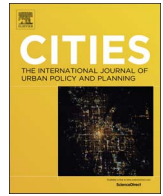


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Physical location factors of metropolitan and rural sprawl: Geostatistical analysis of three Mediterranean areas in Southern Spain

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1. Introduction

In recent decades in many parts of the world there has been a generalized increase in dispersed low density urban growth known as sprawl (Couch, Leontidou, & Petschel-Held, 2007). Most authors agree that the most characteristic aspect of sprawl is its low density although various different definitions of the term have been proposed (Hasse & Lathrop, 2003), and various papers have highlighted the need to consider other factors when characterizing, quantifying and describing this concept (Sohn, Choi, Lewis, & Knaap, 2012). Above and beyond this debate on the definition of the term, the truth is that this model of urban development poses a challenge for the planning of services and for territorial management, and has become an issue of concern for different institutions. In the United States, a range of organizations from financial corporations to environmental groups have highlighted its drawbacks (Wilson, Hurd, Civco, Prisløe, & Arnold, 2003), while in Europe a report by the European Commission defined urban sprawl as an “ignored challenge” (EEA, 2006), and warned about the risks of its progressive extension.

Numerous problems in relation to sprawl have been identified. It has a significant impact from an environmental point of view altering rural areas due to the fragmentation of ecosystems and cultivated areas (Johnson & Klemens, 2005; Salvati, Munafo, Morelli, & Sabbi, 2012). It is also less efficient than other settlement models in terms of energy consumption (Ewing & Rong, 2008). In economic terms the sprawl model of urban development is less competitive than other kinds (Chorianopoulos, Pagonis, Koukoulas, & Drymoniti, 2010), and results in higher public service provision costs (Hortas-Rico & Solé-Ollé, 2010). Its social consequences have also been studied, and it has been found to induce processes of privatisation of space, simplification of functions, isolation and intensification of security measures (Munoz, 2003).

In general, residential dispersion processes begin around the main urban centre, on the edge of which developments begin to spread out in different directions in the form of sprawl. Later however they start appearing further away from the town occupying increasingly large tracts of rural land (Bruegmann, 2006). In the Mediterranean regions of Europe processes of this kind have been taking place for some time,

becoming increasingly more intensive, such that “urban sprawl in coastal zones is no longer necessarily induced and supported by the main coastal cities” (EEA, 2006, p. 23). In recent years, the attraction of coastal areas, together with the freedom of movement in the European Union and the development of easily available, low-cost transport systems has produced a situation in which “residential tourism is growing to be an important aspect of the postmodern lifestyle in the EU” (Leontidou and Marmaras, 2001: 258).

In spite of the existence of these new types of sprawl, most research studies have focused on analysing this phenomenon in metropolitan areas (Kasanko et al., 2006). Several of these have focused on Mediterranean cities such as Barcelona (Catalán, Saurí, & Serra, 2008), Rome (Salvati et al., 2012) and Athens (Chorianopoulos et al., 2010; Leontidou, Afouxenidis, Kourliouros, & Marmaras, 2007; Salvati, Sateriano, & Bajocco, 2013). However less attention has been paid to sprawl in rural areas, which are increasingly affected by tourism dynamics (Hof & Blázquez-Salom, 2013; Yepes & Medina, 2005).

Rural sprawl in these Mediterranean areas has come in the form of second homes for the local population (in some cases of first homes too), and of “residential tourism” for people from northern Europe, who spend long periods on the Mediterranean coast enjoying a more pleasant climate than that of their respective homelands (Navarro-Jurado, Damian, & Fernández-Morales, 2013). This process, which suggests a “thinning of the line between tourism and international migrations” (Leontidou & Marmaras, 2001: 258), has given rise to different kinds of residential tourists (O’Reilly, 2003), many of whom have opted for scattered dwellings in rural areas. Although initially there was a move to recovery and restoration of traditional rural constructions, the strong demand has led to a proliferation of new-build housing units. Many of these new buildings, especially in the Spanish Mediterranean region, have been erected in areas in which building is prohibited, deliberately flouting planning regulations, which have proved to be completely ineffective at containing and regulating this phenomenon, especially in coastal areas (Malvárez García & Pollard, 2004).

When it comes to planning and managing these areas, it is necessary to find out more about their particular characteristics (Salvati & Gargiulo Morelli, 2014; Sayas, 2006), which have an important

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influence on the development of sprawl in each place (Barke, 1991). However in previous research on this issue, there are no detailed papers on sprawl location patterns on the ground or on the factors influencing these patterns. There was no research with chronological information either, in other words which assessed which parameters determine the appearance of sprawl in particular periods.

For this purpose in this article we will be comparing the differing characteristics of three examples of rural sprawl in the Mediterranean area of Southern Spain. We will be focusing on the physical location factors linked with the appearance and distribution of scattered buildings, using a multinomial logistic distribution model with spatial and time data input. To our knowledge this is the first time a model of this kind has been applied to sprawl. This technique allows us to obtain maps of the probability of sprawl appearing in particular areas on the basis of the location factors we analysed. We were also able to compare the most important characteristics of each period. We began our research by posing the following questions:

1. What are the territorial differences between the sprawl that has appeared recently in Mediterranean rural areas near large cities and the sprawl that has developed in tourist destinations with different degrees of consolidation, especially with regard to location factors?
2. How has sprawl developed in recent decades in each of these different situations? To what extent are these differences due to their respective historical circumstances?

