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Green Gentrification in Barcelona¹**Diputació de Barcelona****Introduction**

Urban green spaces provide substantial ecological benefits that improve the quality of life for city residents. Within Barcelona, for example, researchers found that urban forests remove over 300 tons of pollutants from the air per year and stop over 5,000 tons of carbon emissions from being released into the atmosphere (Baro et al. 2014). As well, urban gardens in Barcelona enable pollination and increased biodiversity associated with local food production (Camps-Calvet et al. 2016). In terms of water management, restoration of rivers and wetlands in the city were found to have caused substantial improvements in water quality and flood control capacity (Martin-Vide 1999). Meanwhile, the amount of green space is a key measure for reducing intense heat in Barcelona and elsewhere (Moreno-Garcia 1994).

In addition to the extensive ecological benefits of urban green spaces, which are experienced by most residents of the city, there are numerous targeted health benefits. In recent studies focused on Barcelona and Catalonia, researchers found that higher green space exposure is associated with lower likelihood of poor health, including several indicators of mental health (Triguero-Mas et al., 2015). For example, the risk of cardiovascular disease mortality was 4% lower for those with high residential exposure to green spaces (Gascon et al., 2016). As well, access to green spaces was found to have measurable benefits for children's cognitive development (Davdand et al., 2015).

¹ This article is adapted from a longer study (Anguelovski et al., 2017).

Speaking to the public health imperative, one study estimated that 116 deaths per year would be preventable if Barcelona met minimum established goals for green space access (Mueller, 2016). It is clear from the evidence-based research that much remains to be done in terms of green space provision in Barcelona and beyond.

There are also social and economic benefits associated with urban green spaces. These spaces may lead to stronger social ties among area residents and organizations by providing volunteer opportunities and a meeting place to develop and maintain personal communication and regular interaction (Lee et al., 2011; Connolly et al., 2013). From an economic development perspective, abundant and high quality green spaces strengthen the identity of an area as an attractive and desirable place to work, live, and visit with upward effects on local economies and real estate values (Baycan & Nijkam, 2009; Dale & Newman 2009; Anguelovski, 2015). As well, researchers have repeatedly found access to green space to be a positive driver of residential property values, a benefit for existing homeowners.

While the multiple values of urban green spaces are indisputable, the targeted health, economic and social benefits are often unevenly distributed. In some cases, wealthier and whiter neighborhoods are those with the largest, best maintained, and/or most easily accessible green spaces (Wolch et al. 2005; Boone et al. 2009). As a result, the creation or restoration of green amenities in cities may not be accompanied by an improvement in quality of life for *all* citizens (Gould et al., 2012; Goodling, Green & McClintock, 2015; Wolch et al. 2014; Curran & Hamilton, 2012; Checker, 2011). Furthermore, greening programs may sometimes become part of processes that make historically disadvantaged residents vulnerable to displacement through a process that has come to be known known as “green gentrification” (Pearsall 2010). Given that greening program managers do not intend to expand social inequities or vulnerabilities,

it is essential for all cities to examine the effects of their greening agendas as they build these programs. We undertake such an examination here with the City of Barcelona.

Defining and identifying green gentrification

All gentrification trends embody essentially the same challenge. When a place that had been perceived as undesirable by those in the middle or higher end of the housing market becomes attractive for any of a number of reasons (e.g. global real estate pressures, reduction in crime, physical upgrades, proximity to cultural centers or jobs), affluent or middle-class buyers and investors may begin to see opportunity in that place. Once a critical mass of such buyers purchase property as an investment or a means of improving their own quality of life, the perception of a “rent gap” in the area expands and more buyers are attracted. The result is that existing lower-income residents are displaced due to a rapid rise from historic rental and sale prices and a swift socio-cultural transition in the neighborhood (Clark, 1988; Smith, 1996). Ironically, the neighborhood “trendiness” that often accompanies this process goes against the preferences of most existing residents and gentrifiers alike.

Most recently, a new body of research examines how urban sustainability planning and processes of city re-naturing are incorporated into public-private redevelopment strategies that intensify gentrification processes. This research demonstrates how green infrastructure serves as a catalyst for gentrification, and how the sustainability framework both facilitates and conceals this process. The literature, which is currently mostly situated in the United States and Canada, conceptualizes this phenomenon as green gentrification (Gould et al., 2009), ecological gentrification (Dooling, 2009), and environmental gentrification (Pearsall, 2010; Checker, 2011; Curran et al., 2012; for one of the few cases to date outside of North America see

Sandberg, 2014).² Gould and Lewis (2012, p.121) define green gentrification as the “urban gentrification processes that are facilitated in large part by the creation or restoration of an environmental amenity.” Scholars in this area seek to understand how lower income and non-white populations are systematically denied access to the benefits of urban greening such as improved health and higher quality of life.

