

Overtourism and online short-term rental platforms in Italian cities

Abstract

Although Italian cities have undergone several waves of touristification, concerns about overtourism have only recently become widespread. In the article, we suggest that the diffusion of short-term rental platforms is not merely a concomitant factor, but is crucial to understanding the how and where of contemporary overtourism. To this end we apply a fractal methodology to identify, map and compare those parts of the city that are most affected, and measure the pressure short-term rentals have on city centres as places of residence. By allowing the conversion of residential apartments into tourist accommodation, we argue, short term rentals contribute to the displacement of residents more directly than a generic process of gentrification or touristification. Second, platforms such as Airbnb not only contribute to increasing the accommodation capacity of urban areas, but radically change the morphology of the tourist city. The growing concerns about overtourism are not due to the rising number of tourists per se, but to their increasing penetration into the residential city. We suggest, therefore, that to conceive of overtourism merely as overcrowding is not only inadequate but counterproductive. Even though the depopulation of city centres is difficult to reverse, the coronavirus emergency is an opportunity to plan a different city where tourism coexists with other urban uses and functions.

Keywords: Overtourism; Airbnb; Short-term rentals; Platform economy; City centres; Neighbourhood effects.

Introduction

In recent years overtourism has been on the agenda of various cities worldwide. The term has been used in Google searches since 2006; it became a hashtag on Twitter in 2012 and was first discussed in an article on the travel industry site Skift.com in 2016. Since then the term has gained increasing popularity: a simple search on Google Scholar for the keyword “overtourism” returns approximately 400 papers in 2019 and 150 in 2018, while the same search in 2017 returned only 12 results (Goodwin, 2017). The term “tourismphobia” is also recent; it first appeared in 2008 and since then has been widely used to label, or rather stigmatize anti-tourism protests. These protests have been observed in many European cities (Barcelona, Venice, Palma de Mallorca, Paris, Dubrovnik, Berlin, Bologna, Reykjavik, and others), and elsewhere (Koens et al., 2018). Anti-tourism movements have also flourished in recent years (Hughes, 2018; Colomb and Novy, 2016). Some may argue that these concerns belong to the past, given that the coronavirus emergency has practically halted tourism flows worldwide. However, the epidemic may change mass tourism more or less permanently, but will not stop it indefinitely. However, many of the effects overtourism produced are difficult to reverse, as we will discuss further in the paper. Despite the relevance of the issue and its effects, there is still lack of conceptual clarity about what overtourism is, how contemporary concerns about it differ from earlier worries, what are its causes and

¹ This is the postprint version of the article published in the Journal of Sustainable Tourism: <https://doi.org/10.1080/09669582.2020.1788568>.

consequences and, consequently, how it should be investigated and managed. In this paper, we first provide a review of current conceptualizations in order to highlight the specificities of contemporary concerns about overtourism, and how previous research has attempted to define, measure and monitor the pressure tourism is exerting on cities. In particular, we discuss the crucial role played by the spread of digital accommodation platforms, which sparked a huge and uncontrolled expansion in cities' accommodation capacity with the potential to impact housing availability and affordability, displace permanent residents, and transform the social ecology of the most affected urban neighbourhoods. The article focuses upon Airbnb.com, given that it is the most widely-used short-term rental platform in Italy, and based on the idea that such diffusion is an important part of the problem. The hypothesis is that short-term rentals do not merely contribute to increasing the accommodation capacity of urban areas, but radically change the morphology of the tourist city and, consequently, the relationships between residents and visitors.

On this basis, we develop a methodology aimed at identifying and mapping sub-municipal areas that are most affected by overtourism, and apply this methodology to the most touristified metropolitan cities in Italy – Venice, Florence, Rome, Naples, Palermo, and Bologna. The aim is to provide comparable evidence about the incidence and impact of short-term rentals upon the liveability of city centres, and their contribution to the depopulation of the urban core.

The case study cities have been identified based on the number of short-term rentals listed on the accommodation platform Airbnb.com (Piscia et al., 2017). All of these cities have seen a proliferation of initiatives and social movements denouncing the effects of overtourism and short-term rentals, in particular in terms of housing availability for residents or students². Hotel associations have criticized short-term rentals as a form of unfair competition, given their unregulated status³. These views are often countered by those who argue instead that short-term rentals represent a precious source of (extra) income and urban regeneration. Concerns from local public authorities have initially been limited to attempts to avoid excessive tourism congestion, to 'educate' or 'discipline' tourists, or to limit their access to certain parts of the city. Mayors in some of those cities (Florence, Venice, Rome) have, for example, issued ordinances that ban tourists from consuming meals in public spaces or sitting on monuments. The Mayor of Florence announced in 2017 that he would have church steps watered to prevent tourists from sitting there. In Venice, entry gates were set up to regulate access to the city centre, so that they can be closed when the number of accesses exceeds a certain threshold (the gates were removed shortly afterwards as they were never used). The same has been attempted around specific attractions, like Fontana di Trevi in Rome, which tourists are invited to visit quickly. Visitors entering Venice have recently been asked to pay an entry ticket that ranges from 3 to 10 euros depending on the degree of congestion in each period, with the exception of tourists staying in local accommodation facilities and other categories of city users. Several local associations and (anti-tourism) social movements have protested vehemently against these measures, which they judge counter-productive. What those associations criticize is the transformation of cities into some sort of theme park: access gates and entry tickets cannot but promote and accelerate such process. It is clear, however, that current

² See, for example, the manifesto of the SET network, "Sud Europa di fronte alla Turistizzazione", which many Italian cities signed up to: <https://setfirenze.noblogs.org/post/2019/02/13/founding-manifesto-of-set-network/>.

³ See for example the report "Tourism and the shadow economy" published by Federalberghi, the main Italian association of hotels:

<http://www.federalberghi.it/UploadFile/2018/09/turismo%20e%20shadow%20economy%20-%20edizione%20settembre%202018.pdf>.

approaches are far from constituting an appropriate and definitive management of overtourism, which is not simply an issue of overcrowding, as we will discuss in the next sections.

With regard to the widely debated issue of short-term rentals and digital accommodation platforms, none of those cities have taken any formal steps, but some of them (Bologna and Firenze) have declared very recently their intention to introduce specific regulations and even to 'stop' the conversion of residential dwellings into lodgings for tourists. Proposals have been made, moreover, to change existing regional and national laws in order to provide cities with some tools for monitoring and regulating short-term rentals, which are currently very weak, for example by introducing an ad-hoc licence. Moreover, national authorities have attempted to limit tax evasion and tax avoidance, with limited success. The paper aims both to contribute to existing research and to put forward a more appropriate system for management of overtourism and of its effects.

The how and where of platform-mediated overtourism

Although the term has gained popularity only very recently, concerns about overtourism are by no means new. In tourism research, the topic has been discussed at least since the early seventies (Wall, 2020; Capocchi et al. 2019). For example, an index for measuring residents' 'irritation' towards tourists was proposed by Doxey in 1975. Within Butler's well-known theory of the Tourism Area Life Cycle, the "consolidation" stage is described as the moment when the number of visitors exceeds that of permanent residents (1980). According to Butler, this situation can easily lead to stagnation and decline, as well as causing "opposition and discontent among permanent residents, particularly those not involved in the tourist industry in any way, and result in some deprivation and restrictions upon their activities" (Butler, 1980, p. 8). More recent definitions of overtourism are basically similar, except that the emphasis is more on residents' discontent and perceptions, rather than overcrowding per se (Butler, 2019)⁴.

The first difference with respect to previous concerns about overtourism is indeed this 'discontent'. Concerns and protests about the negative effects of excessive tourism are today particularly widespread (Milano et al., 2019) whereas previously they were more limited (Dodds and Butler, 2019). The second difference is that concerns about overtourism arise today mainly in big cities. The question we must ask therefore is: why? The easiest answer is that tourism is simply growing too much and that this growth is particularly concentrated in cities. This view has been advanced by a recent UNWTO report on the topic (2018), and is common in the burgeoning literature about overtourism (Sequera and Nofre, 2018; Capocchi et al., 2019; Oklevik et al., 2019; Dodds and Butler, 2019). However, this is just part of the answer since the *how* of this growth is, in our view, at least equally important. In this regard, we believe that the role of digital accommodation platforms is crucial for understanding contemporary overtourism. The diffusion of "network hospitality" or platform-mediated short-term rentals is in fact often mentioned as a concomitant factor in the literature about overtourism (Goodwin, 2017; Bouchon and Rauscher, 2019; Dodds and Butler, 2019), but it is rarely the main focus of the analysis.

⁴ The UNWTO defines overtourism as "the impact of tourism on a destination, or parts thereof, that excessively influences perceived quality of life of citizens and/or quality of visitors experiences in a negative way" (2018, p. 4). The Responsible Tourism Partnership (Goodwin, 2017) defines overtourism as "destinations where hosts or guests, locals or visitors, feel that there are too many visitors and that the quality of life in the area or the quality of the experience has deteriorated unacceptably" (p. 1). According to a report commissioned by the European Parliament, "overtourism describes the situation in which the impact of tourism, at certain times and in certain locations, exceeds physical, ecological, social, economic, psychological, and/or political capacity thresholds" (Peeters et al. 2018, p. 22).

One hypothesis that we wish to explore further in this paper is that platforms such as Airbnb have not only hugely increased the accommodation capacity of many destinations, they have also changed substantially the morphology of the tourist city, which “plays an important role in the sentiment of contested spaces between residents and visitors” (Bouchon and Rauscher, 2019, p. 14). Inhabitants, it has been argued, feel increasingly alienated from their own city which they feel has been appropriated by tourists (Diaz-Parra and Jover, 2020).

