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Studying green gentrification:
Methods and definitions in empirical literature

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Abstract

This article presents an exploration of the empirical literature on green gentrification, with the objective of reviewing the differences in the adopted definitions, methodological approaches and indicators. The article is based on a qualitative review of empirical studies on green gentrification, the first part providing descriptive insight, and the second part addressing the issue of whether slight divergences found in how green gentrification is defined are reflected in the differences in the adopted methodological approaches and indicators. Based on our findings, there seems to be no association between differences in definitions on one hand, and methodological approaches or indicators on the other, which gives us indication of the presence of a certain unity within this literature, both in how green gentrification is understood and in how it is studied. We then conclude by giving a few suggestions for future research in the field of green gentrification.

Studying green gentrification: methods and definitions in empirical literature

Margherita Gori Nocentini

1. Introduction

The article presents an analysis of the empirical literature on green gentrification, focusing on the definitions and theoretical frameworks that have been adopted, as well as on the different research methods and indicators that have been used to study this phenomenon. Green gentrification has been defined as involving processes which start with the implementation of an environmental planning agenda which is related to the creation of green spaces, that subsequently lead to the exclusion or displacement of economically vulnerable and politically disenfranchised residents (BCNUEJ 2019).

The literature on green gentrification is relatively new, as is evident from the fact that about half of the articles that we review was published from 2017 to October 2019 (see *fig.1*). The literature is also fairly varied from several points of view. For instance, there is no agreement over which term to use, whether environmental (Banzhaf and Walsh 2006), ecological (Dooling 2009), green (Gould and Lewis 2017), or eco-gentrification (Cucca 2012). However, we propose that the literature converge on the term *green* gentrification, which gives a more specific indication of the root cause of this particular type of gentrification which, as we explain in more detail in the next section (sec.2.1), is spurred by “greening initiatives”. The literature also varies with respect to the types of cases that are considered, whether it is urban park creation (Anguelovski et al. 2017, Immergluck and Balan 2017, Rigolon and Németh 2019), brownfield redevelopment (Sandberg 2014, Bryson 2012, Checker 2015) or general urban greening (Connolly 2019), among others. Instead, from a geographical point of view there appears to be much less variation; most of the studies analyze cases in North America, while very few select European cases, and Asia and Latin America are each represented in only two articles.

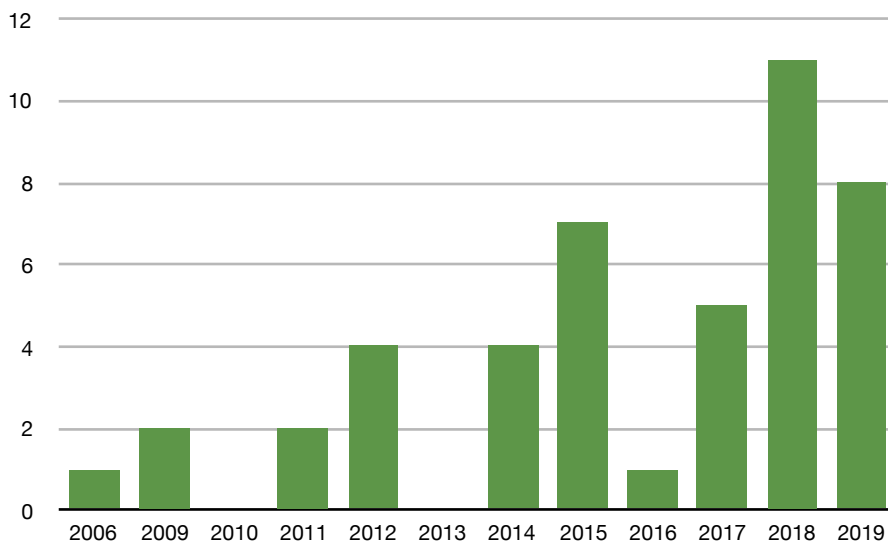


Figure 1: histogram representing the number of articles in our sample published in each year.

The aim of this study is to review the differences in definitions, methodological approaches and indicators that have been used in green gentrification literature through a qualitative analysis. We believe that such an exploration of this relatively recent field of study is useful in that it can present what kind of research has been done on green gentrification, as well as the theoretical bases on which the analyses rest, in order to provide a good understanding of the state of the art and of possible challenges that can be addressed in future research.

To perform our analysis, we gathered empirical literature on green gentrification. As a sampling method we used a simple search for “environmental gentrification”, “green gentrification”, “ecological gentrification” and “eco gentrification” in Web of Knowledge and Scopus databases, integrated with relevant titles found on Google Scholar, taking articles or book chapters that presented such keywords in either the title, abstract, or author keywords, and also addressed green gentrification processes as their main focus of analysis. Because our objective is to compare definitions with research methods and indicators, only studies that conducted empirical research were included in the sample, and several conceptual pieces or literature reviews were therefore excluded from this analysis. Through this method we gathered a total of 46 articles and book chapters on green gentrification. The following paragraphs present our analysis of this body of literature.

In the first section (sec.2) we explore how green gentrification has been defined in the literature, giving a core definition of the mechanism underlying green gentrification and identifying the main areas of divergence in defining the phenomenon from a theoretical point of view. The next section (sec.3) presents the main methodological approaches and methods used to study green gentrification, while the following paragraph (sec.4) focuses on the main indicators that have been employed by authors to measure green gentrification. Finally, sec.5 will discuss the existence of a relationship between divergences in defining the phenomenon and differences in the adopted methodological approaches and indicators.

2. Defining green gentrification

2.1 A core definition of green gentrification

Literature on green gentrification provides no universally applied conceptualization of the phenomenon; nevertheless, it is possible to identify a few traits that have attracted the consensus of social scientists. They understand green gentrification, in general, as processes that entail socio-demographic changes in response to environmental changes; therefore, it can be regarded as the outcome of specific combinations of spatial conditions and social events.

It is possible to identify three fundamental elements which together represent the core mechanism common to different conceptualizations of green gentrification retrieved in the literature.

1. The first is the presence in a gentrified context of a sustainable urban development agenda, which, at least nominally, subscribes to principles of environmental mindfulness and promotion of clean and healthy living environments. This feature links green gentrification and sustainable urban development planning frameworks. In fact, the environmental changes that lead to green gentrification are often embedded in local strategies to make cities greener and more sustainable, which are planned and enacted both by public and private actors, such as real estate developers or even local organizations and private citizens (for example in the form of community gardening, see e.g. Braswell 2018, Maantay and Maroko 2018).
2. The second element is represented by the *implementation* of “greening initiatives”, i.e. the practical realization of sustainable urban development plans through the creation or restoration of environmental amenities. Urban greening has generally been understood to indicate the increased presence of green spaces and vegetation in the urban environment, such as parks or gardens (Cole et al. 2017). However, green gentrification literature has actually focused on the creation of environmental amenities in a broad sense, therefore including other types of development that, while not necessarily nature-based, are nonetheless functional to the advancement of a green and sustainable city model, or are generally related to the improvement of the quality of the urban environment (Haase et al. 2017, Yazar et al. 2019). Brownfield redevelopments, particularly in former industrial areas and waterfronts, climate resilience interventions, green mobility projects, and even healthy and organic food stores are all presented as efforts to create or restore environmental

amenities that may ultimately contribute to green gentrification processes (Pearsall 2018, Park and Pellow 2011).

3. The third element common to all conceptualizations of green gentrification is the occurrence of socio-demographic changes resulting from environmental changes produced by the creation or restoration of green amenities in the city. The most widespread understanding of these changes is in terms of negative social impacts on more vulnerable residents, particularly low-income and ethnic minorities, primarily in the form of displacement. Part of the literature also focuses on *where* such vulnerable residents are displaced *to*, observing that the neighborhoods where they relocate often present worse environmental conditions. There are however very few exceptions that do not take into account the social implications of greening—though undoubtedly the dominant perspective does consider this element. The outlier perspective will be addressed more extensively in the next paragraph, which focuses on the main divergences in defining green gentrification that can be identified within the literature.

2.2 Main areas of divergence in defining green gentrification

As explained in the previous paragraph, all of the reviewed literature agrees on the fundamental mechanism determining green gentrification: a socio-demographic change that occurs in response to the creation or remediation of a green amenity, as part of a sustainable urban development strategy. Most of the literature also agrees that the consequence of such interventions can also come in the form of negative social impacts on low-income or minority residents. One such adverse effect may be their displacement following an increase in real estate prices and costs of living, which are due to the new green amenity making their neighborhood of residence more attractive, thus spurring a subsequent in-migration of wealthier residents.

In this paragraph we look more closely at the theoretical roots of green gentrification literature, in order to identify the main divergences within this literature. We first present urban political ecology (UPE) as the common theoretical framework for scholars working on green gentrification, and then explain how differences in defining green gentrification mainly concern the articles' specific approach within this broader framework. We then show that there are three main UPE approaches used to conceptualize green gentrification: (1) critique of mainstream sustainability theory, (2) environmental justice theory, and (3) local public goods theory.

