms of time and money, we also used the Google Street View tool. This procedure was essential within an area that covers almost 30,000 square kilometers. Its usefulness has been very relevant because a large proportion of houses are located very close to communication routes (Figure 6).

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**Figure 6.** (a) Detection of buildings and (b) the discovery of the residential use of buildings using Google Street View.

In an extraordinary and very timely manner, fieldwork and on-site visits were undertaken when the three sources and procedures described above failed in their mission to unveil residential use.

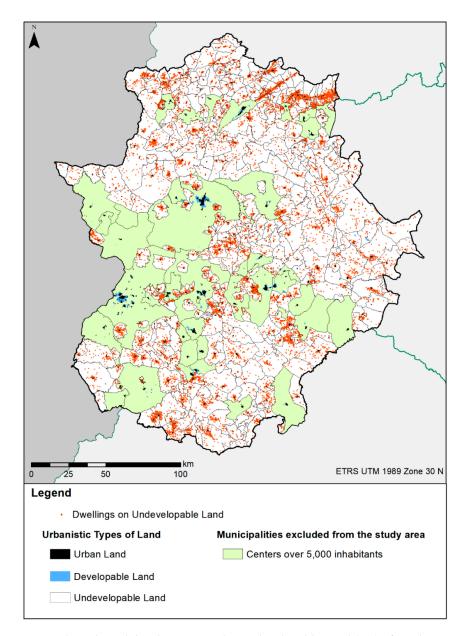
#### 3. Results

The investigation results revealed the existence of 23,171 homes in the UL of the rural municipalities of Extremadura. This figure represents the residential function in rural areas in 2011. In absolute terms and in relation to the total area studied (28,757.90 square kilometers), the number of dwellings may seem small. There were 0.80 houses for each square kilometer of UL in rural municipalities. This means the direct artificialization of 3,604,129.92 square meters because of homes in the rural environment (to obtain the total artificialization due to residential use in rural municipalities, we added the area classified as Consolidated Town and Developable Land, amounting in total to 193.88 square kilometers). However, to understand the importance of this figure, it is necessary to learn the characteristics of its location.

Its spatial distribution showed that all rural municipalities, except two (Higuera and Hinojal), had this type of scattered houses. In this sense, the situation in 1981 was very similar, since only eight out of 350 municipalities lacked housing. At that time, the total number of homes rose to 7020. The linear progression was more than half a thousand houses built in the countryside per year (remember that this was a kind of land not initially thought of for this use). However, the intermediate dating discovered that since 1998, this growth has accelerated. In the last 13 years studied, the number of homes built represents almost two thirds of the total (64.86%).

As we can see in Figure 7, the greatest concentration of housing occurred around the population centers, especially urban ones. The small peripheral zone of 500 meters around them contains 35.77% of the total housing. In these spaces, the density of homes was triggered by the greater availability of resources (sewage networks, lighting, water distribution, etc.). Zonally, the highest proportion of dwellings is placed in mountainous and valley areas, located to the north of the region. In previous works [39,40], we already demonstrated the specialization of the north of Extremadura in rural and nature tourism, obviously determined by its environmental context, and the quantity and quality of its resources. The present work shows an important spatial coincidence between the most relevant tourist areas and the most urbanized spaces in the countryside.

Despite this specialization and greater proportion in certain areas, the phenomenon is very broad. During the three decades studied, this type of residential growth has been widespread. In fact, except for the aforementioned two cases, all of the components of this large group experienced an increase in the number of homes.

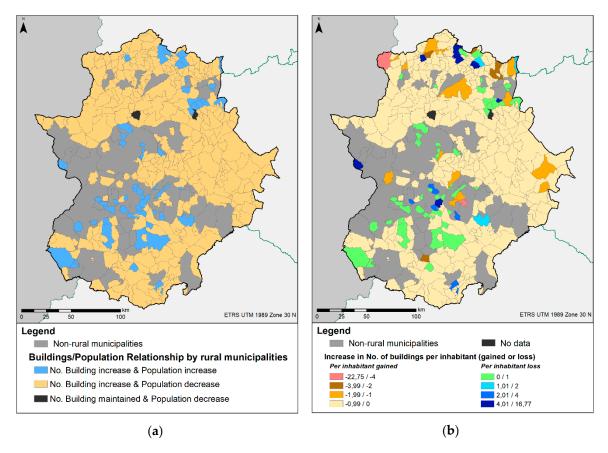


**Figure 7.** Scattered residential development in the Undevelopable Land (UL) of rural municipalities in Extremadura.

At the same time, demographic trends in rural areas have been negative. Meanwhile, the total regional population has remained stable and has even grown slightly (3.71%). This contradiction is explained by two main reasons. First, Extremadura touched its demographic bottom between 1981 and 1991, at the end of the strong emigration process to other Spanish regions. Since then, the population has grown very faintly thanks to a better distribution of wealth between the national territories and the reception of immigrants (mainly Americans and Africans). The fast aging of society and the increase in mortality rates have prevented higher population growth. Second, the demographic losses of most of the rural municipalities have become growths for urban centers, mainly for those with more than 10,000 inhabitants. The number of municipalities that belong to this group has not grown since 1981, but its population has, which means that the intermediate and low strata (centers below 10,000 inhabitants) tend to disappear for the benefit of the small upper group.

