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Residents' Perceptions of Urban Greenspace in a Shrinking City: Ecosystem Services and Environmental Justice

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Abstract: Although urban greenspace enhances ecological functioning and human well-being through ecosystem services (ES), it is oftentimes inequitably distributed. Environmental justice (EJ) encompasses aspects of distributive, procedural, and interactive justice related to accessibility and allocation of environmental benefits. Vacant land in shrinking cities has the potential to address greenspace inequalities and provide ES. This study investigated the perceptions of residents regarding urban ES and EJ in their communities in St. Louis (MO, USA)—a shrinking city that was undergoing green development, through semi-structured interviews. Altogether, 27 residents were selected from socio-economically disadvantaged neighborhoods characterized by high levels of vacancy due to legacies of redlining and systemic racism. Interview analysis revealed four themes: green benefits (including recreation opportunities), green costs (e.g., concerns for increased crime and nuisance animals), injustice issues (e.g., access to community greenspaces), and changes in the community (e.g., higher property taxes). Results revealed that residents perceived ES as closely connected with EJ when it comes to urban greening projects in their city. This study helps inform the process of urban greening projects, particularly in shrinking cities at risk of inequities.

Keywords: urban greenspace; ecosystem services; environmental justice; residents' perceptions

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1. Introduction

Urban greenspace, either formal (those that are deliberately planned and managed, e.g., parks, gardens, and greenways) or informal (i.e., unmanaged/unplanned greenspace, such as vacant land), can enhance environmental sustainability, ecological functioning, and overall human well-being [1] by reconnecting the cities to the biosphere, bringing back local commons, and decreasing ecological footprints [1]. Previous research has well-documented the physiological and psychological benefits that urban greenspace can bring to individuals (e.g., lowered stress, improved cognition, eased symptoms of mental illness [2]). Urban greenspace can also contribute to societal well-being by increasing social functioning and community engagement through providing safe places for diverse members of the society to interact [3], improving surrounding residential property values [4], and enhancing environmental health and sustainability [5]. In addition, urban greening projects are capable of facilitating alternative modes of transportation, making wise use of scarce urban space through repurposing and transforming existing infrastructure, and incorporating nature into dense urban areas while promoting social interactions [6]. However, these benefits are often not equitably distributed [7], with more greenspace and benefits found in more affluent neighborhoods and communities [8]. Such inequitable access to greenspace and

benefits distribution is one of the many aspects directly associated with individuals' health and quality of life and magnified by societal disparities [2]. More efforts are needed to address greenspace inequity issues in all cities, particularly in "shrinking" cities whose disproportionate inundation of vacant land is seen as an asset [9] and opportunity [5] to many (e.g., to re-create and enhance urban greenspace it provides).

This past decade has witnessed the increasing phenomenon of urban decline worldwide, where cities are "shrinking" [10], attributed to de-industrialization, globalization, and unconventional urban trajectories precipitated by governments, city planners, and social or ecological forces [11]. As urban areas shrink, reminders of their former vitality remain, with homes or businesses becoming vacant and lots left unoccupied. These under-utilized spaces within shrinking urban areas present rich socio-ecological opportunities/potential to serve as increasingly valued resources for urban greenspace that can potentially provide a wide array of benefits toward enhanced human health and well-being [5,12]. While shrinking cities are a global phenomenon, many older industrial cities in the U.S. (e.g., Baltimore, Detroit, St. Louis) experience dilapidated housing, concentrated poverty, and legacies of racial discrimination [13], and are exploring green infrastructure solutions to address social, economic, and environmental challenges these cities face [13,14] Therefore, this study was conducted to explore residents' perception of urban greenspace in the shrinking city of St. Louis, Missouri (USA), currently undergoing "greening" through both ecosystem services and environmental justice frameworks. Specifically, we address the following research questions: (1) how do residents perceive nearby urban greenspace? and (2) how do these perceptions correspond to dimensions in the ecosystem services and environmental justice frameworks?