UPE has its roots in Political Ecology, an interdisciplinary field originated in the 1970s and 80s from different branches of social research, including Marxist scholarship, a post-positivist understanding of nature-society relations, and feminist and postcolonial studies (Bridge et al. 2015). PE has been variously conceptualized. For instance, according to Robbins (2011), political ecology can be viewed as “an explicit alternative to apolitical ecology”, that is for example the mainstream environmental thinking put forward by international organizations and NGOs, according to which environmental problems must be addressed through technical or procedural solutions, which results in their de-politicization (Certomà 2009). In this sense, PE instead focuses on unmasking the influence of political economic forces in shaping environments (Robbins 2011). As in this approach nature cannot be understood separately from socio-political contexts, political ecology also critiques conventional notions of environmental science and policy, which have considered nature as apolitical and objective, thus adopting a positivist perspective. Some common elements in political ecology scholarship are in fact a strong post-positivist approach, roots in critical social theory, and methodological pluralism with a heavy focus on in-depth research on local contexts (Bridge et al. 2015). As defined by Keil (2003), political ecology is an approach rooted in political economy and cultural studies, which critically studies “the relationship between environmental change, socio-economic impact and political process, and has been strongly motivated by an ethic of environmental justice and social change” (p. 728). Political ecology is in fact also a strongly engaged and normative field of study, committed to highlighting the struggles of marginalized groups and bringing about social justice and political change.

While political ecology was initially focused on agricultural economies and rural areas in the so-called global South, focus was later shifted, mainly by Anglo-American literature, to urban environments (Bridge et al. 2015). Urban political ecology has emerged as an approach at the intersection of strands of political economy, political ecology, and science and technology studies, while also building on previous urbanist traditions (Heynen 2017). The roots of this approach can be found in the work of marxist geographer David Harvey (1973, 2003), whose work on spatial justice, capitalism, and the city laid the groundwork for the development of urban political ecology.

A central idea in UPE is that of “urban metabolism”, which highlights how both human labor and non-human processes contribute to producing socio-spatial formations, therefore shaping urban environments (Heynen 2013). UPE in fact shares with political ecology the objective of breaking down the dualism that characterizes modern notions of society and nature (Keil 2003). However, UPE is not only about highlighting the dialectic between social and spatial, as this approach also retains a political connotation. UPE is in fact especially focused on showing the uneven power relations that shape the formation of urban environments (Heynen 2013). Moreover, UPE has specifically addressed not only distributional inequalities based on social class but also other elements such as race, considered as a major factor in producing environmental injustices (Keil 2003). The focus of this approach can therefore be summed up as investigating “the interconnected economic, political, social and ecological processes that together go to form highly uneven and deeply unjust urban landscapes” (Swyngedouw et al. 2003).

In our review we have found that all of the considered literature on green gentrification—with only one exception, which we consider here as an outlier—can be located within the broader theoretical approach of political ecology, and urban political ecology in particular. The articles included in our sample generally agree on the core definition of green gentrification as presented in sec.2.1, since they consider green gentrification as a process resulting from a physical transformation of the urban environment which has socio-economic and political causes and implications. All of these articles therefore position themselves within a political ecology framework (though some do so more explicitly than others), since they are all focused on the economic and political aspects implicit in the uneven power relations that influence the formation of urban environments. Moreover, the articles generally focus on the (potential) negative social impacts of environmental improvements in urban contexts, and on issues of inequality, notably on how these interventions may affect more low-income and minority residents. As we have mentioned, there was only one exception to this interpretation, which frames green gentrification merely in terms of the financial implications of greening (Chegut et al. 2014) and which, as an outlier, we therefore exclude from our analysis.

There are however some differences within the literature regarding how green gentrification is specifically defined and conceptualized as a social problem. For instance, some definitions are more concise and loosely describe the core mechanism that has been illustrated in sec.2.1; others build on it by adding further elements worth of consideration. The latter types of definitions therefore rest on specific approaches *within* UPE, which based on our analysis are the following:

- environmental justice theory;
- critiques of mainstream sustainability theory;
- local public goods theory.

As we were interested in identifying different conceptualizations of green gentrification, we initially looked at how the authors defined this phenomenon. To this end, all of the reviewed articles have been qualitatively analyzed to determine whether the adopted definitions of green gentrification present additional elements compared to the essential, core definition presented in sec.2.1. It is important to note that not all the authors provide a clear definition of green gentrification in their work; therefore, background sections have been particularly scrutinized to detect references to different perspectives in analyzing green gentrification which were relevant for our analysis. The figure above (*fig. 2*) therefore presents each contribution’s definition of green gentrification, indicated with the corresponding article’s reference. Definitions which generally trace the core definition presented in sec.2.1 are located within the dotted line at the center of the diagram, while

the definitions closer to the “poles” include additional elements by linking green gentrification to either environmental justice theory, critiques of mainstream sustainability theory, or local public goods theory.

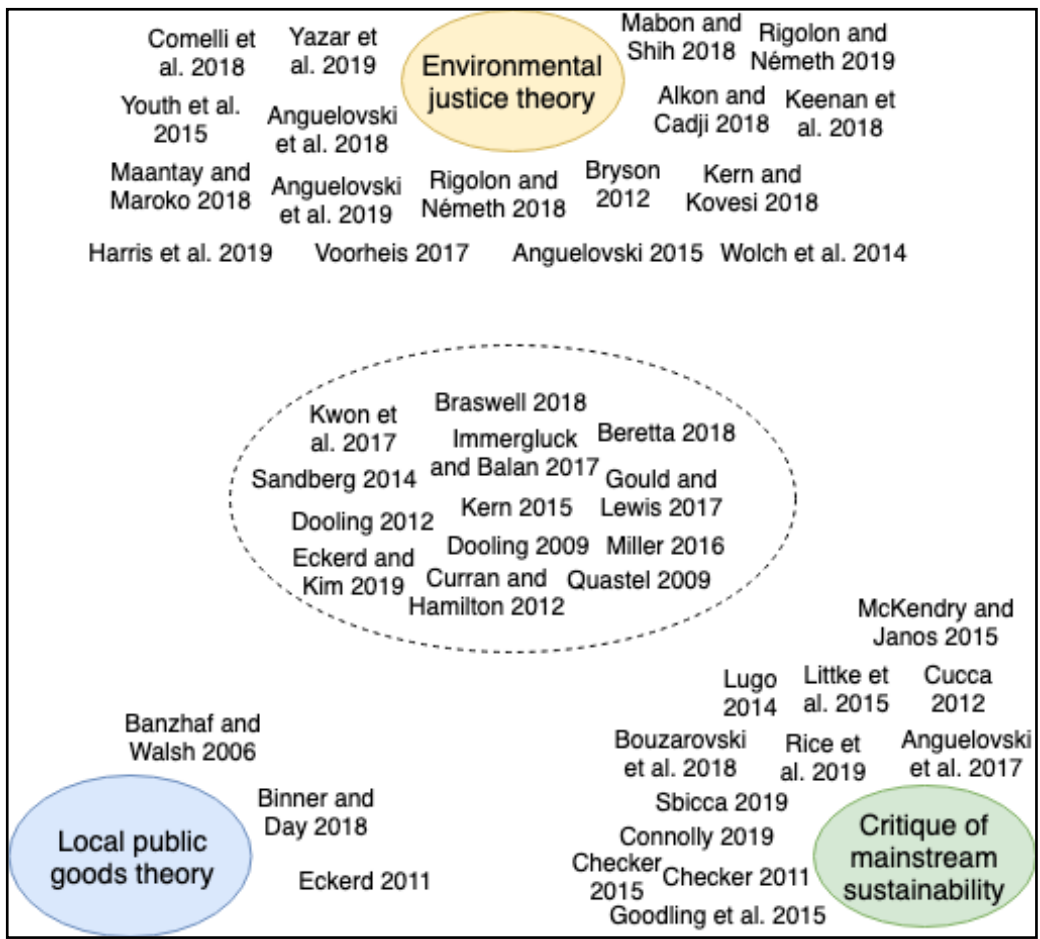


Figure 2: diagram representing our systematization of the definitions of green gentrification found in the reviewed literature. References within the dotted line at the center indicate articles that trace the core definition presented in sec.2.1, while those located close to the poles indicate articles that stress additional elements in their conceptualization of green gentrification.