2. Material and methods

2.1. Selection of study areas

In recent decades in the Andalusia region of Southern Spain there have been intensive processes of sprawl, especially along the Mediterranean coastal strip. To carry out this study we selected three towns in this area in which significant development has taken place in dispersed housing (Fig. 1): Cártama, Estepona and Torrox.

The first town (Cártama) lies northwest of the city of Málaga in the Guadalhorce river valley; it occupies an area of 10,512 ha and has a population of 24,592 (2015). It can be classified as part of the urban agglomeration of Málaga, and traditionally has contained an intensive dispersed habitat linked to agriculture. In recent decades, however, the density of housing has increased considerably, especially in the irrigated farmland area.

Estepona is on the Mediterranean Coast at the western end of the province of Malaga and is an important, well-established tourism resort. The municipal area covers 13,791 ha and has a population of 67,080 inhabitants (2015). There have traditionally been numerous rural settlements linked to farming situated in a halo formation around the town. Scattered housing has increased notably in recent years as a result of the boom in residential tourism.

For its part, Torrox is situated on the eastern part of the Costa del Sol. It covers an area of 5095 ha, and has a population of 15,117 (2015). Tourism in this town developed slightly later than in Estepona. In spite of its mountainous terrain, there was widespread scattered population living on smallholdings outside the town itself. In recent decades the population density in these mountain areas outside the town has increased substantially.

2.2. Digitalization and processing of the information

In each of these three towns, a geographical information system (GIS) has been used to manually digitalize the scattered buildings in rural areas, from aerial photographs taken at different times in the past. Each construction is identified with a dot, to which is associated information about the historical period in which it first appeared and, when applicable, if it disappears in some later period. These studies considered four clearly distinguishable periods in the recent development of population settlement in Spain as follows:

1. Prior to 1956. The buildings that appear in aerial photographs taken in 1956–57 (REDIAM, 2017a). These illustrate the situation of Spain prior to the period of economic development that began in around 1959, when the government abandoned its policy of autarky to open up the economy to foreign trade, so enabling important economic and demographic transformations to take place (Hoggart & Paniagua, 2001). This encouraged the urbanization of Spain with a population shift from the countryside to the city. In order to improve the reliability of the aerial photographs from 1956, they were complemented with photographs from 1977 (REDIAM, 2017a).
2. From 1956 to 1984. New buildings that appear in the aerial photographs for 1984–85 (REDIAM, 2017a). This was a period of substantial economic and demographic growth in which according to Barke (1991) there were two parallel tendencies: on the one hand, people from the city who had prospered, started buying rural plots of land at cheap prices for “hobby farming”, on which they later

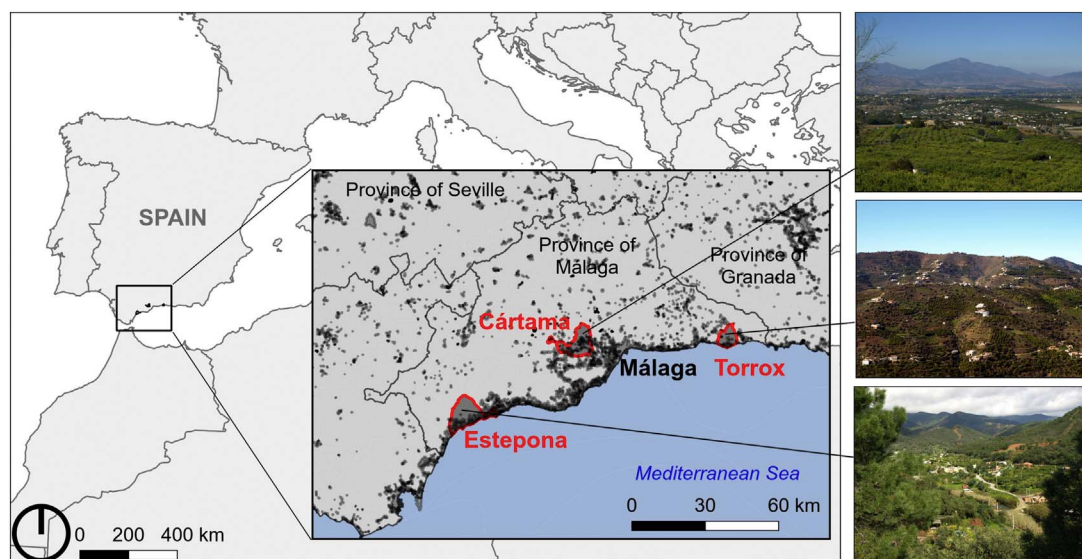


Fig. 1. Map showing the location of the three study areas.
Source: The Authors, using data from IECA (2013).

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