Thereby, the residential growth trends are independent of the demographic behavior of the municipalities. The population decrease does not guarantee the maintenance of the artificialization levels in the UL caused by houses (Figure 8a). In fact, these levels are increasing (Figure 9a) and the

simultaneous existence of a demographic decline and a building increase is the most common situation (293 of the 350 rural municipalities).

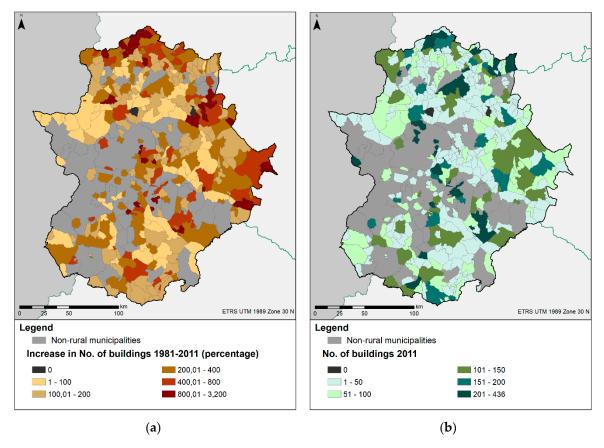


**Figure 8.** Relationship between the urban and demographic trends in rural municipalities (a) and level of building increases related to population unit loss or gain (b).

The increases registered in 55 municipalities were only relevant in relative and absolute terms for those settlements that exceeded 2000 inhabitants and were adjacent to urban municipalities. In any case, an inverse relationship was observed between the distance to an urban nucleus and the sign of demographic evolution.

The increase in the number of houses did not respond to a demographic logic either (Figure 8b). The brief increments of housing, in absolute terms, were the general trend. In 314 of the 350 rural municipalities, the upsurge in the number of dwellings per inhabitant (gained or lost) did not reach one building. In any case, the lost per capita values were always significant. This situation may respond to the occasional return of former emigrants, who now build their recreational homes outside of consolidated settlements.

The high and extreme values were found in the areas above-mentioned, that is, those with high tourism potential and within the influence of urban centers. All of this behavior responded to the way in which rural municipalities have digested the close presence of an urban center. When small towns on the cities' outskirts became dormitory towns, they benefited from the official population census figures, but also increased their artificialization of the countryside. In this process, not only do the former emigrants contribute, but also the urban population, who look for recreational spaces that are minimally remote but connected to their main residence.



**Figure 9.** Record of the residential buildings increase in UL by municipality (**a**) and number of total residential buildings by municipality (**b**).

Rural spaces away from urban centers do not have this extra contribution at the demographic level in the population census. For this reason, the protagonists of the new residential role of the rural environment are urbanites coming from more distant urban centers (even from outside the region). In addition, in some cases in northern Extremadura, the strength of the tourism sector is so strong that it allows population growth in rural areas with a higher level of isolation.

When an urban center functions as a rural population sink, the population increase decreases, but the growth in the number of houses in the countryside is maintained by urbanites.

Independent of the demographic behavior, the urbanization of the rural environment has followed an unstoppable progress during the last 30 years. The power of this increase has been very remarkable, exceeding twice the values registered in 297 of the rural municipalities in Extremadura. It has even multiplied by more than ten from the figures of 1981 in 24 of them, although they practically all started from a very low base value (less than 10 houses in UL). Among them, it is worth highlighting the municipalities that have multiplied in the presence of housing in the UL within a generalized and persistent context of demographic losses and without a nearby relevant urban center (northwest and center-east of the region).

The final result after three decades (Figure 9b) was the acquisition of the new role of the rural environment in Extremadura. This new role advanced without the need for demographic support, but reached peaks of 436 homes in municipalities with 4792 inhabitants, which is a perennial urban transformation that is not subject to continuous occupation. However, this proportion is not one of the most alarming. In at least 12 rural municipalities, the ratio between the number of dwellings and inhabitants surveyed was one for every five.

In addition, in more than 40% of rural municipalities, the new homes located in the UL exceeded fifty. These buildings condition the dense and continuous growth of the settlements due to their close but dispersed location as well as the occupation of the houses inside them, of which they are competitors.

## 4. Discussion

The new residential function of rural areas in Extremadura opens a new paradigm. This region, among the poorest in Spain and the European Union, has perfected its primary sector in certain rural areas. However, areas without this possibility have turned to the tourism sector as a lifeboat.