The most numerous of the categories represented in *fig. 2* includes contributions which highlight the link between green gentrification and **environmental justice** (Alkon and Cadji 2018, Anguelovski 2015, Anguelovski et al. 2018, 2019, Bryson 2012, Comelli et al. 2018, Harris et al. 2019, Keenan et al. 2018, Kern and Kovesi 2018, Maantay and Maroko 2018, Mabon and Shih 2018, Rigolon and Németh 2018, 2019, Wolch et al. 2014, Yazar et al. 2019, Youth et al. 2015). Environmental justice is one of the most important theories within political ecology, and is mainly concerned with the fact that disadvantaged social groups such as ethnic minorities and lower-income communities are disproportionately affected by environmental bads, such as pollution or hazardous sites, on account of their unequal spatial distribution (Agyeman 2005, Haughton 1999). Its origins can be found in the 1980s community-based environmental activism in the United States, which had strong ties to civil right struggles and was concerned with exposing the unequal spatial distribution of environmental risks along the lines of racial segregation (Mohai et al. 2009). Environmental justice is in fact also an example of an approach where theory and practice are strongly integrated, gathering contributions from scholars, activists, and non-governmental organizations from all over the globe.

Definitions of green gentrification that stress its environmental justice implications suggest that though the benefits of greening are framed as universal, they may actually be unequally distributed, and often end up advantaging up only wealthier/affluent and privileged residents, instead of the

least well-off. Environmental injustice aspects are particularly stressed by the literature describing how greening in a lower-income areas may lead to gentrification and displacement of historic residents, those who were initially meant to benefit from the greening efforts and who instead then find themselves excluded from their enjoyment (Wolch et al. 2014, Mabon and Shih 2018, Rigolon and Németh 2019). Moreover, other authors (Anguelovski et al. 2019, Maantay and Maroko 2018) have described how the displacement of deprived residents may reinforce unequal patterns in the distribution of environmental risks, as far as these relocate in less expensive neighborhoods offering worse living conditions, for example in terms of pollution or access to green space. In addition to redistributive concerns, green gentrification literature has also focused on procedural justice, looking for example at how greening projects are initially developed. The literature has also looked at how green development projects, including interventions designed to improve environmental quality such as hazardous site cleanup, end up becoming disamenities and green LULUs, i.e. *locally unwanted land uses* (Anguelovski 2015, 2018), for those disadvantaged residents who find themselves facing a “green paradox” or conundrum (Wolch et al. 2014, Rigolon and Németh 2018, 2019): on one hand they legitimately advocate for a better-quality environment, while on the other facing the fact that any neighborhood improvements may increase their risk of being displaced.

A second group of definitions represented in *fig. 2* gathers those conceptualizations of green gentrification that put a particular focus on critically addressing the role of **mainstream sustainability theory** in these processes (Anguelovski et al. 2017, Bouzarovski et al. 2018, Checker 2011, 2015, Connolly 2019, Cucca 2012, Goodling et al. 2015, Littke et al. 2015, Lugo 2014, McKendry and Janos 2015, Rice et al. 2019, Sbicca 2019). The concept of sustainability, as put forward by the Brundtland report (1987), later adopted by international organizations and enshrined in the 2030 Agenda for Sustainable Development (UNGA 2015), is based on a tripartite structure aiming to balance economic growth, social inclusion and environmental protection. Since the 1990s, this idea of sustainability has become a cornerstone for a mainstream global environmental discourse, adopted by governments and private actors alike, and has therefore been widely used as a framework for urban development. In parallel, scholarship has emerged addressing the weaknesses implicit in this sustainability paradigm, based on the consideration that, in its practical applications, social equity has not been prioritized on par with the economic and environmental dimensions (Agyeman et al. 2003, Krueger and Gibbs 2007).

The definitions of green gentrification in this category largely build on this literature, highlighting how a strong focus on ecological sustainability in urban development agendas has often been paired with a failure to consider social impacts, thus resulting in the implementation of greening projects and environmental improvements which are linked to gentrification processes. As put by Lugo (2014), “green gentrification paints urban renewal with ecological sustainability’s moral urgency, but tends to reproduce the same silence about race and segregation that has characterized suburbanization”, and therefore ends up actually exacerbating existing inequalities. Supported by a win-win discourse based on the assumption that urban greening provides universal benefits, sustainability has informed development strategies in cities looking to spur processes of urban regeneration and high-end redevelopment (Checker 2015, McKendry and Janos 2015, Bouzarovski et al. 2018). Sustainability can therefore represent a mere buzzword, a branding tool for cities engaging in entrepreneurial efforts to attract higher-income residents (Goodling et al. 2015, Rice et al. 2019). In this sense, some authors explicitly highlight the role of sustainability in both supporting and concealing the relationship between greening efforts and gentrification (Anguelovski et al. 2017, Connolly 2019). This can occur as a way of masking underlying social conflicts and disparities by presenting sustainable urban development as providing technical and politically neutral solutions in order to advance a “green” growth model, which actually serves a neoliberal order and caters to economic interests, instead of supporting social equity goals (Checker 2011, 2015).

Finally, a third group of definitions of green gentrification is comprised of a few articles which analyze the phenomenon on the basis of **local public goods theory** (Banzhaf and Walsh 2006, Binner and Day 2018, Eckerd 2011). This approach is linked to studies on local public finance and

situates green gentrification within Tiebout’s residential sorting model (1956). According to this model, residents choose where to live (i.e. they “sort themselves”) by considering how their preferences and income match the public goods that are provided in a certain community. Environmental quality, as part of the provided public goods, is considered a factor in people’s decisions on where to move. Pollution-heavy sites will be considered as undesirable and therefore have lower property values, and these in turn will be higher in sites closer to environmental amenities. Thus, according to the model, high-income residents will opt to live away from environmental bads and close to green amenities, therefore displacing lower-income resident who will relocate to neighborhoods in worse conditions.

3. Investigating green gentrification

As we have seen in the previous section, definitions of green gentrification are subject to a certain degree of variation. In this paragraph we will show how this also holds true for the methods that have been used to study this phenomenon. It is interesting to note that this body of literature uses qualitative, quantitative and mixed-methods approaches—though not in the same proportions. Out of a total of 45 empirical studies on green gentrification, the majority (29) were based on a qualitative approach, almost a third (13) used quantitative methods, while only a small number of articles (3) use a mixed-methods approach (see *fig.3*). After a brief discussion on these different methodological approaches, the following sections reviews the main methods that have been used by green gentrification literature within each research approach. The final section then focuses on the indicators that have been used to measure green gentrification. The methods described below, as well as the articles that use them, are also summarized in *table 1* (see Appendix A).

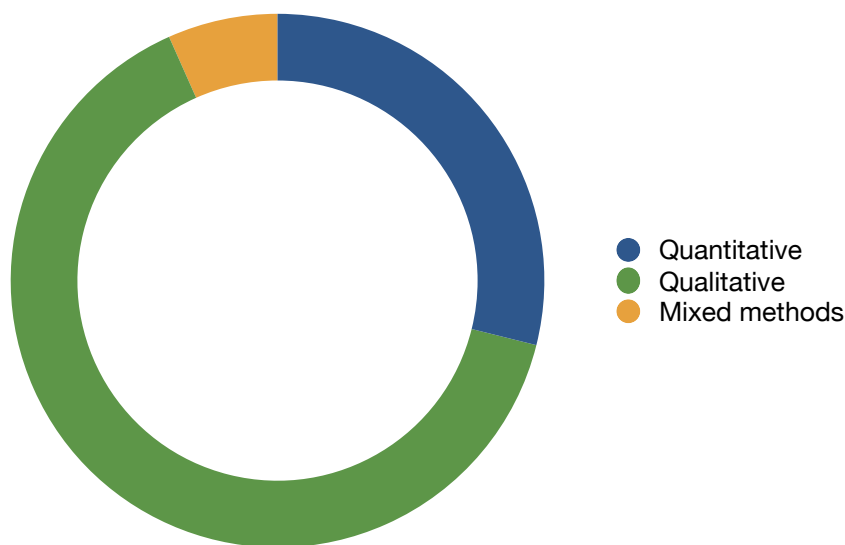


Figure 3: graph representing the proportion of each of the methodological approaches used in the reviewed articles on green gentrification.

Methodology has to do with how we produce knowledge of the social world and with the specific methods and techniques that we apply when doing research. Methodological issues are closely related to ontological and epistemological questions regarding our understanding of the social world and of how we come to know it (Corbetta 1999). Generally speaking:

- quantitative methodological approaches are closely associated with a neopositivist perspective, which considers the social world as an external object that can be observed and studied, and therefore accepts techniques that entail manipulation of contextual condition (such as experimentation and variable control);
- qualitative approaches are generally closer to an interpretivist understanding of the social world, which affirms the existence of interactional processes between the researcher and the observed social phenomena.

Though there is actually no broad consensus among social scientists on how to define methodological approaches, the most widely used distinction is still quality and quantity, and, as all of the studies in our sample maintain this position, this article also adopts this distinction.