Green gentrification literature highlights the social-ecological underpinnings of processes of urban exclusion and calls attention to the need to avoid a “post political” approach to urban sustainability (Swyngedouw, 2010). While on the surface the provision of green infrastructure is a politically neutral goal that is often couched within consensual planning processes, in practice green space provision may subordinate social equity to lucrative development embodied in the construction of new real estate geared towards more privileged groups (Checker, 2011). Thus, environmental gentrification is an essential consideration for any urban sustainability model that seeks to simultaneously promote ecologically and socially responsible urban planning. Without such critical discourse, municipal representatives and sustainability advocates who uncritically accept calls for more urban green space may, against their own intentions, create new socio-spatial inequities (Pearsall & Pierce, 2010).

Research on environmental gentrification contributes to the extensive literature on inequitable access to green spaces in cities and environmental justice. Indeed, it has been shown that higher income and whiter populations have greater access to trees, parks and natural settings, urban public recreation resources, and maintenance funds for parks (Wolch et al., 2005; Dahmann et al. 2010, Pham et al. 2012). Urban reforestation programs also sometimes benefit only owner-occupied (and generally higher-income)

² Different authors and fields refer to this process in different terms. For instance, the emphasis on ecological (Dooling, 2009) is meant to highlight that designing new public green areas contributes to bringing nature back in the city while reducing the negative impacts created by human and industrial activity on biophysical progresses. “Ecological” also questions the exclusion of humans from conceptions of ecosystems and environment.

neighborhoods (Perkins, Heynen, & Wilson, 2004). In contrast, low-income, disadvantaged groups and non-white populations, especially in the United States, often occupy areas where green spaces are either scarce or poorly maintained (Heynen, Perkins & Roy, 2006; Anguelovski, 2015). Addressing such inequities has become an urban planning priority, with many cities developing new strategies to increase and restore green amenities in low-income areas (Curran et al., 2009, Wolch et al. 2014).

Despite the commitment from cities to address past inequities, the creation of urban green amenities in low-income areas generates a *green space paradox*. Neighborhood-scale case studies thus far indicate that the greater the number, size, and quality of urban green spaces in an area in transition, the more attractive and desirable it tends to become, thus favoring the displacement of minority groups toward unwanted (and likely less green) areas (Pearsall, 2009; Checker, 2011; Curran et al., 2012; Gould et al., 2012; Dooling, 2009; Goodling et al., 2015). In these cases, the green amenities were touted by real estate developers, public agencies, and local politicians as competitive advantages, placing the environmental and economic benefits of greening in tension with its social and health benefits. Given these findings, it is important to ask if the green space paradox is a universal trend or more narrowly targeted to North American cities where it has been observed thus far. In the sections that follow, we take up this question.

The transformation and greening of democratic Barcelona

In the 1970s, the legacy of Francisco Franco's dictatorship left many Spanish cities with a poor quality built environment and with enormous deficits in schools, cultural centers, health services, public transportation, and even basic infrastructure such as street paving, water, and sanitation (Saurí et al., 2009). While such deficits were apparent in all

areas of Barcelona municipal services including public parks and gardens (El verd: plantejament i diagnostic verd, 2010), the most socially vulnerable areas of the city had a particularly acute lack of green space. After the first municipal democratic elections of 1979, Barcelona’s City Council decided to prioritize increasing the number of parks and gardens through implementation of new urban plans. During this time, green spaces were primarily designed to provide meeting places and playgrounds for children and elderly residents (Saurí et al. 2009).

In 1986, when Barcelona was awarded the 1992 Olympic Games, a new stage of urban redevelopment began (Anguelovski, 2014). Barcelona’s public green spaces shifted almost entirely toward the mega-event demands of the Olympics. The City Council began to negotiate directly with developers that built the necessary infrastructure rather than with neighborhood groups about the design and placement of green space. During this period of “strategic urbanism,” the social component present in the initial creation of public spaces during the early 1980s diminished (Monclús, 2003; Montaner, 2004; Anguelovski 2014;). For example, the new Olympic parks were designed more as aesthetic amenities for visitors than for residents (Figure 1, left picture); neighborhood-scale social interactions became less of a priority. Residents had fewer places for sitting and holding neighborhood meetings or other social and cultural activities (Saurí et al. 2009).



Image 1. On the left: Port Olímpic Park (1992). *Source:* The Authors. **On the right:** Diagonal Mar Park (2002). *Source:* Barcelona City Council.