Evidence about the spatial effects of accommodation platforms is indeed ambivalent (for a review, see Guttentag, 2019). Short-term rentals, it has been shown, are causing both the over-touristification of already highly touristified city centres (Arias Sans and Quagliari Domínguez, 2016; Picascia et al., 2017; Benítez-Auriolles, 2018; Alizadeh et al., 2018) and the invasion and gentrification of non-touristic neighbourhoods (Cocola-Gant, 2016; Wachsmuth and Weisler, 2018; Ioannides et al., 2019). This apparent ambivalence can easily be solved by assuming that short-term rentals are much more diffused and widespread all over the cities’ central and near-central areas than hotels and traditional accommodation facilities (Gutiérrez et al., 2017; Celata, 2017; Gyòdi, 2017). The rising concerns about overtourism may therefore be due not to the growing number of tourists per se, but to their growing penetration into the residential city, closer to where the inhabitants live.

Moreover, the diffusion of short-term rentals may have a much more direct effect on the socio-spatial ecology of city centres than a ‘standard’ gentrification process (Sequera and Nofre, 2018; Jover and Diaz-Parra, 2019) and even than touristification in general, whose effects are mainly indirect. By allowing the conversion of thousands of residential apartments into tourist lodgings, short-term rentals immediately cause a substantial decrease in the housing stock available for long-term residents and contribute directly to the depopulation of city centres, as we will show.

Another difference with respect to previous debates about overtourism, as already mentioned, is in the typology of destination that is today more exposed (Bouchon and Raucher, 2019; Phi, 2019; Butler, 2019; Wall 2020). Traditionally, concerns about the number of tourists exceeding an acceptable threshold have been raised with regard to, for example, natural parks and areas of ecological importance, small islands, specific tourist sites, or “resort cities” where “a major part of the area’s economy will be tied to tourism” (Butler, 1980, p. 8). Since today overtourism predominantly affects big cities, the conceptual and empirical lens through which we observe and eventually react to overtouristification must change.

For example, based on previous experiments in destinations affected by overcrowding, the application of “carrying capacity” or “the limits of acceptable change” methods is frequently suggested (Papathanassis, 2017; Bouchon and Rauscher, 2019; Phi, 2019; Capocchi et al., 2019; Milano et al., 2019; Goodwin, 2017; Koens et al. 2018; UNWTO, 2018; Peeters et al., 2018; Dodds and Butler, 2019). A wealth of “urban carrying capacity” assessment methods exists (Wei et al., 2015), and these have been applied to determine the maximum amount of tourism allowable in, for example, Venice (Bertocchi et al., 2020). The option attracted several criticisms (Saarinen, 2006; Koens et al., 2018; Wall, 2019, 2020). The measurement of the maximum acceptable number of tourists may be based on the physical capacity of, e.g., accommodation facilities, public transport or the waste treatment system (Bertocchi et al., 2020). However, touristification can cause irreversible and detrimental effects, as well as raising concerns and protests from the local population, much before such an extreme threshold and the city’s complete saturation is reached. Contemporary overtourism is not, moreover, simply due to congestion or overcrowding; the concern is about how touristification affects and interacts with the social fabric of the city, and what the consequences are for residents. At the same time, to measure carrying capacity based on residents’ perceptions or sociocultural variables is problematic, equivocal, and potentially flawed, as

long as what is an “acceptable” pressure is based on a complicated and debatable aggregation of individual preferences (Seidl and Tisdell, 1999). Additionally, the relationship between the density and degree of touristification and the “acceptable change” it induces is not linear (Wall, 2019). And what should we do once we know that the number of tourists is excessive? Such a view implicitly calls for an approach based on limiting tourist numbers, which is not only problematic, but also far from being a proper management of the causes and consequences of overtourism in an urban context (Phi, 2019), as mentioned in the introduction. Moreover, cities have a much more diversified social and economic base with respect to those over-specialized destinations that have been traditionally affected by tourism congestion. The issue is therefore not merely overcrowding, but how touristification relates to – and potentially conflicts with – other urban functions, and how it contributes together with a wealth of other factors and processes to urban change. Finally, as long as the destinations that are the most affected by contemporary overtourism are big metropolitan areas, the issue is not “how much” but “where” overtourism is in the urban area (UNWTO, 2018).

In the following sections, we will provide evidence about some of the issues mentioned above, issues that, in our view, are crucial for understanding the how and where of contemporary overtourism.

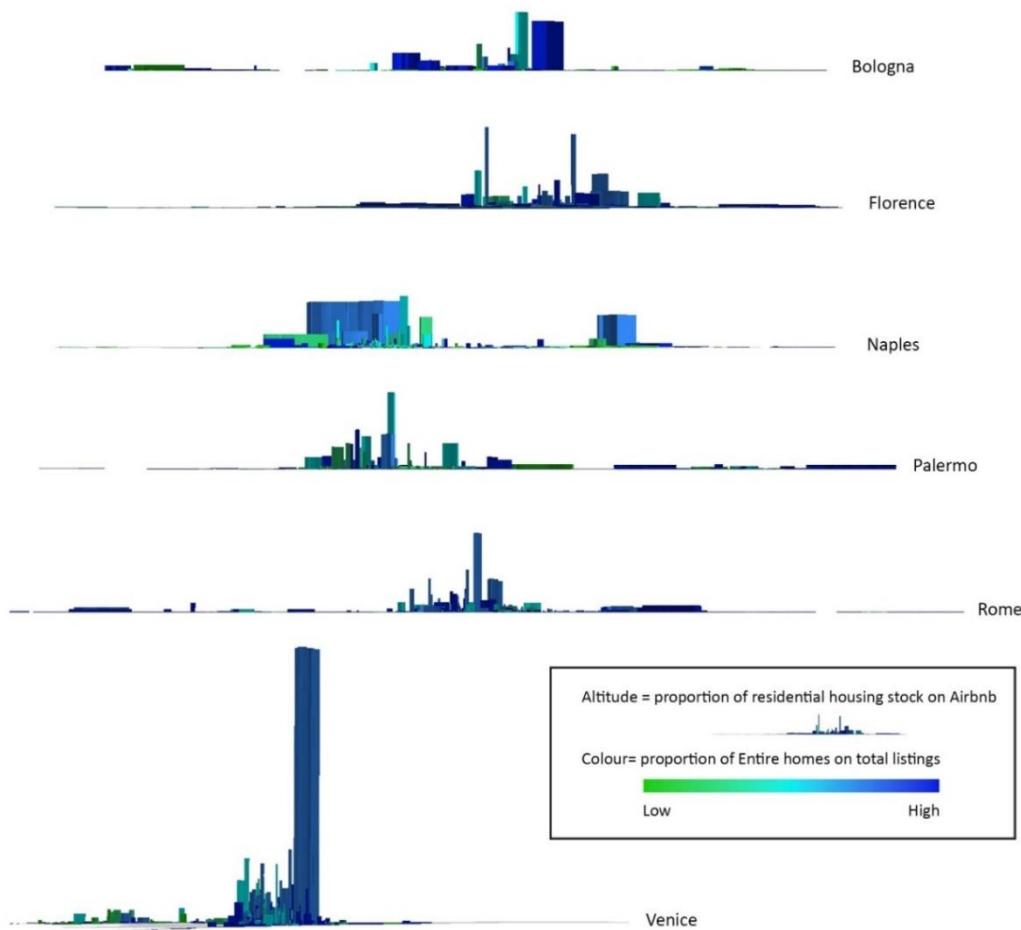


Fig. 1- Airbnbscapes in Italian cities. The bars' height is proportional to the portion of the housing stock that is available for rent on Airbnb.com per census tract. The bars' colour is the proportion of “entire homes” out of total Airbnb listings. Data sources: Insideairbnb, ISTAT.

Data and methodology

The analysis presented below provides first, the identification of those areas in the city that are affected by overtourism and, secondly, some evidence about the socio-spatial impact of platform-mediated

touristification. The methodology and measurements are aimed at providing comparable evidence across some of the main Italian tourism cities: Bologna, Florence, Naples, Palermo, Rome, and Venice. The study is based on data scraped from Airbnb.com in 2019 by Insideairbnb.com, microdata from official statistics (ISTAT), Municipal statistics and Openstreetmap geodata.

We first identify within the six cities the area that may be defined as the ‘tourist city’, based on a common method, and using the location of Airbnb listings. In particular, we apply a fractal methodology (Jiang & Miao, 2015) in order to make the different cities comparable or, more precisely, to avoid the so-called modifiable area unit problem (MAUP). The analysis presented in the paper is in fact applied to various urban areas that range from medium-sized cities such as Venice (260,000 inhabitants) to big metropolitan areas such as Rome (2.9 million inhabitants). In order to properly compare those cities, their different sizes as well as their different internal structures should be taken carefully into account. Figure 1 enables us to appreciate such variation: the city’s ‘skyline’ is composed of bars whose height is proportional to the ratio of the city’s housing stock that is for rent on Airbnb.com per each census tract. Bars are coloured based on the percentage of entire homes over total listings. Tall blue bars, in short, indicate areas in the city where not only are there more Airbnb listings, but where the impact on the availability of housing for permanent residents is higher, an issue that we will discuss in greater detail below. At this stage, the figure is useful to provide some sort of 3D visualization of the pervasive but non-homogeneous distribution of short-term rentals over the urban space, and to outline a preliminary taxonomy of the tourist city’s morphology. In Florence and Bologna the spatial pattern is concentrated in and more or the less equally distributed all over the city centre. Naples shows a multi-polar pattern. Venice is heavily polarized, while Palermo and Rome are both multi-polar and hierarchical.