Broadly speaking, the objective of quantitative research is to produce generalizations, statements that hold true when abstracted from specific context, through the identification of relationships between variables. To do this, quantitative research employs statistical procedures and large sample sizes, in order to control for contextual specificities through variable manipulation. On the other hand, qualitative research is generally used for in-depth inquiries, with the objective of interpreting a specific phenomenon. This type of research is primarily case-based, meaning that it is more interested in producing a dense knowledge of one or a small number of cases (which are therefore analyzed by looking at several different characteristics) instead of one or few dimensions as in the case of more variable-based quantitative research (Della Porta 2008). Recently, social science scholarship has also put forward a third major approach, known as “mixed-methods” research (Creswell et al. 2007). This approach is based on the idea of combining qualitative and quantitative methods in order to analyze objects from different perspectives, obtain richer data, and incorporating triangulation, which allows to corroborate or confirm results obtained with one method by applying another within the same study (Johnson et al. 2007).

3.1 Qualitative methods in green gentrification research

The majority of reviewed articles conduct their empirical studies using qualitative methods. As we have seen, the main objective of qualitative research is to intensively investigate social phenomena. Unsurprisingly, most of the research on green gentrification in this category involves case studies, a type of research design that entails an in-depth inquiry into a particular project, policy, institution or system, which is investigated in its real-life context (Thomas 2011). In analyzing the socio-ecological processes that produce green gentrification, studies usually concentrate on the implementation of a specific urban greening projects or a series of environmental improvement programs within the same neighborhood or city. Some studies also use comparative analysis to analyze multiple cases within the same research, in order to highlight differences and similarities. For example, Cucca (2012) considers three cases, comparing sustainable urban development efforts in Copenhagen, Vancouver and Vienna to show how the first two cities have fostered a more environmentally friendly context, but only the latter has simultaneously addressed social justice issues through housing policies oriented towards both environmental sustainability and affordability.

Within the same methodological approach, we then find considerable variation with respect to the specific methods that have been used. The qualitative studies in our sample used various research and techniques, including semi-structured interviewing, field observations (participant or non-participant), and content analysis. Most of the reviewed studies actually used a combination of two or more methods. The most popular of these methods is semi-structured interviewing, which can be defined as an interaction, between and interviewer (the researcher) and an interviewee, with the purpose of obtaining descriptions of the life world of the interviewee, in order to then interpret the meaning of the described phenomena (Brinkmann 2014). In the reviewed literature, authors have conducted interviews with a variety of actors and groups involved in or affected by green gentrification processes, such as community residents and activists, but also policy makers and planners (Anguelovski et al. 2015, Bryson 2012, Dooling 2009).

A second method which has been widely used in qualitative research on green gentrification is field observation, both participant and non-participant. Field observation requires that the researcher be involved in the community of people he or she is studying, observing them in their natural environment over a period of time, to gain familiarity with them and their practices and better understand their frame of mind (Bray 2008). In the reviewed literature, field observations were conducted for example in neighborhoods experiencing green gentrification processes or at social and environmental justice activists’ meetings or events (Alkon and Cadji 2018, Anguelovski 2015, Comelli et al. 2018). This method has most often been used in combination with interviews, and in some cases has been one of the methods employed in ethnographic research projects (Lugo 2014, Checker 2011, 2015).

Other methods used in research on green gentrification use secondary sources. As studies on green gentrification often consider specific urban development projects as case studies, in some cases an important part of the research is focused on reviewing official policy sources such as government planning documents. This is the case for a study conducted by Anguelovski et al. (2018) on the climate change adaptation interventions put in place in New Orleans after hurricane Katrina. Here the authors highlight how the inadequate attention given by the city to the potential impacts of the resiliency plans on lower-income communities of color was evident from a lack of social indicators in the metrics of success included in the plans, which instead focused on economic objectives such as increases in property values. Other studies also look at media accounts and newspaper archives, which can be a rich source of information regarding significant issues and moments for neighborhoods experiencing green gentrification processes, or relevant local actors and their positions (Kern and Kovesi 2018, Littke et al. 2015). In a few cases these types of materials have also been analyzed using content analysis (Mabon and Shih 2018,), which is generally defined as a method for analyzing texts and documents in order to capture the “message” that they put forward (Prior 2014).

3.2 Quantitative methods in green gentrification research

As we have seen, quantitative research is based on statistical analysis, which uses mathematical elaborations of empirically relevant data to establish generalizable relationships between variables (Della Porta 2008). Generally speaking, the quantitative studies we have reviewed are interested in investigating the relationship between greening interventions and gentrification processes. This has been done in different ways, which range from studies using simple correlation to verify the co-location between public greening initiatives and areas that experienced gentrification (Connolly 2019), to more sophisticated analyses that are based on more complex models and simulations. One example of the latter case are two studies that employ equilibrium sorting models (Banzhaf and Walsh 2006, Binner and Day 2018). These studies are econometric in nature, as they use both the properties of market equilibria and information on economic agents’ behavior to estimate structural parameters that characterize preference heterogeneity (Kuminoff et al. 2013). Through these models, the authors test if changes in the provision of environmental public goods affect the composition of neighborhoods by impacting on household choices on where to live (i.e. if environmental improvements produce gentrification effects).

Quantitative studies are especially useful for taking into account changes over time and across large areas. For instance, Voorheis (2017) used data on pollution and demographics to analyze trends in individual exposure to pollutants across the United States and verify if disparities in terms of exposure were consistent with socio-economic inequalities, thus confirming a pattern of green gentrification where wealthier and more advantaged residents at the beginning of the study ended up with a greater reduction in exposure to pollution at the end. Other studies perform statistical analyses using data relative to entire states (Youth et al. 2015) or cities (Anguelovski et al. 2017, Rigolon and Németh 2019).

Several of the reviewed studies are based on spatial analysis, which seeks to include the spatial dimension in the study of human behavior (Anguelovski et al. 2017, Braswell 2018, Eckerd 2011). The main spatial analysis technique used in green gentrification literature is spatial regression, which allows us to account for spatial dependence, that is the fact that observations in one location are not independent but tend to exhibit values similar to those in nearby locations (LeSage 2008). Using spatial regression, it is therefore possible to investigate the causal relationship between greening efforts and gentrification, while also taking into account the potential effects of larger trends, for example city-wide changes in demographics.

Other techniques used in the literature on green gentrification include: agent-based models, hedonic models for price estimation, and geo-statistical procedures. Eckerd and Kim (2019) employs agent-based modeling, which is a technique used to simulate how autonomous agents act and interact and observe how they affect the system as a whole (de Marchi and Page 2008). In this study, the authors use simulations to look at how city residents move over time and at the burdens that are placed on residents in gentrifying neighborhoods, with the objective of making policy recommendations based on their results. Immergluck and Balan (2013) instead use a hedonic

model to analyze changes in real estate prices in the areas around the Atlanta Beltline, a trail constructed by reconvertng an old rail line. Finally, Kwon et al. (2017) employ data mining and geo-statistics—which is a class of statistics used to estimate values associated with spatial phenomena—to estimate increases in house transaction prices around the Gyeongui Line Forest park in Seoul, and thus map the process of gentrification.

3.3 Mixed methods in green gentrification research

Only three studies in our sample used a mixed-methods approach (Keenan et al. 2018, Harris et al. 2019, Miller 2016). This small number probably reflects the fact that mixed-methods approaches in general are still relatively new compared to the more established qualitative and quantitative traditions. Moreover, research design differs among these three studies, as qualitative and quantitative methods are combined in different ways and for different reasons. For instance, Keenan et al. (2018) employed an exploratory design in their study on the impacts of climate change on geographies and property markets, using qualitative data gathered during the first part of the research to inform decisions concerning a second quantitative phase (Creswell et al. 2007). Specifically, they used interviews with various actors (local officials, real estate developers, community residents and activists) to develop a hypothesis concerning a relationship between elevation and increase in property value, which was then tested in the second part of the study.

Another article instead used sequential explanatory designs, using qualitative data to help explain initial quantitative results (Creswell et al. 2007). This is the case of Harris et al. (2019), who first used quantitative analysis to gain macro-level understanding of use of the 606 (a trail in Chicago constructed by repurposing an old railway), and then further explored the topic through in-depth interviews. Finally, Miller's (2016) research design can be defined as sequential, meaning that quantitative and qualitative methods are not used simultaneously, and embedded, as the quantitative part is merely instrumental to the qualitative (Creswell et al. 2007). The research focused on investigating local residents' support or opposition to cleanup processes in the Gowanus Canal area, Brooklyn, as well as the determinants for their participation in decision-making processes. In order to determine where to conduct a series of interviews with neighborhood residents, which constituted the basis of the research, the author used spatial analysis to locate the area that had the most residential units.

4. Main green gentrification indicators

As gentrification is a complex process which can involve changes in neighborhood compositions along different dimensions, several studies, and in particular those using quantitative methods, constructed indicators in order to observe and measure it. Indicators are in fact used in social research as measurable entities that are used to measure concepts which are not as easily quantifiable. Within green gentrification literature, there seems to be a small degree of variation with respect to the choice of indicators used to assess it.