The urbanization engine has been the humble urban centers of the region and tourism potential areas. However, this growth has occurred irregularly and disorderly. This clandestine growth is mostly recreational and dispersed. In addition, it has been faster than the legal and orderly growth, generally linked to the first residence. For this reason, residential growth in the UL has taken advantage of the best spaces, not only those with urbanistic expectations (around the consolidated settlements), but also those with the greatest tourist attraction. This fact has created a competition that the government and the society of Extremadura must manage. Several dilemmas have been posed: continuing to look the other way, or managing dispersed urbanism in the rural environment and its future growth.

The application of the designed methodology is able to stop this. The methods developed cannot compete, in terms of speed, with other detection techniques such as remote sensing. The objective of this proposal is deeper: to serve a comprehensive management of the matter. Therefore, it cannot be used in an improvised manner to solve risk situations, which require quick responses (fire, flood, etc.). Government forecasts and first results are required for this specific purpose. However, the investment in time leads to a greater precision. This high level of detail creates precise knowledge (activities developed, their intensity and location) of the use of the territory, which should be an obligation for any government.

This information is essential to apply the law. Thus, while remote sensing simply gives us contours of artificial elements (without individual identification), this new methodology provides us with more information about what has been built.

Under the current design and thanks to its low economic cost, any administration can apply it without spending a large number of resources. The public administration can reuse its own cartography (for instance, orthophotography series) and enhance it through free resources from private entities with international coverage. Furthermore, any minimum investment in the tracking of the elements built in the rural environment (greater hiring of specialized personnel) can mean a great advance for the proposed methodology, and without a doubt, a substantial progress in the current cartography.

Maintaining a system out of control will mortgage future economic policies, especially in those sectors where physical support and resources are needed. This is the case of the primary sector and tourism in Extremadura.

The management of this tourism development involves two types of actions: one current and one future. The first must face the challenge of redirecting the benefits of this urban development to the local sphere. For this, it would be advisable to reduce the temporality of the residents through rural environment support policies, which would reinforce local small-scale trade. In this way, the new residents will contribute to local development and social relations will be reinforced, avoiding friction. The second action involves the approval of a new legal framework that does not criminalize construction in rural areas, but that clearly limits the uses that do not beneficially revert to the territory. Recreational residential use cannot pose a threat to the development of other economic sectors, and in this sense, the magnitude of it is a factor that must be controlled. The proposed methodology solves this problem.

#### 5. Conclusions

By considering the results achieved, the rural environment of Extremadura suffers from urban development that does not correspond to its general demographic descent. Data provided led to the conclusion that certain rural and natural spaces of Extremadura are experiencing a tourism-driven urban sprawl. The areas with more natural resources, greater implementation and development of the tourism sector, and a higher degree of urban transformation in the form of dispersed housing coincide in the same territory. However, this growth based on tourism potential represents competition for it and its economic sector.

Although one of the main attractions for homeowners is contact with nature and a pure rural environment, a good part of the houses are located in areas very close to the population centers. Additionally, residential growth accompanied by population growth occurs mostly in rural municipalities close to urban areas. This fact led us to conclude that in these areas, the increase in the number of homes in the UL did not correspond to their own demographic dynamics, but was rather induced by the urban centers.

The phenomenon of urbanization of the countryside for these recreational purposes is far from disappearing. All global indicators on tourist mobility have increased. At the same time, there are local indicators that denote a greater social mainstreaming of this process. In fact, the average area of housing in the countryside has been reduced in these three decades. More and more people can access this type of construction for recreational and seasonal use. Therefore, not even economic shortage has slowed down this trend, but only affects the characteristics of the acquired good.

The rural environment must lend itself to its transformation, since it is the only way to maintain the rural population. However, the current model is not adequate. Part of the uncontrolled phenomenon studied must be integrated into the law, offering solutions such as the legalization and consolidation of developments, while others must be penalized. This will make the difference with respect to the territorial planning law. The conciliation between this law and tourism must be mandatory to avoid spatial competitiveness. Thus, Extremadura must urgently initiate an intense and complete process of the production of territorial plans.

From there, new alternatives will be opened for rural areas in Extremadura. The most significant are those related to clean energies, without abandoning other strategies. Among the latter, government facilities for the installation of traditional industries (always under the strictest environmental controls) should be considered, which are the true solution to unemployment and depopulation. An economy with balanced sectors will promote rural and local development. The tourism sector will add to this strategy, provided it can be managed to contain it within the law.

Definitely, the tourist attraction of certain areas in Extremadura and urban influence are an additional boost to a larger phenomenon. The rurbanization in Extremadura is the spatial consequence of the confluence of several processes, all of them related to social change tending to recreation. Thus, different motivations with different players add up to the same total.

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