The fractal methodology permits us to account for such variability by taking into account those areas where Airbnb listings are most concentrated, but also the overall structure of the (tourist) city, without adopting any predefined spatial partition. Previous analyses of the distribution and impact of short-term rentals are often affected by the MAUP. Such impact is in fact analysed sometimes at the city scale, e.g. based on municipal boundaries (Wegmann and Jiao, 2017; Alizadeh et al., 2018), sometimes on a sub-municipal scale using predefined divisions such as neighbourhoods or census tracts (Wachsmuth and Weisler, 2018; Gutierrez et al., 2016; Cocola-Gant, 2016), and other times focusing on specific neighbourhoods (Smith et al., 2018; Cocola-Gant and Gago, 2019; Ioannides et al. 2019). Estimates are therefore affected by the scale and shape of the geographical divisions adopted, which is particularly problematic if we wish to compare cities or neighbourhoods. Municipal and sub-municipal boundaries are in fact not only very different in size and shape but also arbitrary, being imposed from the top down by public authorities. The actual extent of cities in more geographical/spatial terms is defined and delineated based on their physical morphology, for example in terms of the average distance between buildings. The same applies to the ‘tourist city’: our methodological option is to identify these tourist cities based on the distance between Airbnb listings or, more precisely, based on the head/tail breaks rule. In detail, the approach “involves dividing things around an average into large and small, which respectively constitute the head and the tail of the rank-size plot” (Jiang, 2015, p.6). The process has four steps (Figure 2): we first calculated the Triangular irregular networks of Airbnb listings (A); we then measured the length of the interpolation edges (B), and (C) selected those whose length is below the median value, and those below the 75th centile. Finally, we created the fractal areas (D) by aggregating those high proximity features (point C) into single-part polygons. Figures 3-8 report the results: in orange the fractal area obtained by aggregating edges whose length is below the median, and in blue those below the 75th centile. In the analysis that follows, the “tourist city” corresponds to the fractal area with proximity of listings below the median value. The methodology allows us to obtain

homogeneous and comparable spatial units, as well as to highlight the spatial structure of the tourist city, e.g. the extent to which it is more or less compact or, on the contrary, fragmented.

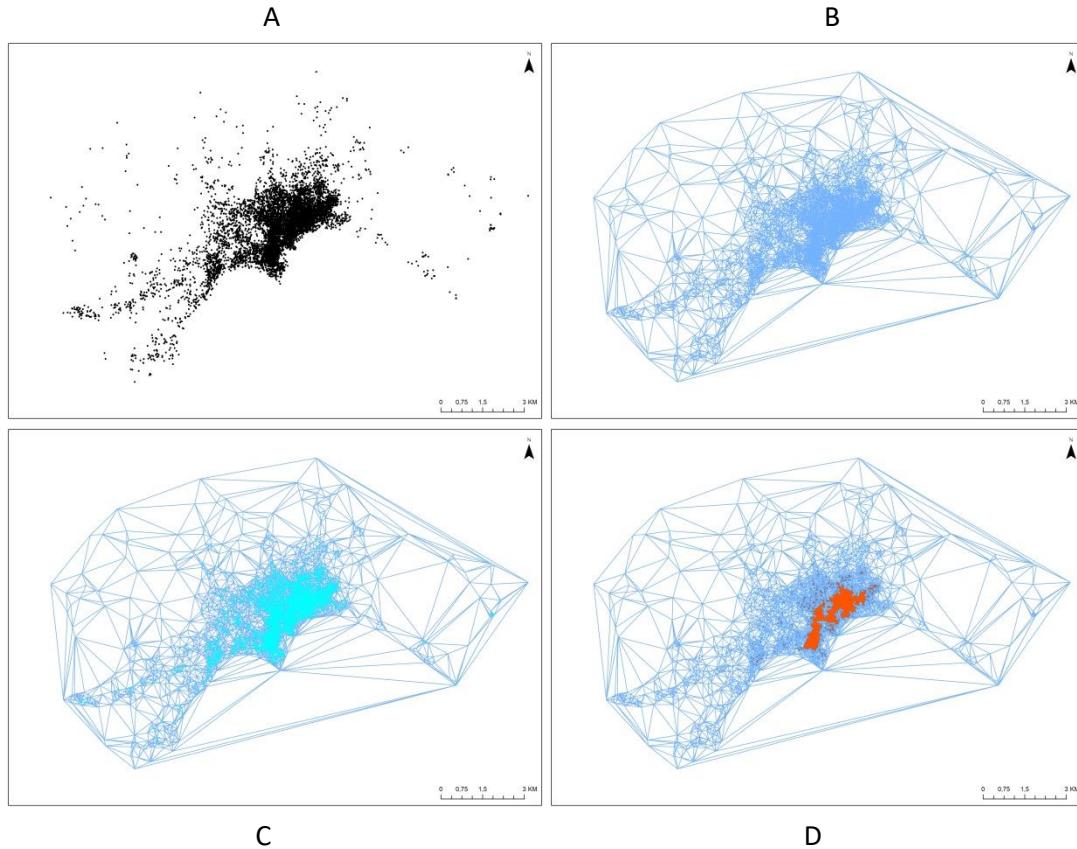


Figure 2. Fractal methodology to identify the tourist city: A) Airbnb listings (1 dot = 1 listing), B) interpolation edges between listings, C) selection of edges shorter than the median length, D) identification of the fractal area (in orange). Naples. Data source: Insideairbnb.com, 2019.

Using those spatial units, we calculated several indicators such as the extent of the tourist city, the concentration of Airbnb listings in this area, their growth rate, the ratio of short-term rentals on the residential housing stock, and the relation between their accommodation capacity and the resident population (Table 1).

Finally, we present and discuss the trends of population variation within and outside of the tourist city, and we then focus on some of those cities in order to provide further evidence about the association between the city centre's depopulation and the diffusion of short-term rentals, and about how the distribution of Airbnb listings in the city differs from that of hotels and registered accommodation facilities.

The spatiality and impact of platform-mediated overtourism

The fractal approach described in the previous section permits us, first, to obtain a comparable delimitation of the 'tourist city' within the metropolitan areas that are the object of our analysis. The results are presented in figures 3-8. These maps adopt the same geographical scale, and show that the overall extension of the tourist city is more or less similar despite these cities having very different sizes and populations, with the exception of Rome, where the tourist city is bigger, and Bologna, where it is smaller and more fragmented.



Figure 3. The tourist city in Venice, identified based on the distribution of Airbnb listings. Data source: insideairbnb.com, May 2019.

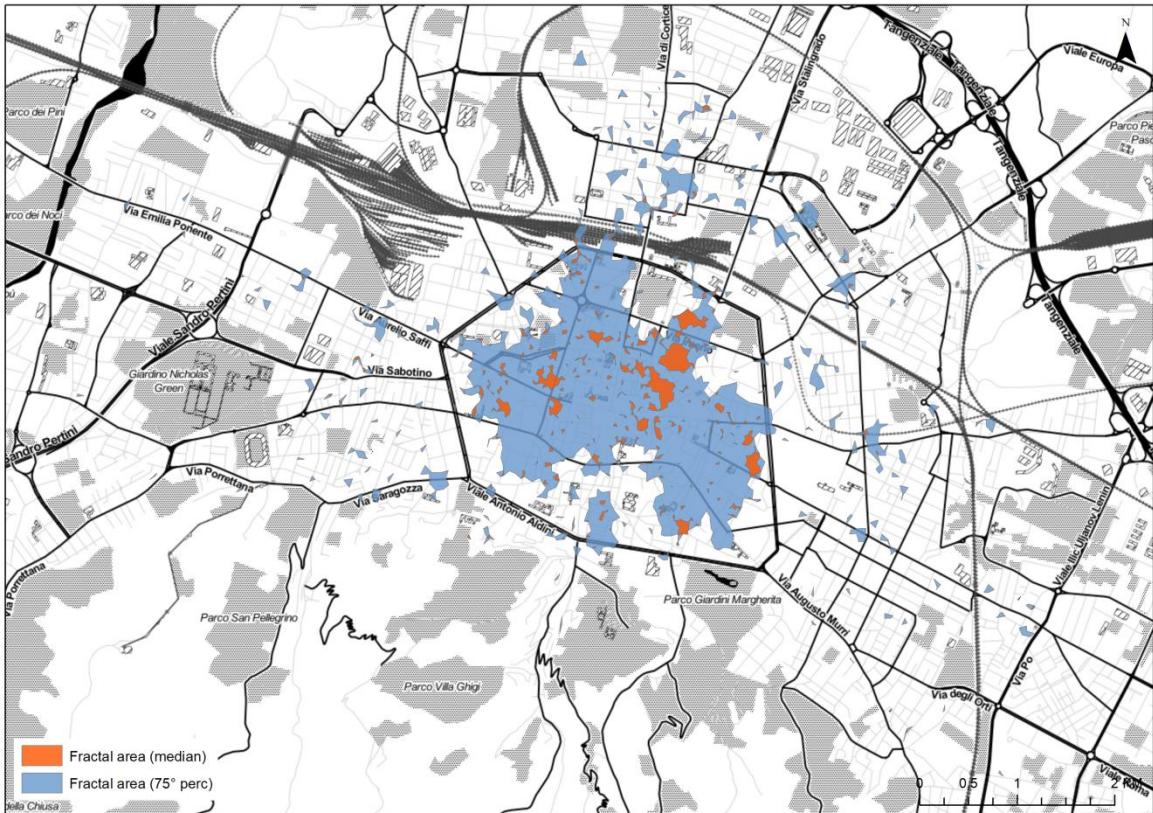


Figure 4. The tourist city in Bologna, identified based on the distribution of Airbnb listings. Data source: insideairbnb.com, May 2019.