The most widely used indicators include greater than average increase in household incomes, median home sales prices, median rents, and in the percentage of residents who have a bachelor's degree or higher (see *fig.4* below). The latter is included in Ley's gentrification index (1986), which also considers the percent of adult residents holding managerial professional positions, and which is employed by two articles in our sample (Braswell 2018, Eckerd 2011).

Other indicators appear to be more context-specific. For instance, most of the studies analyzing cases within the United States also look at increases in the percentage of white residents and the reduction of African-American or Latin residents, as these minorities tend to be poorer and therefore more vulnerable to the adverse social effects of gentrification. In their study on Barcelona, Anguelovski et al. (2017) also consider the number of residents over 65 years old living alone, which are among the most vulnerable residents to displacement, and immigrant population, separating nationalities considered as global North from those considered global South, the latter being more likely to have lower incomes.

It is interesting to note that a few qualitative studies also look at demographic data in their research to observe change over time and identify gentrification processes (Gould and Lewis 2017, Rice et al. 2019, Anguelovski 2015, Sandberg 2014). Gentrification indicators used in these cases include much of the same indicators that have been used in quantitative studies, such as differences real estate and rent prices, as well as neighborhood demographic changes concerning residents' income, educational attainment, and ethnicity. Sandberg (2014), however, also adds the number of residents on social assistance, the number of rental properties, and the number of cars as gentrification indicators.

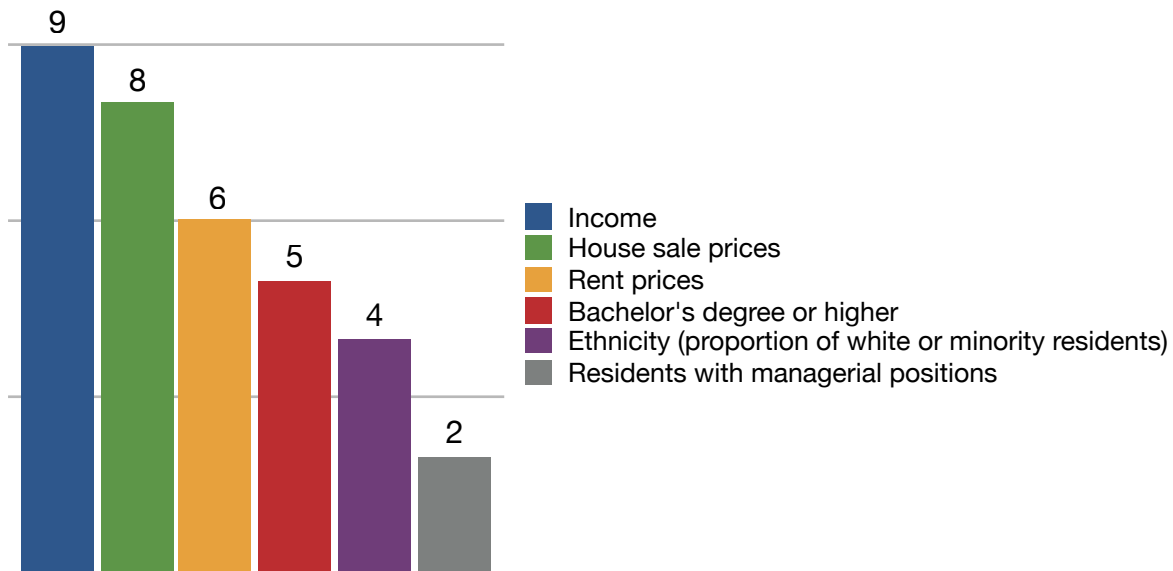


Figure 4: histogram representing the frequency (in absolute numbers) with which each indicator has been used in studies on green gentrification. Indicators used in only one study were excluded from this graph.

Interestingly, the indicators employed by the literature on green gentrification are relative to both social and market-related processes. In fact, some of the most common indicators are relative to demographic changes such as an increase in median income or in the proportion of residents with high educational attainment levels. These reflect a change in the social composition of gentrifying neighborhoods, concerning the social class, and sometimes the ethnicity or nationality, of their residents. On the other hand, other popular indicators measure instead mechanisms that are strictly market-related, such as the increase in the price of selling or renting houses, which reflects the fact that greening projects are the result of sustainable urban development investments that increase neighborhood attractiveness and property values. As shown in *fig.5*, the majority of the reviewed articles use both social and market-related indicators (8), while smaller numbers use either social (5) or market-related (4) indicators.

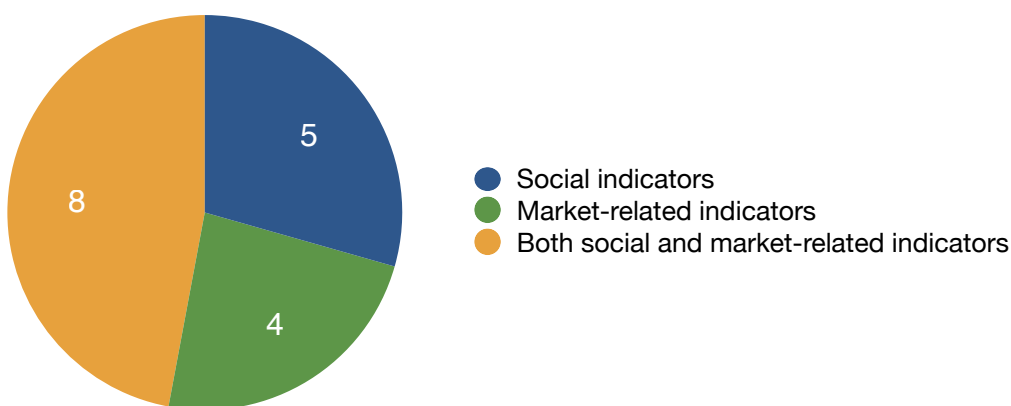


Figure 5: proportion of articles that use social indicators, market-related indicators, or a combination of both types.

5. Discussion

The previous paragraphs described how green gentrification has been defined (sec.2) and investigated (sec.3) in the empirical literature, as well as the indicators that have been used to measure the phenomenon (sec.4). In this section we compare definitions, methods, and indicators in order to explore possible divergences in the literature. To this end, we attempt to answer two key questions:

1. Do different methodological approaches reflect different definitions of green gentrification?
2. Do differences in indicators reflect divergences in defining green gentrification?

With regards to the first question, we look at differences in the methodological approaches (sec.3) and in the definitions of green gentrification (sec.2.2) that have been adopted in the articles we have reviewed, in order to see if the two may be in any way associated.

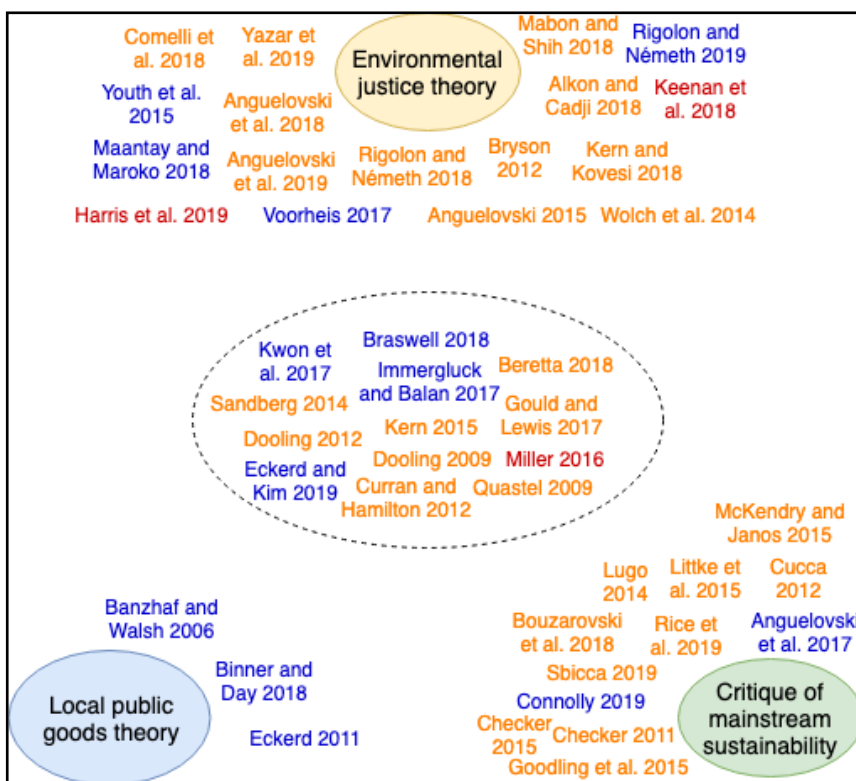


Figure 6: diagram showing our taxonomy of the differences in defining green gentrification (as presented in sec.2), as well as the different methodological approaches adopted by each study: yellow-colored references indicate qualitative studies, blue are quantitative studies, and red are mixed-methods.