Following the 1992 Olympic Games, the later stages of post-Franco redevelopment were characterized by efforts to leverage the newfound international appeal of Barcelona. During most of the 1990s, public parks design and construction was strongly linked to economic development, and often used private funds (Saurí et al. 2009; Montaner, 2004; Anguelovski, 2014). Toward the end of the 1990s, the municipality focused on redeveloping the last of the large areas of formerly industrial space. At this time, the Poble Nou neighborhood was targeted for a luxury residential project anchored by the Diagonal Mar Park – built as the second largest public park in Barcelona (Figure 1) The Diagonal Mar Park was the central component of the project’s sustainability strategy, but was widely criticized for being designed as an amenity for the high-end condominiums on its border (Anguelovski, 2014). Knowing this evolution of green space provision in democratic Barcelona, it is essential to understand how environmental amenities shape who benefits from urban life in the city, especially in the mid- and long-term.

Green Gentrification Trends in Barcelona

In order to understand whether the distribution of new environmental amenities became more or less equitable as Barcelona implemented its greening agenda, we examined how housing and population trends changed over time near 18 new parks built in the northeastern half of the city since 1992.³ The groups we considered particularly socially vulnerable in Barcelona were lower income residents, residents with a lower education level, elderly residents living alone, and residents from countries in the Global South. Figure 1 shows the parks that we analyzed. We identified whether areas near parks ex-

³ Because of poor data availability in the 1980s, we could not conduct our analysis for the parks built during this earlier period of the democratic transition

perceived above normal changes by comparing the trends within 500 meters of parks to those of the districts in which the parks are located. As well, we verified the statistical significance of these trends by running global ordinary least squares (OLS) and local geographically weighted regressions (GWR) in order to confirm that parks were playing a causal role in the changes we observe. In the findings below, we present the general dynamics that these analyses demonstrated.

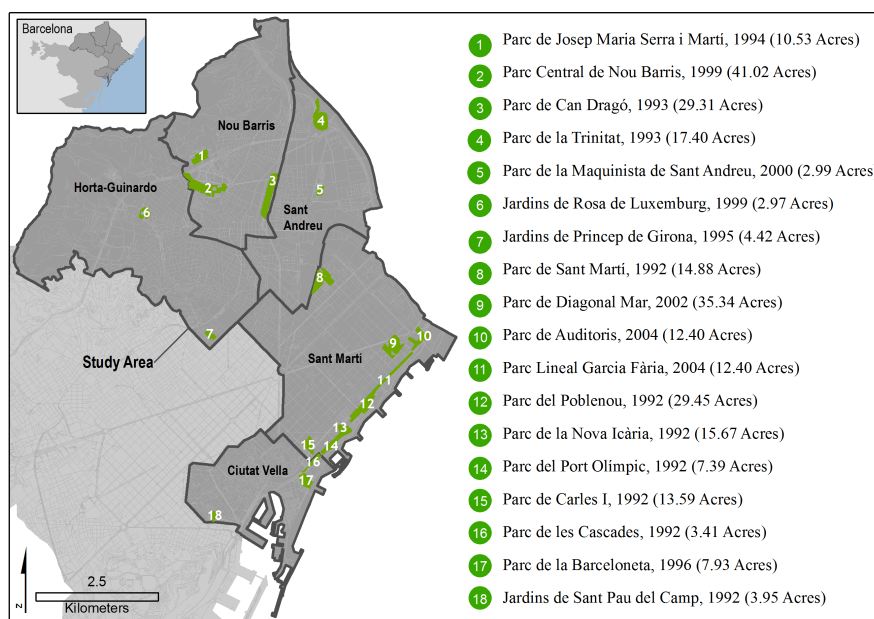


Figure 1. In green, parks built between the period 1992–2004 within the Ciutat Vella, Sant Martí, Sant Andreu, Nou Barris, and Horta-Guinardó districts.

In order to determine the parks and gardens that appear to be associated with green gentrification, we assigned one point to parks with buffer areas that outpaced their districts and added the points to form a composite score from five indicators (Table 1). For population with a bachelor’s degree or higher, we identified areas near parks with greater increases than the district for the same period of time. We did the same for elderly population living alone. For the percent of immigrants from the Global North variable, we identified areas near parks with greater increases than the district for the same period of time that *also* did not have greater increases than the district for Global

South immigrants. In short, this variable identifies parks with above average increases in Global North populations *and* below average increases in Global South populations. Finally, because we are missing data for income or home values for some parks, but have one or the other for all parks, we use income as the fourth variable and use home values as a proxy when income is not available. Therefore, a score of 4 would imply gentrification is occurring near parks across the full spectrum of indicators measured here.