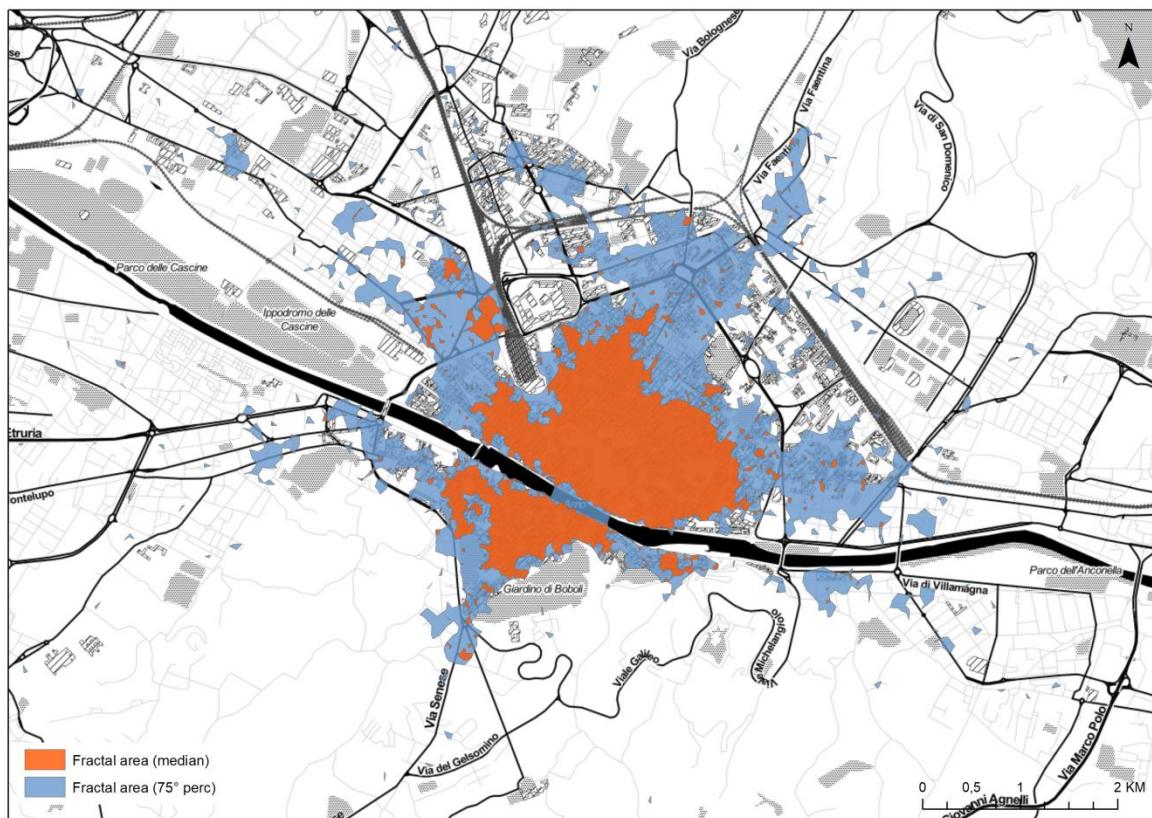


Figure 5. The tourist city in Florence, identified based on the distribution of Airbnb listings. Data source: insideairbnb.com, May 2019.

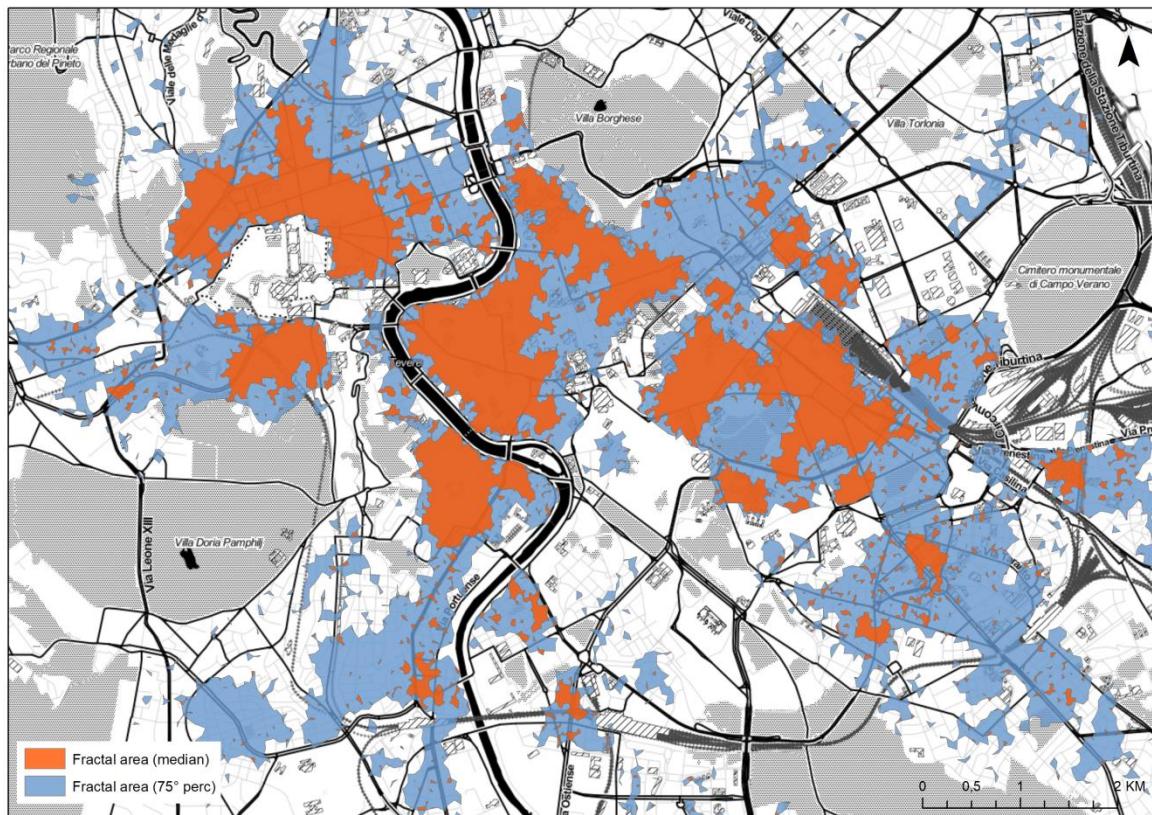


Figure 6. The tourist city in Rome, identified based on the distribution of Airbnb listings.
 Data source: insideairbnb.com, May 2019.

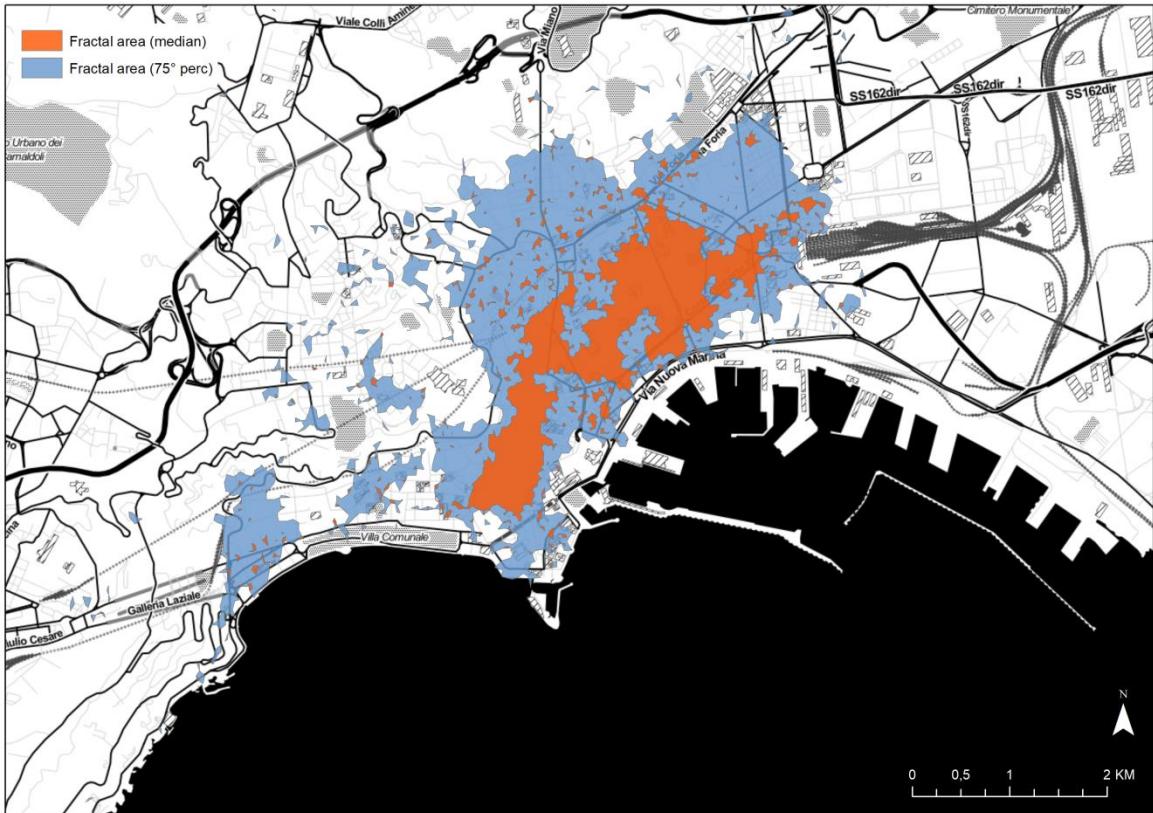


Figure 7. The tourist city in Naples, identified based on the distribution of Airbnb listings.

Data source: insideairbnb.com, May 2019.