There appears to be no specific association between different definitions of green gentrification and the adopted methodological approaches. In fact, as shown in *fig. 6*, the latter seem to be more or less equally distributed in each of the “poles” indicating different definitions of green gentrification, as well as among those studies that merely trace the core definition of green gentrification (sec.2.1). The only exception are the articles that frame the phenomenon using local public goods theory. This is unsurprising since these articles conceptualize green gentrification on the basis of Tiebout’s (1956) residential sorting model, which is an econometric model that considers market equilibria and economic agents’ behavior—and therefore adopts a quantitative approach. It is interesting to note that Eckerd (2011), though adopting local public goods theory as the main framework to understand green gentrification, actually performs a spatial regression in his empirical analysis.

To address the second question, we instead look at which indicators have been used to measure green gentrification, and compare these with the definitions of the phenomenon given by each article. The reviewed studies on green gentrification may be grouped into three categories, based on the type of indicators (as described in sec.4) that they use:

- social indicators,
- market-related indicators,
- both social and market-related indicators.

As shown in the figure below (fig.7), there seems to be no evident association between the type of definition adopted by each article and the indicators chosen to measure the phenomenon. In fact, different indicators are not necessarily used by articles employing different definitions. Moreover, articles that present definitions of all types use both social and market-related indicators to measure green gentrification. This is in line with the idea that green gentrification is generally understood as a complex mechanism, which includes both economic and social processes, as well as environmental change. This understanding in fact largely reflects the core definition of green gentrification provided in sec.2.1, which includes both the fact that greening projects are often part of sustainable urban development strategies that can improve environmental conditions while increasing the value of neighborhoods where new amenities are located, as well as the subsequent risk of negative social impacts, such as displacement, for more vulnerable residents.

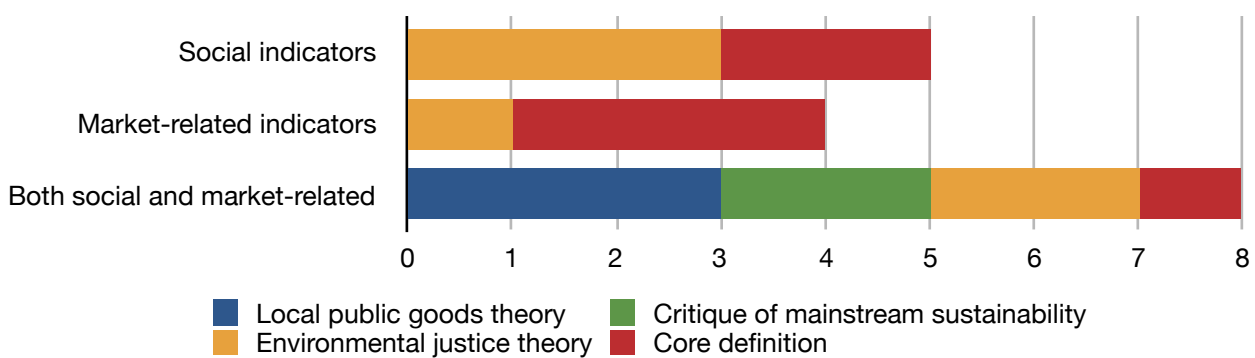


Figure 7: bar graph representing how different types of definitions of green gentrification are distributed within three categories of articles based on the type of indicators used to measure green gentrification.

However, it is interesting to note that four articles actually only consider market-related indicators—that is changes in house selling and rental prices—in their analyses (Eckerd 2019, Immergluck and Balan 2017, Keenan et al. 2018, Kwon et al. 2017). We find this especially surprising, since all of these articles also define green gentrification as a process with relevant social implications. In fact, three of these articles adopt the core definition of green gentrification, while the other (Keenan et al. 2018) frames the phenomenon as an environmental justice issue. We believe that this can be problematic, since on one hand the definitions of green gentrification in these articles recognize that one of the main features of the phenomenon are the social and demographic changes that it entails, while on the other hand green gentrification is analyzed by only considering its implications in the housing market. We therefore have four cases in which the complex processes that constitute green gentrification are reduced in the analyses to one single indicator, which undoubtedly gives an indication on one of the relevant dimensions, though it cannot give a comprehensive representation of the phenomenon.

Through our analysis, though as we have seen in previous paragraphs there are some areas of divergence in the definitions, methodological approaches, and indicators adopted to study green gentrification, we find no relevant association between how green gentrification is defined and the methodological approaches and indicators used to study the phenomenon. In other words, different approaches to studying green gentrification and the use of different indicators do not necessarily reflect divergences in how the phenomenon has been defined. Based on these results, we can make a few considerations. First of all, considering that we only had 45 articles in our sample, which reflects the fact that the literature on green gentrification is relatively new, it is possible that the absence of significant associations be due to the low number of cases. However, we also believe that this absence gives us an indication of the presence of a certain unity with respect to how green gentrification is studied. In fact, given that there appears to be no one strand

within this literature that consistently adopts a different approach, both in defining and in investigating green gentrification, this can confirm our impression of a general consensus within this literature. From this point of view, an interesting line for future research could be the comparison between research on green gentrification and research on gentrification in general, which would test whether the basic consensus shared in the former literature is also reflected in the latter, particularly in its more recent developments.

6. Final remarks

Through our analysis we have provided an exploration of the empirical literature on green gentrification, while attempting to answer questions on whether divergences in definitions of green gentrification reflect differences in which methodological approaches and indicators have been used. In the first part of the article we provided descriptive insight on the reviewed literature, summing up both the main aspects highlighted by definitions of green gentrification and the main methods and indicators that authors have adopted for their analyses. Below are some key findings:

- There is agreement in the literature on the core mechanism underlying green gentrification, which is generally understood as a socio-demographic change that occurs in response to the creation or remediation of a green amenity as part of a sustainable urban development strategy (sec.2.1). Some authors stick to this general idea in defining the phenomenon, while others instead build on it by highlighting other aspects and adopting insights from more specific approaches within UPE, notably environmental justice theory, critiques of mainstream sustainability theory, and local public goods theory (sec.2.2).
- Studies on green gentrification mainly adopt qualitative methodological approaches, though quantitative and mixed-methods analyses are also present in the literature. This may be linked on one hand to the fact that this field of research is located within the broader framework of UPE, which as an approach is generally focused on in-depth study of localities and small communities, and therefore may call for more case-based research. On the other hand, it is also possible that, being a relatively recent topic of study, green gentrification research is still in need of more exploratory research to refine the concept, defining its boundaries and its main characteristics, and therefore requires qualitative designs.
- The main indicators used in green gentrification literature are household income, house selling prices, and rent prices. Other popular indicators also include educational attainment and residents' ethnicity (specifically, the proportion of either white residents compared to the number of minority residents). Most studies on green gentrification employ both social and market-related indicators, thus confirming the idea that this is generally understood as a complex process mechanism that includes both social and economic processes.

In sec.4 we then addressed the issue of whether slight divergences in the literature that we found on how green gentrification is conceptualized were then reflected in the differences in the adopted methodological approaches and indicators. Based on our findings, there seems to be no association between differences in definitions on one hand, and methodological approaches or indicators on the other. The fact that there appears to be no one strand within the literature that consistently adopts a different approach, both in defining and in investigating green gentrification, therefore gives us a further indication of the fact that there appears to be a general consensus within this literature. We also propose that further research compare literature on green gentrification and gentrification in general in order to see if the basic consensus shared in the former literature is also reflected in the latter, particularly in its more recent developments.

Finally, regarding suggestions for further research on green gentrification in particular, we believe that it would be undoubtedly useful that future studies refine the concept of green gentrification, an effort which should include discussing the use of a single term to indicate the phenomenon, as well as proposing a common definition. We also believe that further research concerning other aspects of green gentrification could potentially shed light on instances in which the unity in the literature we have analyzed is challenged. For instance, we believe that further research should address the

issue of which types of environmental improvements cause green gentrification. Most of the research in fact still focuses mainly on parks and other classic forms of urban greening, though there are several articles which consider other types of improvement such as climate-resilience interventions (Anguelovski et al. 2018a, 2018b, Bouzarovski et al. 2018), green mobility projects (Lugo 2014), and healthy and organic food stores (Anguelovski 2015, Alkon and Cadji 2018). Finally, we believe that future research should also explore the conditions that foster green gentrification, as well as evaluate the appropriateness of applying this concept in different geographical contexts (for instance, by increasing the number of case-studies outside of North America). From a methodological point of view, the broadening of objects of study and geographical location of cases will probably require the use of qualitative exploratory research.

We believe that a stronger focus on green gentrification within academia is of great importance, in order to better understand a complex phenomenon, which potentially aggravates the living conditions of population categories that are already in a vulnerable position, such as lower-income or minority residents, and is also on the rise, along with the increase in the use of a sustainability framework in urban development. We also stress the importance of understanding the conditions that foster its development, which may in turn help to create policies that can prevent or mitigate its effects.