Park Name (Year Built)	District	Bachelor's Degree	65 or Older Living Alone	Global North	Income	Home Sales	Total
Jardins de Sant Pau del Camp (1992)	Ciutat Vella	0	0	0	0	0	0
Parc de la Barceloneta (1996)	Ciutat Vella	1	1	0	0	0	2
Jardins Príncep de Girona (1995)	Horta-Guinardó	0	1	1	0	1	3
Jardins de Rosa de Luxemburg (1999)	Horta-Guinardó	1	0	0	0	0	1
Parc de Can Dragó (1993)	Nou Barris	1	0	0	0	1	2
Parc Josep M. Serra i Martí (1994)	Nou Barris	0	0	0	0	1	1
Parc de Nou Barris (1999)	Nou Barris	1	0	0	1	0	2
Parc de la Trinitat (1993)	Sant Andreu	1	0	0	1	1	2
Parc de la Maquinista (2000)	Sant Andreu	1	1	0	0	0	2
Parc de Sant Martí (1992)	Sant Martí	0	0	0	0	0	0
Parc del Poblenou (1992)	Sant Martí	1	1	1	1	0	4
Parc de Diagonal Mar (2002)	Sant Martí	1	1	0	1	0	3
Parc del Port Olímpic (1992)	Sant Martí	1	1	1	1	0	4

Table 1. Final green gentrification indicator scores for parks within the study area.

Using these indicators, we find that several parks in the Sant Martí district including the Poblenou Park, Nova Icària Park, Carles I Park and Port Olímpic Park, as well as the Cascades Park (Ciutat Vella district), experienced strong environmental gentrification (4 out of 4 rating). These parks were built in a time of significant urban revitalization associated with the Olympic Games. In addition, other parks in the Sant Martí district built at different times including the Diagonal Mar, Auditoris, and Garcia Fària Lineal experienced moderate environmental gentrification (3 out of 4 rating). Likewise, the Príncep de Girona Garden in the southern area of the Horta-Guinardó district got a 3 out of 4 rating. The GWR findings support these areas as those where distance to parks is a significant predictor of the given indicator, suggesting that these

findings are not random artifacts of other geographic processes. All other parks located in the northwestern zone of Barcelona and in parts of the Ciutat Vella district did not produce green gentrification trends according to our results (1 or 2 out of 4 rating).

Figure 2 below summarizes the results of our analysis.

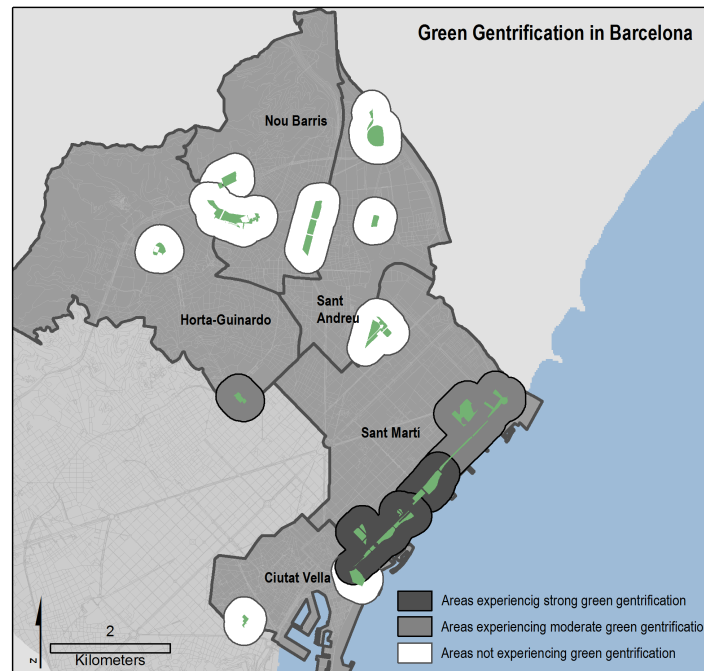


Figure 2. Areas where strong, moderate, and no green gentrification seem to be occurring.

Conclusion

In sum, our study indicates that the impacts of park creation in socially vulnerable neighborhoods depend on their context of creation, setting, and overall built environment. In Barcelona, it seems that green gentrification has occurred in parks located in more desirable neighborhoods such as the old industrial (and waterfront) areas within the Sant Martí and Ciutat Vella districts or in the southern area of Horta-Guinardó. For parks located in extremely dense distressed neighborhoods such as the Raval in Ciutat Vella (which also tend to be much smaller parks), or in neighborhoods with a semi-old building stock associated with late dictatorship or early transition projects, green gentrification appears to not have taken place. The next steps are to examine how green amenities can be introduced to redeveloping districts like Sant

Martí and Ciutat Vella without making them instruments for gentrification.

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