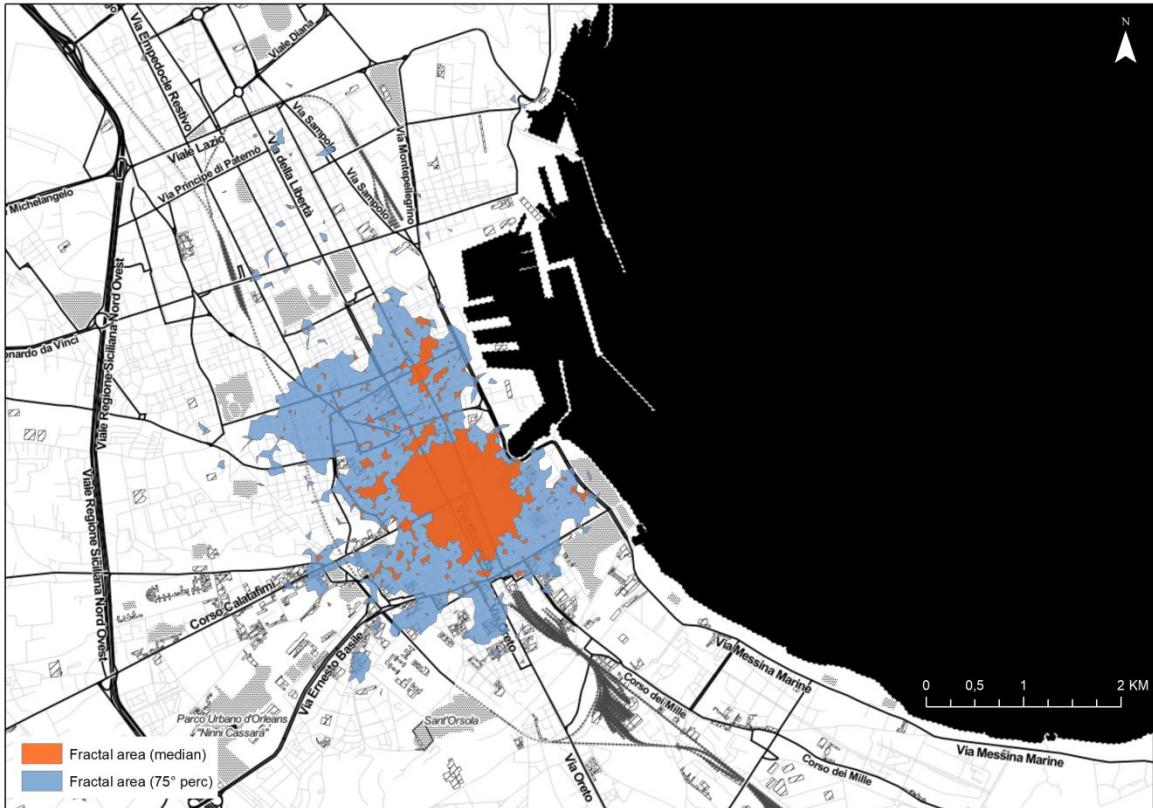


Figure 8. The tourist city in Palermo, identified based on the distribution of Airbnb listings. Data source: insideairbnb.com, May 2019.

As reported in Table 1, the ‘tourist city’ is relatively small in terms of extent with respect to the entire municipality (2.2% of the municipal area in Florence, 1.5% in Venice, approximately 0.5% in the other cities), but also quite significant as it covers most of the city centre, and includes between one third and three quarters of the entire supply of Airbnb listings. The demand for those listings is even more heavily concentrated in this central area: the percentage of reviews obtained by central listings (which can be considered proportional to the number of guests) is always above the percentage of listings located in this area, with the single exception of Florence, due to the attractiveness of villas in less central areas for rent on Airbnb.

In terms of impact, as already mentioned, the most direct and worrying effect is the subtraction of housing units available for permanent residents, and their conversion into short-term rentals. In order to assess this, we calculate the ratio between the entire residential housing stock in the census tracts that have their centroid in the ‘tourist city’, and the number of entire apartments for rent on Airbnb.com in the same area. The ratio ranges from 11% (Naples) to 30% (Florence and Bologna). Census data is only available for 2011; however, in the ‘tourist city’ the housing stock is relatively stable, given that the area includes heavily regulated historic neighbourhoods⁵.

Table 1. Tourist city’s extent and incidence of Airbnb listings in Bologna, Florence, Naples, Palermo, Rome, Venice. Data source: Insideairbnb.com, Istat.

City	Fractal area / Tourist city (km ²)	Percentage of Airbnb listings in the fractal area	Percentage of Airbnb reviews in the fractal area	Density of Airbnb listings in the fractal area (per Km ²)	Yearly growth rate (%) of listings within the fractal area (2018-2019)	Ratio between entire homes on Airbnb and the total residential housing stock in the fractal area	Ratio between entire homes on Airbnb and the number of families residing in rented apartments in the fractal area	Ratio between the accommodation capacity of Airbnb listings and the resident population in the fractal area
Bologna	0.25	34%	41%	5632	+288%	32.4%	136.8%	99.7%
Florence	2.3	77%	70%	3599	+39%	29.1%	149.5%	118.5%
Naples	1.76	64%	71%	2823	+84%	10.9%	30.3%	34.8%
Palermo	0.93	54%	71%	3266	+91%	25.0%	85.7%	95.2%
Rome	5.78	62%	74%	3300	+57%	17.0%	118.4%	75.9%
Venice	2.01	73%	75%	2986	+46%	21.8%	124.3%	86.0%

⁵ Census data shows that from 2001 to 2011 the number of apartments in residential buildings has indeed decreased in Venice (-9%), Bologna (-3%), Florence (-16%) and Rome (-8%), probably due to their conversion into office space, and increased only slightly in Naples (+2%) and Palermo (+6%) (dati.istat.it). More recent data shows moreover that the average surface of residential apartments in the historic centres of Rome and Naples didn’t change from 2012 to 2016 (https://www.agenziaentrate.gov.it/portale/web/guest/agenzia/agenzia-comunica/prodotti-editoriali/pubblicazioni-cartografia_catasto_mercato_immobiliare/immobili-in-italia); we can therefore exclude that the number of these apartments increased due to their subdivision into smaller units.

It should be noted that in most Italian cities the availability of rentals is very limited, as the great majority of families live in homes they own. The conversion of residential apartments into short-term rentals impacts therefore, in particular, upon the already small proportion of the housing stock which is available for long-term rentals. To measure such pressure, we compare the number of entire apartments listed on Airbnb with the number of families renting in the year 2011, i.e. before the Airbnb ‘invasion’ began. In four of the six cities, the number of apartments listed on Airbnb in 2019 exceeds those rented to residents in 2011. The indicator is not meant as a ratio but simply, as already mentioned, as a proxy of pressure. In fact, not only rented apartments but also those occupied by their owners may have been converted into short-term rentals. The available data do not allow us to measure actual conversion rates. However, while the percentage of families living in owned apartments increased consistently over the past decades, the percentage of residential apartments for rent (to either tourists or residents) increased in Rome and Naples from 2012 to 2016, and more in the city centres (+5.5%) than in the whole city (+3%). This may be due to various factors. What the above-mentioned data show is that the growth of short-term rentals is probably one of those factors.

The ratio of tourists to the permanent population is also a potential indicator of (over)touristification and of the pressure short-term rentals exert on city centres as places of residence. We therefore compared the entire accommodation capacity of Airbnb listings with the number of residents in 2011: with the single exception of Naples, such ratio is always close to or even above (in the case of Florence) 100%. Obviously, the resident population may have changed since 2011, as we discuss below. It is also unlikely that the total accommodation capacity of Airbnb listings is permanently and completely occupied by tourists. On the other hand, we only considered Airbnb listings. When tourists staying in hotels or in accommodation facilities advertised through other digital platforms are added, these numbers increase substantially.

Short-term rentals and the depopulation of city centres

How are such numbers and trends actually impacting the liveability of cities? The primary and most visible impact is upon the resident population of city centres. Figures 9, 10 and 11 show population trends within and outside the “tourist city”, i.e. those neighbourhoods that correspond more closely to the fractal areas identified in Figures 3-8.

In Rome, the central and most touristified part of the city is indeed depopulating fast (Figure 9), in particular since 2010, and especially after 2014: in four years, the two most touristified neighbourhoods – the zone labelled “historical centre” and Trastevere – have lost approximately one third of their inhabitants. In Venice (Figure 10), the municipal population is also more or less stable overall, while the number of residents in the historic city is decreasing. Unlike in the case of Rome, in Venice this trend seems to predate the Airbnb ‘invasion’ (which explains also why the ratio between the accommodation capacity of Airbnb listings and the resident population reported in Table 1, is lower in Venice than Florence or even Palermo). In Bologna, the municipal population is growing, but this growth does not affect the most touristified parts of the city, which are in fact slightly depopulating (Figure 11).

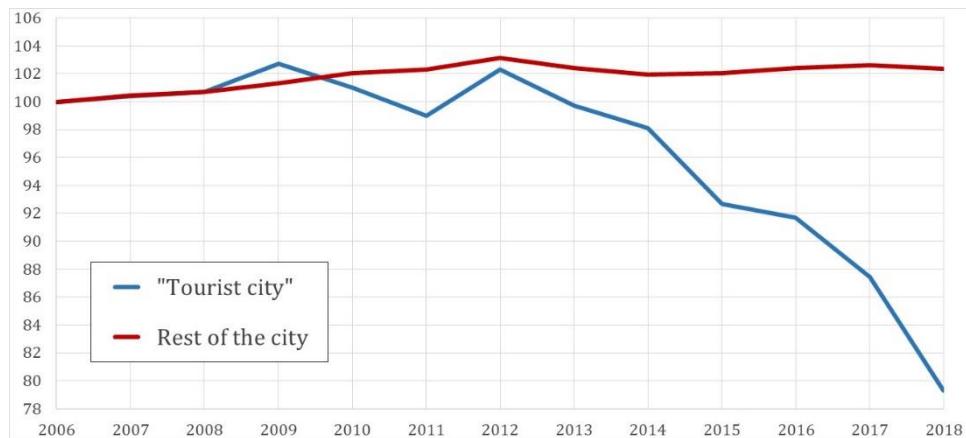


Figure 9. Variation of the resident population in Rome, 2006-2018 (Base: 2006 = 100). The tourist city's neighbourhoods are those that fall almost completely within the fractal area (Figure 5): Centro Storico, Trastevere, Esquilino, XX Settembre, Prati and Eroi. Data source: Municipality of Rome (<https://www.comune.roma.it/web/it/roma-statistica-popolazione.page>).