Appendix A

Methodological approach	Methods	Articles
<i>Qualitative</i>	Semi-structured interviewing	<ul style="list-style-type: none"> - Alkon and Cadji 2018 - Anguelovski 2015 - Anguelovski et al 2019 - Bouzarovski et al 2018 - Bryson 2012 - Checker 2011 - Comelli et al 2018 - Curran and Hamilton 2012 - Dooling 2009 - Dooling 2012 - Harris et al 2019* - Keenan et al 2018* - Kern 2015 - Kern and Kovesi 2018 - Lugo 2014 - Miller 2016* - Rice et al 2019 - Rigolon and Németh 2018 - Sandberg 2014 - Sbicca 2019 - Yazar et al 2019
	Field observations (participant or non-participant)	<ul style="list-style-type: none"> - Alkon and Cadji 2018 - Anguelovski 2015 - Anguelovski et al 2019 - Checker 2011 - Checker 2015 - Comelli et al 2018 - Curran and Hamilton 2012 - Dooling 2009 - Dooling 2012 - Gould and Lewis 2017 - Harris et al 2019* - Kern 2015 - Kern and Kovesi 2018 - Littke et al 2015 - Lugo 2014 - Rice et al 2019 - Sandberg 2014 - Yazar et al 2019
	Review of policy sources/ documents	<ul style="list-style-type: none"> - Anguelovski et al 2018 - Beretta 2012 - Bouzarovski et al 2018 - Curran and Hamilton 2012 - Goodling et al 2015 - Kern 2015 - McKendry and Janos 2015 - Quastel 2009 - Rigolon and Németh 2018 - Sandberg 2014 - Wolch et al 2014 - Yazar et al 2019

	Review of media accounts and newspaper archives	<ul style="list-style-type: none"> - Anguelovski 2015 - Bouzarovski et al 2018 - Checker 2011 - Curran and Hamilton 2012 - Goodling et al 2015 - Gould and Lewis 2017 - Kern and Kovesi 2018 - Littke et al 2015 - McKendry and Janos 2015 - Quastel 2009 - Rice et al 2019 - Sandberg 2014
	Content analysis	<ul style="list-style-type: none"> - Mabon and Shih 2018
	Policy evaluation	<ul style="list-style-type: none"> - Cucca 2012
<i>Quantitative</i>	Spatial analysis	<ul style="list-style-type: none"> - Anguelovski et al 2017 - Braswell 2018 - Eckerd 2011 - Maantay and Maroko 2018 - Miller 2016*
	Equilibrium sorting models	<ul style="list-style-type: none"> - Banzhaf and Walsh 2006 - Binner and Day 2018
	Regression	<ul style="list-style-type: none"> - Harris et al 2019* - Keenan et al 2018* - Rigolon and Németh 2019 - Voorheis 2017
	Co-location	<ul style="list-style-type: none"> - Connolly 2018
	Agent-based models	<ul style="list-style-type: none"> - Eckerd and Kim 2019
	Hedonic models for price estimation	<ul style="list-style-type: none"> - Immergluck and Balan 2017
	Geo-statistical procedures	<ul style="list-style-type: none"> - Kwon et al 2017
	ANOVA	<ul style="list-style-type: none"> - Youth et al 2015

Table 1: Summary of the research methods and techniques that have been employed by the reviewed literature on green gentrification. References marked with a star () are the mixed-methods studies, which as shown in the table use both qualitative and quantitative methods.*

References

- Agyeman, J. (2005). *Sustainable communities and the challenge of environmental justice*. New York, NY: NYU Press.
- Agyeman, J., Bullard, R.D. & Evans, B. (eds.) (2003). *Just sustainabilities: Development in an unequal world*. Cambridge, MA: MIT Press.
- Alkon, A. H. & Cadji, J. (2018). Sowing seeds of displacement: gentrification and food justice in Oakland, CA. *International Journal of Urban and Regional Research*, DOI: 10.1111/1468-2427.12684
- Angelovski, I. (2016) Healthy food stores, greenlining and food gentrification: contesting new forms of privilege, displacement and locally unwanted land uses in racially-mixed neighborhoods. *International Journal of Urban and Regional Research*, 39(6), 1209-1230.
- Angelovski, I., Connolly, J., Masip, L. & Pearsall, H. (2017). Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geography*, 39(3), 458-491.
- Angelovski, I., Connolly, J. & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life: for whom is the new green city?. *City*, 22(3), 417-436.
- Angelovski, I., Irazábal-Zurita, C., & Connolly, J.J. (2019). Grabbed urban landscapes: Socio-spatial tensions in green infrastructure planning in Medellín. *International Journal of Urban and Regional Research*, 43(1), 133-156.
- Banzhaf H. S. & Walsh R. P. (2006). Do people vote with their feet? An empirical test of environmental gentrification. RFF Discussion Paper No. 06-10, retrieved from <https://media.rff.org/archive/files/sharepoint/WorkImages/Download/RFF-DP-06-10.pdf>
- BCNUEJ (2019, Dec. 2). Our published studies on green gentrification. Retrieved from <http://www.bcnuej.org/green-gentrification/>
- Beretta, I. (2018). The social effects of eco-innovations in Italian smart cities. *Cities*, 72, 115-121.
- Binner, A. & Day, B. (2018). How property markets determine welfare outcomes: an equilibrium sorting model analysis of local environmental interventions. *Environmental and Resource Economics*, 69(4), 733-761.
- Bouzarovski, S., Frankowski, J., & Tirado Herrero, S. (2018). Low-carbon gentrification: When climate change encounters residential displacement. *International Journal of Urban and Regional Research*, 42(5), 845-863.
- Braswell, T. H. (2018). Fresh food, new faces: community gardening as ecological gentrification in St. Louis, Missouri. *Agriculture and human values*, 35(4), 809-822.
- Bray, Z. (2008). Ethnographic approaches. In Della Porta, D. & Keating, M. (eds.) *Approaches and methodologies in the social sciences: a pluralist perspective* (1st ed. pp. 296-315). New York, NY: Cambridge University Press.
- Bridge, G., McCarthy, J. & Perrault, T. (2015). Editors' introduction. In Perrault, T., Bridge, G., & McCarthy, J. (eds.) *The Routledge Handbook of Political Ecology* (1st ed., pp. 3-19). New York, NY: Routledge.
- Brinkmann, S. (2014). Unstructured and semi-structured interviewing. In Leavy, P. (ed.) *The Oxford Handbook of Qualitative Research* (1st ed., pp. 277-299). New York, NY: Oxford University Press.
- World Commission on Environment and Development (1987). *Our Common Future*, retrieved from <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
- Bryson, J. (2012). Brownfields gentrification: redevelopment, planning and environmental justice in Spokane, Washington. *Environmental justice*, 5(1), 26-31.

- Certomà, C. (2009). *Postenvironmentalism: a material semiotic perspective on living spaces*. New York, NY: Palgrave.
- Checker, M. (2011). Wiped out by the “greenwave”: environmental gentrification and the paradoxical politics of urban sustainability. *City & Society*, 23(2), 210-229.
- Checker, M. (2015). Green is the new brown: “Old school toxics” and environmental gentrification on a New York city waterfront. In Isenhour, C., McDonogh, G. & Checker, M. (eds.) *Sustainability in the global city: myth and practice* (1st ed., pp. 157-179). Cambridge, UK: Cambridge University Press.
- Chegut, A., Eichholtz, P. & Kok, N. (2014). Supply, demand and the value of green buildings. *Urban Studies*, 51(1), 22-43.
- Cole, H. V., Lamarca, M. G., Connolly, J. J., & Anguelovski, I. (2017). Are green cities healthy and equitable? Unpacking the relationship between health, green space and gentrification. *J Epidemiol Community Health*, 71(11), 1118-1121.
- Comelli, T., Anguelovski, I., & Chu, E. (2018). Socio-spatial legibility, discipline, and gentrification through favela upgrading in Rio de Janeiro. *City*, 22(5-6), 633-656.
- Connolly, J. J. (2019). From Jacobs to the Just City: A foundation for challenging the green planning orthodoxy. *Cities*, 91, 64-70.
- Corbetta, P. (1999). *La ricerca sociale: metodologia e tecniche*. Bologna IT: Il Mulino.
- Creswell, J., Plano Clark, V.L., Gutmann, M.L. & Hanson, W.E. (2007). Advanced mixed-methods research designs. In Tashakkori, A. & Teddlie, C. (eds.) *Handbook of Mixed Methods in Social & Behavioral Research* (1st ed., pp. 209-240). Thousand Oaks, CA: Sage Publications.
- Cucca, R. (2012). The unexpected consequences of sustainability. Green cities between innovation and eco-gentrification. *Sociologica*, 6(2), 1-21.
- Curran, W. & Hamilton, T. (2012). Just green enough: contesting environmental gentrification in Greenpoint, Brooklyn. *Local Environment: The International Journal of Justice and Sustainability*, 17(9), 1027-1042.
- de Marchi, S. & Page, S. (2008). Agent-based modeling. In Box-Seffensmeier, J.M., Brady, H.E. & Collier, D. (eds.) *The Oxford Handbook of Political Methodology* (1st ed., pp. 71-94). New York, NY: Oxford University Press.
- Della Porta, D. (2008). Comparative analysis: case-oriented versus variable-oriented research. In Della Porta, D. & Keating, M. (eds.) *Approaches and methodologies in the social sciences: a pluralist perspective* (1st ed. pp. 198-222). New York, NY: Cambridge University Press.
- Dooling, S. (2009). Ecological gentrification: a research agenda exploring justice in the city. *International Journal of Urban and Regional Research*, 33(3), 621-639.
- Dooling, S. (2012). Sustainability planning, ecological gentrification and the production of urban vulnerabilities. In Dooling, S. and Simon, G. (eds.) *Cities, Nature and Development: The politics and production of urban vulnerabilities* (1st ed., pp. 101-119). Farnham, UK: Ashgate Publishing House.
- Eckerd, A. (2011). Cleaning up without clearing out? A spatial assessment of environmental gentrification. *Urban Affairs Review*, 47(1), 31-59.
- Eckerd, A., Kim, Y., & Campbell, H. (2019). Gentrification and Displacement: Modeling a Complex Urban Process. *Housing Policy Debate*, 29(2), 273-295.
- Goodling, E., Green, J. & McClintock, N. (2015). Uneven development of the sustainable city: shifting capital in Portland, Oregon. *Urban Geography*, 36(4), 504-527.
- Gould, K. A., & Lewis, T. L. (2017). *Green gentrification: Urban sustainability and the struggle for environmental justice*. New York, NY: Routledge.
- Haase, D., Kabisch, S., Haase, A., Andersson, E., Banzhaf, E., Baró, F., Brenck, M., Fischer, L.K., Frantzeskaki, N., Kabisch, N., Krellenberg, K., Kremer, P., Kronenberg, J., Larondelle, N.,