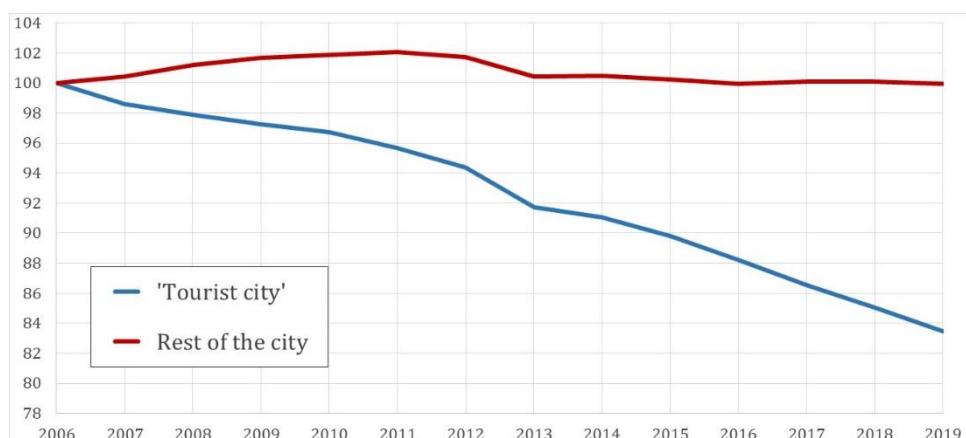


Figure 10. Variation of the resident population in Venice, 2006-2018 (Base: 2006 = 100). The tourist city corresponds to the zone "centro storico", i.e. the main central islands (neighbourhoods: S.Marco-Castello-S.Elena-Cannaregio and Dorsoduro-S.Polo-S.Croce-Giudecca). Data source: Municipality of Venice (<https://www.comune.venezia.it/it/content/serie-storiche>).

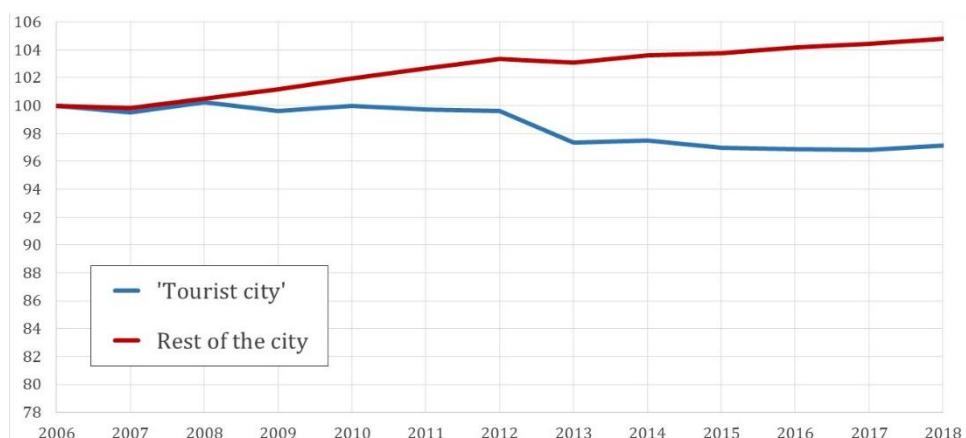


Figure 11. Variation of the resident population in Bologna, 2006-2018 (Base: 2006 = 100). The 'tourist city' corresponds to the zone "Irnerio". Data source: Municipality of Bologna (<http://dati.comune.bologna.it/node/1033>).

For the other cities, a complete historical series is not available. Based on the limited data available, we can see that in Florence the population of the “historical centre” zone (an area similar to that of Figure 5) decreased its weight with respect to the total municipal population, from 18.2% in 2012 to 17.3% in 2018⁶. In Naples, the sub-municipal areas are too big to match with the ‘tourist city’ identified in Figure 7, and data is only available until 2016; however, from 2010 to 2016, the resident population of the central area of the city shows a small decrease in absolute numbers, but not with respect to the rest of the city, as the whole urban population is decreasing⁷. In Palermo, the zone “circoscrizione 1” – which includes the ‘tourist city’ identified in figure 8, although it is bigger – the resident population decreased by 4.9% between 2012 and 2018, while the total urban population decreased by 4.25%⁸.

The depopulation of city centres is certainly not a new phenomenon. However, the population in the ‘tourist city’ from 2001 to 2011 – i.e. before the “Airbnb invasion” – remained stable in Bologna (+0.2%), increased in Naples (+3.4%) and Palermo (+9.3%), and decreased in Florence (-4.5%). The population trend for the historic centre of Rome is reported in figure 12, and it had been more or less stable since 1991. Venice (Figure 13) experienced the highest decrease between 2001 and 2011 (-10%), which is in any case lower with respect to both the previous five decades, and the most recent one (-15% from 2009 to 2019).

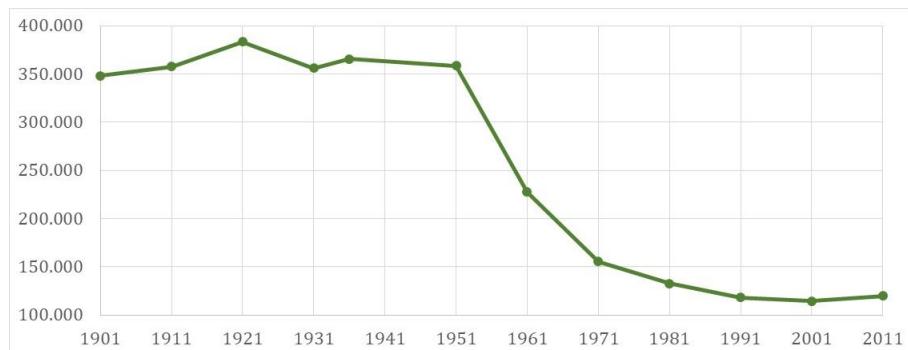


Figure 12. Resident population in the historic centre of Rome, 1901-2011

Source: Sonnino et al., 2011 (1901-1991 data) and Istat (2001-2011 data)

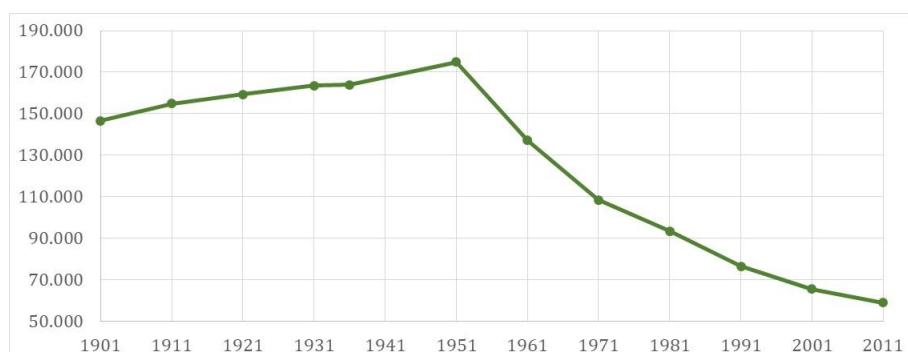


Figure 13. Resident population in the historic centre of Venice, 1901-2011

Source: Municipality of Venice

⁶ Data accessed at <http://dati.toscana.it>, February 7th 2020.

⁷ Data accessed at <http://www.comune.napoli.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/34362>, February 7th 2020.

⁸ Data accessed at <https://opendata.comune.palermo.it>, February 7th 2020.

In order to assess to what extent depopulation is associated with the spread of short-term rentals, we calculated the Pearson correlation between the variation of the resident population in each of the 155 neighbourhoods of Rome ("zone urbanistiche") and in the 12 neighbourhoods of Venice ("quartieri"), with several measures of the concentration of Airbnb listings in those neighbourhoods. As shown in Table 2, the correlations are always significant, above a 99% confidence level, and also quite high. The highest correlation is, not surprisingly, with the number of entire apartments for rent on Airbnb. The same correlation for the 18 neighbourhoods of Bologna is significant (the correlation is -0.585, significant at the 0.05 level) only if the variation of the population is calculated from 2012, and if two low-income but central zones (Bolognina and Marconi) where both the number of residents and of Airbnb listings have grown in the last years are eliminated.

Table 2. Pearson correlation between the resident population variation in the neighbourhoods of Rome (2014-2018) and Venice (2014-2019), and the concentration and variation of Airbnb listings

	Number of Airbnb listings, 2019	Number of entire apartments for rent on Airbnb, 2019	Cumulate number of Airbnb listings reviews, 2019	Absolute difference in the number of Airbnb listings, 2016-2019
Rome	-,616**	-,699**	-,629**	-,648**
Venice	-,862**	-,897**	-,857**	-,834**

** Correlation is significant at the 0.01 level (2-tailed). Data source: Insideairbnb, Municipality of Rome, Municipality of Venice.

Finally, in order to assess how the morphology of the tourist city is changing due to the expansion of short-term rentals, we calculated the average distance between the resident population and the closest accommodation facility, which measures how 'close' tourists are to where residents live. Table 3 shows that this distance is substantially lower for Airbnb listings with respect not only to hotels and similar, which are obviously fewer in number, bigger and consequently more concentrated, but also with respect to registered accommodation facilities such as bed & breakfasts or 'formal' rooms and apartments for rent to tourists. Such 'closeness' is relatively even higher in the central area we defined as the 'tourist city' than in the entire municipality⁹.

Table 3. Average distance between the resident population and the closest accommodation facility in Rome.

	Entire Municipality	'Tourist city'
Hotels and similar	649.5 mt	279.2 mt
Airbnb listings	136.7 mt	10.5 mt
Non-hotel registered accommodation facilities	351.1 mt	51.1 mt

Data source: Insideairbnb, Municipality of Rome, ISTAT

⁹ It is worth noting that in Rome the average distance to the three 'top' attractions (the Colosseum, the Pantheon and Fontana di Trevi), which measures how 'conveniently' located tourists are in the city, is higher for tourists staying in hotels (4.6 km) than for those staying in Airbnb listings (3.6 km), when calculated for the entire municipality. This result is in line with the evidence provided by Gutierrez et al. (2016). However, when the same indicator is calculated only for the 'tourist city', i.e. for a more central area, the opposite is true: Airbnb guests are relatively more distant from the three top attractions (2 km) than tourists staying in hotels (1.5 km).

Discussion and conclusions

Although Italian cities have undergone several waves of touristification, concerns about overtourism are very recent. The hypothesis explored in this article is that the growth of digital short-term rental platforms is not merely a concomitant factor contributing to an excessive growth in the number of tourists but crucial for understanding how such growth is distributed in the city and, consequently, how it impacts upon city centres as living spaces.

Accommodation platforms such as Airbnb produce two primary effects. First, platform-mediated touristification radically changes the most affected neighbourhoods, producing more direct and immediate effects compared to a generic process of gentrification (Sequera and Norfe, 2018; Jover and Diaz-Parra, 2019) or of touristification in general. As mentioned in Section 2, gentrification causes resident displacement mainly indirectly, by driving up rents and prices. Indeed, several studies demonstrate how the spread of short-term rentals influences the cost of rents and real estate values (for a review, see Guttentag, 2019). The conversion of residential units into short-term rentals, however, reduces the housing stock that is available for permanent residents directly and immediately, without even having to assume or to demonstrate any impact on the cost of housing¹⁰. The impact is dramatic in those parts of the city where the concentration of short-term rentals exceeds a certain threshold.

In the article, we applied a methodological approach to identify those parts of the city that are more greatly affected. Such an ad-hoc delimitation was also aimed at obtaining comparable evidence for cities with very different sizes and structures. In those ‘tourist cities’, short-term rentals listed on Airbnb.com occupy a substantial portion of the total residential housing stock; their number in the majority of cases exceeds the number of long-term rentals; and their capacity is close to or above that of apartments occupied by residents.

We showed, moreover, that the resident population of those city centres is decreasing. Such depopulation may indeed have many causes, not limited to touristification. Population may decrease because residential dwellings are converted into short-term rentals, or because of the indirect effects touristification has on, for example, the commercial fabric, congestion, noise, etc., but also due to unrelated factors such as ageing, decreasing occupancy rates, the conversion of residential units into office space, or other factors. The depopulation of city centres is also a much older process, but it had slowed considerably before the last decade, even if it had not stopped completely. It goes beyond the scope of the paper to demonstrate any direct causality between the spread of digital accommodation platforms and population de-growth. Intuitively, however, in Rome in particular, there is a clear temporal coincidence between the depopulation of the city centre and not touristification in general, but platform-mediated touristification, which started in around 2013. As a confirmation of this, the correlation between population de-growth and the growth in Airbnb listings, in Rome and Venice, is high and significant: those areas in the city where the resident population decreases the most are also the areas with the highest concentration and the fastest growth of Airbnb listings. The available data does not permit us to test the same correlation for the other cities.

The analysis has also some limitations. The evidence presented in the paper is in fact mainly indirect, although consistent with our hypothesis. The numbers are in any case impressive. The conversion of

¹⁰ In most Italian cities, real estate values have decreased in the last years because of the economic recession. Between 2012 and 2016 the average value per square metre of a residential apartment decreased by -27% in Bologna, -20% in Naples, -15% in Rome, -11% in Florence and -1.2% in Venice (https://www.agenziaentrate.gov.it/portale/web/guest/agenzia/agenzia-comunica/prodotti-editoriali/pubblicazioni-cartografia_catasto_mercato_immobiliare/immobili-in-italia).

thousands of residential apartments into short-term rentals cannot but contribute to the depopulation of city centres where the housing stock is stable, if not decreasing. However, future research should confirm the validity of our hypothesis and findings, based both on direct evidence and longitudinal micro-data to be obtained through, for example, an ad-hoc survey of residential apartments and their actual usage through the years, or more recent secondary data and more robust analytical techniques that permit testing for causal relationships, or through a comparison with less touristy cities.

A second hypothesis we explored in the paper is that short-term rentals penetrate the residential city much more deeply than hotels or other more traditional accommodation types. In terms of spatial pattern, the fractal methodology whose results are reported in Figures 3-8 outlines a very compact and dense 'tourist city' that covers more or less homogenously a substantial proportion of the city centre. The only exception is Bologna, where the spread of Airbnb listings is more recent and less widespread, i.e. more clustered in specific locations. The assessment of the average distance between places of residence and tourism accommodation in Rome confirms the extent to which Airbnb brings tourists 'closer' to where people live (see also Gutiérrez et al., 2017; Gyödi, 2017). The distribution of short-term rentals, in other words, is pervasive and invades central or near-central zones that were more marginal during previous waves of touristification.

By allowing its guests to "live like a local", short-term rental platforms cause visitors and inhabitants to make use more often of the same spaces, infrastructure and services, causing discontent in the resident population (Bouchon and Rauscher, 2019). The perceived impact of these transformations goes well beyond the areas of the city that are more heavily affected. These changes affect in fact predominantly a central and relatively small part of the urban area, but one which is crucial for both the material life of the city and for its inhabitants' sense of belonging to the city. Permanent residents, consequently, are both physically displaced from the urban centre and feeling increasingly alienated from their own city (Díaz-Parra and Jover, 2020).

It is not surprising, then, that most of the discontent about overtourism is today addressed to Airbnb and short-term rental platforms, rather than against tourism per se. Slogans such as "go to hotels" are indeed common in protests and campaigns against overtourism; those slogans are implicitly calling for a more segregated tourist city in which inhabitants and visitors are more functionally and physically separated.

The problem of overtourism is, therefore, not simply the growth or overcrowding of tourists (Butler, 2019), but their increasing penetration into the residential city. The case of Italian cities confirms moreover that the relationship between the degree of tourism congestion and the effects it causes in terms of residents' perceptions and reactions is not linear (Wall, 2019). For example, our analysis shows that in Bologna the incidence of short-term rentals is much lower than in the other cities, and no significant correlation with the variation of the resident population has been found. Bologna has, however, seen some of the strongest protests against short-term rentals and the city was the first to declare its will to stop any further increase in Airbnb listings, especially because they are severely limiting the availability of apartments for rent to students¹¹. In Palermo, on the contrary, impact indicators are much higher, similar to Venice or Florence, but overtourism has only recently induced some reactions from residents and local social movements¹².

¹¹

https://bologna.repubblica.it/cronaca/2019/11/13/news/case_bologna_il_sindaco_in_arrivo_un_freno_ad_airbnb-240978631/

¹² <https://www.facebook.com/turistificazionepalermo/>.

In this framework, approaches to the management of overtourism based on limiting tourists' access to and use of the city are useless, as these do not address the root causes nor the more worrying effects of touristification. Those approaches even risk being counterproductive, as they contribute to the 'museumification' of city centres and increase the alienation of inhabitants from such an important part of the city. Instead, based on our hypothesis and findings, appropriate regulation of short-term rentals could make a difference. The problem is that the same elements that cause platform-mediated touristification to be so pervasive and impactful prevent adequate governance of the short-term rentals market. Since lodgings advertised through platforms such as Airbnb are predominantly residential apartments, they are not subject to ad-hoc planning regulations, and the instruments available to monitor and regulate the phenomenon are very weak if not non-existent (Gurran and Phibbs, 2017; Ferreri and Sanyal, 2018). Even more pressing and more challenging is the need to guarantee that the urban centres of big tourist cities remain lively and liveable for both visitors and inhabitants, through for example (social) housing policies, rental support or urban planning more generally.

The coronavirus emergency has thrown us, at least temporarily, into a different world. At the time of writing, lockdown measures have been implemented in many countries worldwide that have radically reduced movement and activities. The impact of those measures upon tourist destinations and especially upon the centres of historic cities has been particularly dramatic¹³. Local authorities are therefore now desperately looking for alternatives, while some short-term rentals are being converted into longer-term ones (Celata, 2020). The emptiness that the lockdown created in tourist cities' centres may eventually be filled again by tourists, or by a return of residents, or both. It is also a matter of what kind of policies will be adopted after the emergency. To outline those policy options in detail goes beyond the scope of the paper. The crisis is having a terrible impact, but it is also making the problem evident and providing an opportunity to prepare for a different future. Our cities, we believe, are perfectly capable of again hosting masses of tourists, but only if we take this opportunity to understand how these numbers can be made compatible with other urban uses and functions.

Acknowledgments: We thank Massimiliano Crisci (IRPPS-CNR), Patrizia Veclani (Osservatorio civico indipendente sulla casa e sulla residenzialità, Venezia) and Grazia Galli (Pensare urbano, Firenze) for providing detailed population data, and the three anonymous referees for their constructive comments.

References

- Alizadeh, T., Farid, R., & Sarkar, S. (2018). Towards understanding the socio-economic patterns of sharing economy in Australia: an investigation of Airbnb listings in Sydney and Melbourne metropolitan regions. *Urban Policy and Research*, 36(4), 445-463. Doi: 10.1080/0811146.2018.1460269.
- Arias Sans, A. and Quaglieri Domínguez A. (2016). Unravelling Airbnb: Urban Perspectives from Barcelona. In Russo A. P., Richards G. (Eds.), *Reinventing the Local in Tourism: Producing, Consuming and Negotiating Place*. Channel View, Bristol, 209-228.. Reinventing the Local in Tourism. Channel View, Bristol, 209-228.