- Mathey, J., Pauleit, S., Ring, I., Rink, D., Schwarz, N. & Wolff, M. (2017). Greening cities—To be socially inclusive? About the alleged paradox of society and ecology in cities. *Habitat International*, 64, 41-48.
- Harris, B., Schmalz, D., Larson, L., Fernandez, M. & Griffin, S. (2019). Contested spaces: intimate segregation and environmental gentrification on Chicago's 606 trail. *City & Community*, DOI: 10.1111/cico.12422
- Harvey, D., (1973). *Social Justice and the City*. Oxford, UK: Blackwell.
- Harvey, D. (2003). The right to the city. *International journal of urban and regional research*, 27(4), 939-941.
- Haughton, G. (1999). Environmental justice and the sustainable city. *Journal of planning education and research*, 18(3), 233-243.
- Heynen, N. (2013). Urban political ecology I: The urban century. *Progress in Human Geography*, 38(4), 598-604.
- Heynen, N. (2017). Urban Political Ecology. *International Encyclopedia of Geography: People, the Earth, Environment and Technology*, DOI: 10.1002/9781118786352.wbieg1110
- Immergluck, D., & Balan, T. (2018). Sustainable for whom? Green urban development, environmental gentrification, and the Atlanta Beltline. *Urban Geography*, 39(4), 546-562.
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, 1(2), 112-133.
- Keenan, J.M., Hill, T. & Gumber, A. (2018). Climate gentrification: from theory to empiricism in Miami-Dade County, Florida. *Environmental Research Letters*, 13(5), 054001.
- Kern, L. (2015). From toxic wreck to crunchy chic: environmental gentrification through the body. *Environment and Planning D: Society and Space*, 33(1), 67-83.
- Keil, R. (2003). Urban Political Ecology. *Urban Geography*, 24(8), 723-738.
- Kern, L., & Kovesi, C. (2018). Environmental justice meets the right to stay put: mobilising against environmental racism, gentrification, and xenophobia in Chicago's Little Village. *Local Environment*, 23(9), 952-966.
- Krueger, R., & Gibbs, D. (eds.) (2007). *The sustainable development paradox: urban political economy in the United States and Europe*. New York, NY: Guilford Press.
- Kuminoff, N. V., Smith, V. K., & Timmins, C. (2013). The new economics of equilibrium sorting and policy evaluation using housing markets. *Journal of Economic Literature*, 51(4), 1007-62.
- Kwon, Y., Joo, S., Han, S., & Park, C. (2017). Mapping the distribution pattern of gentrification near urban parks in the case of Gyeongui Line Forest Park, Seoul, Korea. *Sustainability*, 9(2), 231.
- LeSage, J.P. (2008). An Introduction to Spatial Econometrics. *Revue d'économie industrielle*, 123(3), 19-44.
- Littke, H., Locke, R., & Haas, T. (2016). Taking the High Line: elevated parks, transforming neighbourhoods, and the ever-changing relationship between the urban and nature. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 9(4), 353-371.
- Lugo, A. E. (2015). Can human infrastructure combat green gentrification? Ethnographic research on bicycling in Los Angeles and Seattle. *Sustainability in the Global City*, 306.
- Maantay, J., & Maroko, A. (2018). Brownfields to greenfields: Environmental justice versus environmental gentrification. *International journal of environmental research and public health*, 15(10), 2233.
- Mabon, L. & Shih, W. (2018). What might 'just green enough' urban development mean in the context of climate change adaptation? The case of urban greenspace planning in Taipei Metropolis, Taiwan. *World Development*, 107, 224-238.

- McKendry, C., & Janos, N. (2015). Greening the industrial city: equity, environment, and economic growth in Seattle and Chicago. *International Environmental Agreements: Politics, Law and Economics*, 15(1), 45-60.
- Miller, J.T. (2016) Is urban greening for everyone? Social inclusion and exclusion along the Gowanus Canal. *Urban Forestry and Urban Greening*, 19, 285-294.
- Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental justice. *Annual review of environment and resources*, 34, 405-430.
- Park, L.S & Pellow, D.N. (2011). *The slums of Aspen: The war on immigrants in America's Eden*. New York, NY: NY University Press.
- Pearsall, H. (2018). New directions in urban environmental/green gentrification research. In Lees, L. & Philips, M. (eds.) *Handbook of Gentrification Studies* (1st ed., pp. 329-345). Cheltenham, UK: Edward Elgar Publishing.
- Prior, L. (2014). Content Analysis. In Leavy, P. (ed.) *The Oxford Handbook of Qualitative Research* (1st ed., pp. 358-379). New York, NY: Oxford University Press.
- Quastel, N. (2009). Political ecologies of gentrification. *Urban Geographies*, 30(7), 694-725.
- Rice, J. L., Aldana Cohen, D., Long, J. & Jurjevich J. R. (2019). Contradictions of the climate-friendly city: new perspectives on eco-gentrification and housing justice. *International Journal of Urban and Regional Research*, DOI:10.1111/1468-2427.12740
- Rigolon, A., & Németh, J. (2018). “We're not in the business of housing:” Environmental gentrification and the nonprofitization of green infrastructure projects. *Cities*, 81, 71-80.
- Rigolon, A. & Németh, J. (2019). Green gentrification or ‘just green enough’: Do park location, size and function affect whether a place gentrifies or not?. *Urban Studies* DOI: 10.1177/0042098019849380
- Robbins, P. (2011). *Political ecology: A critical introduction* (2nd ed.). John Wiley & Sons.
- Sandberg, L. (2014). Environmental gentrification in a post-industrial landscape: the case of the Limhamn quarry, Malmö, Sweden. *Local Environment: The International Journal of Justice and Sustainability*, 19(10), 1068-1085.
- Sbicca, J. (2019). Urban Agriculture, Revalorization, and Green Gentrification in Denver, Colorado. In Bartley, T. (ed.) *The Politics of Land* (1st ed., pp. 149-170). Bingley, UK: Emerald Publishing Limited.
- Swyngedouw, E., & Heynen, N. C. (2003). Urban political ecology, justice and the politics of scale. *Antipode*, 35(5), 898-918.
- Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse, and structure. *Qualitative inquiry*, 17(6), 511-521.
- Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of political economy*, 64(5), 416-424.
- UN General Assembly (25 September 2015). *2030 Agenda for Sustainable Development*, retrieved from https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E
- Voorheis, J. (2017). Longitudinal Environmental Inequality and Environmental Gentrification: Who Gains From Cleaner Air? (No. 2017-04). Center for Economic Studies, US Census Bureau.
- Wolch, J. R., Byrne, J. & Newell, J. P. (2014). Urban green space, public health, and environmental justice: the challenge of making cities ‘just green enough’. *Landscape and Urban Planning*, 125, 234-244.
- Yazar, M., Hestad, D., Mangalagiu, D., Kerem Saysel, A., Ma, Y., & Thornton, T. (2019). From urban sustainability transformations to green gentrification: urban renewal in Gaziosmanpaşa, Istanbul. *Climatic Change*, DOI 10.1007/s10584-019-02509-3