¹³ During the lockdown in Italy, the population of historic cities' centres decreased up to 70-80%, similarly to sky resorts: <https://www.nocodegeography.com/big-data/spostamenti-popolazione-ai-tempi-del-coronavirus/>

- Benítez-Aurioles, B. (2018) The role of distance in the peer-to-peer market for tourist accommodation. *Tourism Economics*, 24(3), 237-250. Doi: 10.1177/1354816617726211.
- Bertocchi, D., Camatti, N., Giove, S. & van der Borg, J. (2020). Venice and Overtourism: Simulating Sustainable Development Scenarios through a Tourism Carrying Capacity Model. *Sustainability*, 12(2), 512. Doi: 10.3390/su12020512.
- Bouchon, F., Rauscher, M. (2019). Cities and tourism, a love and hate story; towards a conceptual framework for urban overtourism management. *International Journal of Tourism Cities*, 5, 598-619. Doi: 10.1108/IJTC-06-2019-0080.
- Butler, R. W. (1980). The concept of a tourist area cycle of evolution: implications for management of resources. *The Canadian Geographer*, 24(1), pp. 5-12. Doi: 10.1111/j.1541-0064.1980.tb00970.x
- Butler, R. W. (2019). Tourism carrying capacity research: a perspective article. *Tourism Review*, ahead of print. Doi: 10.1108/TR-05-2019-0194.
- Capocchi, A., Vallone, C., Pierotti, M., & Amaduzzi, A. (2019). Overtourism: A literature review to assess implications and future perspectives. *Sustainability*, 11(12), 3303. Doi: 10.3390/su11123303
- Celata, F. (2017). La airbnbificazione delle città: gli effetti a Roma tra centro e periferia. Working paper. Retrieved from: https://web.uniroma1.it/memotef/sites/default/files/Celata_Airbnbificazione_Roma_2017_0.pdf
- Celata, F. (2020) Come cambieranno le città degli affitti brevi e di Airbnb dopo la pandemia. Che-fare.com. Retrieved from: <https://www.che-fare.com/celata-citta-affitti-piattaforme-pandemia/>
- Cocola-Gant, A. (2016). Holiday rentals: The new gentrification battlefield. *Sociological Research Online*, 21(3), 1-9. Doi: 10.5153/sro.4071.
- Cocola-Gant, A., & Gago, A. (2019). Airbnb, buy-to-let investment and tourism-driven displacement: A case study in Lisbon. *Environment and Planning A: Economy and Space*, online first. Doi: 10.1177/0308518X19869012.
- Colomb, C., & Novy, J. (2016). *Protest and resistance in the tourist city*. London: Routledge. Doi: 10.4324/9781315719306.
- Diaz-Parra, I., & Jover, J. (2020). Overtourism, place alienation and the right to the city: insights from the historic centre of Seville, Spain. *Journal of Sustainable Tourism*, online first. Doi: 10.1080/09669582.2020.1717504.
- Dodds, R., & Butler, R. (Eds.). (2019). *Overtourism: Issues, realities and solutions*. De Gruyter Oldenbourg. Doi: 10.1515/9783110607369.
- Doxey, G. (1975). A Causation Theory of Visitor-Resident Irritants: Methodology and Research Inferences. In *The Travel Research Association Conference*, Vol. 6, pp. 195-198. San Diego: The Travel Research Association.
- Ferreri, M., & Sanyal, R. (2018). Platform economies and urban planning: Airbnb and regulated deregulation in London. *Urban Studies*, 55(15), 3353-3368. Doi: 10.1177/0042098017751982.
- Goodwin, H. (2017). The challenge of overtourism. *Responsible Tourism Partnership Working Paper 4*, October 2017.
- Gurran, N., & Phibbs, P. (2017). When tourists move in: how should urban planners respond to Airbnb?. *Journal of the American planning association*, 83(1), 80-92. Doi: 10.1080/01944363.2016.1249011.

- Gutiérrez, J., García-Palomares, J.C., Romanillos, G-, & Salas-Olmedo M.H. (2017). The eruption of Airbnb in tourist cities: Comparing spatial patterns of hotels and peer-to-peer accommodation in Barcelona. *Tourism Management*, 62, 278-291. Doi: 10.1016/j.tourman.2017.05.003.
- Guttentag, D. (2019). Progress on Airbnb: a literature review. *Journal of Hospitality and Tourism Technology*, 10(4), 814-844. Doi: 10.1108/JHTT-08-2018-0075.
- Gyòdi, K. (2017). Airbnb and the hotel industry in Warsaw: an example of the sharing economy? *Central European Economic Journal*, 2, 23-34. Doi: 10.1515/ceej-2017-0007.
- Hughes, N. (2018). 'Tourists go home': anti-tourism industry protest in Barcelona. *Social movement studies*, 17(4), 471-477. Doi 10.1080/14742837.2018.1468244.
- Ioannides, D., Röslmaier, M., & Van der Zee E. (2019). Airbnb as an instigator of 'tourism bubble' expansion in Utrecht's Lombok neighbourhood. *Tourism Geographies*, 21(5), 822-840. Doi 10.1080/14616688.2018.1454505.
- Jiang, B. (2015) The fractal nature of maps and mapping. *International Journal of Geographical Information Science*, 29(1), 159-174. Doi: 10.1080/13658816.2014.953165.
- Jiang, B., & Miao, Y. (2015). The evolution of natural cities from the perspective of location-based social media. *The Professional Geographer*, 67(2), 295-306. Doi: 10.1080/00330124.2014.968886.
- Jover, J., & Díaz-Parra, I. (2019). Gentrification, transnational gentrification and touristification in Seville, Spain. *Urban Studies*, online first. Doi: 10.1177/0042098019857585.
- Koens, K., Postma, A., & Papp, B. (2018). Is overtourism overused? Understanding the impact of tourism in a city context. *Sustainability*, 10(12), 4384. Doi: 10.3390/su10124384.
- Milano, C., Novelli, M., & Cheer, J. M. (2019). Overtourism and degrowth: a social movements perspective. *Journal of Sustainable Tourism*, 27(12), 1857-1875. Doi: 10.1080/09669582.2019.1650054.
- Oklevik, O., Gössling, S., Hall, C. M., Jacobsen, J. K., Grøtte, I., & McCabe, S. (2019). Overtourism, optimisation, and destination performance indicators: A case study of activities in Fjord Norway. *Journal of Sustainable Tourism*. Doi: 10.1080/09669582.2018.1533020.
- Papathanassis, A. (2017). Over-tourism and anti-tourist sentiment: An exploratory analysis and discussion. "Ovidius" University Annals, Economic Sciences Series, XVII(2), 288-293 <https://EconPapers.repec.org/RePEc:ovi:oviste:v:xvii:y:2017:i:2:p:288-293>.
- Peeters, P., Gössling, S., Klijs, J., Milano, C., Novelli, M., Dijkmans, C., & Mitas, O. (2018). Overtourism: Impact and possible policy responses, Research for TRAN Committee. European Parliament, Brussels, Belgium. Retrieved from: [http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU\(2018\)629_184](http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2018)629_184).
- Phi, G. T. (2019). Framing overtourism: A critical news media analysis. *Current Issues in Tourism*, online first. Doi 10.1080/13683500.2019.1618249
- Picascia, S., Romano, A., & Teobaldi, M. (2017). The airification of cities: making sense of the impact of peer to peer short term letting on urban functions and economy. In *Proceedings of the Annual Congress of the Association of European Schools of Planning*, Lisbon, pp. 2212- 2223. ISBN: 978-989-99801-3-6.
- Saarinen, J. (2006). Traditions of sustainability in tourism studies. *Annals of tourism research*, 33(4), 1121-1140. Doi: 10.1016/j.annals.2006.06.007.

- Seidl, I., & Tisdell, C. A. (1999). Carrying capacity reconsidered: from Malthus' population theory to cultural carrying capacity. *Ecological economics*, 31(3), 395-408. Doi: 10.1016/S0921-8009(99)00063-4
- Sequera, J., & Nofre, J. (2018). Shaken, not stirred: New debates on touristification and the limits of gentrification. *City*, 22(5-6), 843-855. Doi: 10.1080/13604813.2018.1548819
- Sonnino E., Bertino S., Casacchia O., Crisci M., D'Orio G., Rosati R. (2011). *Popolazione e previsioni demografiche nei municipi di Roma Capitale. Dinamiche attuali e prospettive fino al 2024*, Roma: Gangemi.
- Smith, M. K., Egedy, T., Csizmady, A., Jancsik, A., Olt, G., & Michalkó, G. (2018) Non-planning and tourism consumption in Budapest's inner city. *Tourism Geographies*, 20(3), 524-548. Doi: 10.1080/14616688.2017.1387809.
- UNWTO (2018) '*Overtourism? Understanding and managing urban tourism growth beyond perceptions*'. UNWTO: Madrid, Spain. Doi: 10.18111/9789284420070.
- Wachsmuth, D. and Weisler, A., 2018. Airbnb and the rent gap: Gentrification through the sharing economy. *Environment and Planning A: Economy and Space*, 50(6), pp.1147-1170. Doi: 10.1177/0308518X18778038.
- Wall, G. (2019). *Perspectives on the environment and overtourism*. In: Dodds & Butler, cit., 27-45.
- Wall, G. (2020). From carrying capacity to overtourism: a perspective article. *Tourism Review*, ahead of print. Doi: 10.1108/TR-08-2019-0356.
- Wegmann, J., & Jiao, J. (2017). Taming Airbnb: Toward guiding principles for local regulation of urban vacation rentals based on empirical results from five US cities. *Land Use Policy*, 69, 494-501. Doi: 10.1016/j.landusepol.2017.09.025.
- Wei, Y., Huang, C., Lam, P. T., & Yuan, Z. (2015). Sustainable urban development: A review on urban carrying capacity assessment. *Habitat International*, 46, 64-71. Doi: 10.1016/j.habitatint.2014.10.015.