1.1. Ecosystem Services and Disservices

Ecosystem services (ES) are the direct or indirect benefits humans receive from ecosystem functions [15]. Ecosystems can deliver goods, life-support services, and non-material cultural benefits to people through their interactions with man-made systems [16]. Four commonly accepted categories of ES include (1) provisioning (direct, tangible products extracted from nature); (2) regulating (providing benefits through the regulation of natural processes); (3) cultural (providing non-material, intangible benefits to people, which can be obtained through spiritual, reflective, and recreation in outdoor settings); and 4) supporting (broadly defined as those essential for the provision of all others, and typically deliver benefits indirectly over long temporal periods) services [17–19]. Cultural ES also include aesthetic appeal, place value, social cohesion, and the provision of "nature experiences" that may result in improved human–nature relationships and increased pro-environmental behavior [20]. Many urban greenspaces are multi-functional in terms of their ability to contribute various ES to nearby communities [21]. For example, urban vegetable gardens, parks, and forests can provide a food supply for households and serve as provisioning ES [22] while contributing to the social health and well-being of communities as a cultural ES [23]. In the case of urban foraging, wealthier residents participate for social reasons, while poorer ones participate for diet supplementation [23]. As such, depending on the recipients, urban greenspace has different meanings and can deliver different ES. Further, the type and quality of urban ES vary based on the contextual constraints of differing urban areas, greenspace management, aesthetic preferences, and socioeconomic factors [21,24].

While ecosystems provide many benefits and essential services, it is equally important to recognize potential ecosystem disservices (EDS), which are the negative impacts that ecosystems can have on human well-being [25–27]. Understanding EDS is critical in urban settings to help guide design and equitable land-use strategies that minimize the negative impacts of urban greenspace [21,28,29], particularly for vulnerable and low-income communities [30]. While there is no established standard categorization of EDS, common categories focus on the types of negative impacts such as health-related (e.g., spread of diseases, allergens), economic/financial (soil degradation, crop damage, changing property value, infrastructure damage), safety and security (e.g., flooding, storm damage, fear of

crime, wildlife conflicts), aesthetics (e.g., blocked views, unwanted vegetation, negative cultural associations) [25,31–37]. It is important to acknowledge there is debate in the literature regarding the root cause of ecosystem disservices and whether social systems can consider [25] only ecological origins [35]. In this paper, we take the approach that EDS can originate from ecosystem functions even if influenced by human activities, recognizing the interplay of social context and ecological functions [25]. Indeed, previous studies have identified EDS, such as feeling unsafe and fear of crime in urban greenspaces [33,34,36], as well as economic issues, including costs and decreased property value due to unmanaged green areas, and the prevention of a more profitable use of the space [25,36,37].

1.2. Environmental Justice

Greenspace in urban areas is often located along a socio-economic continuum: poorer areas frequently correlate to fewer, less well-managed natural resources, accompanied by limited benefits [38,39]. The environmental justice (EJ) movement emerged in the 1970s and early 1980s in response to a growing awareness of the unequal social burden of pollution and unwanted land uses on minority communities in the U.S. before going global [40,41]. Over time, EJ has evolved to recognize both the distribution of environmental burdens as well as equitable access to nurturing environments and the inclusion in decision-making, concerns broadly encapsulated by social justice movements that can address embedded social inequities and injustices in the provision of urban greenspace and correlated environmental benefits [42,43]. Various frameworks that capture dimensions of EJ exist [40,44–48]. One useful framework used for urban parks and greenspace contexts is a tripartite framework of three interrelated components: distributive, procedural, and interactional justice [7,40,49]. Distributive justice is foundational to modern political theory and proposes a distribution of resources that is "to everyone's advantage" [50]. Distributive justice refers to the availability and accessibility of quality public spaces and measures whether equitable and fairly allocated natural resources exist [49]. Procedural justice, on the other hand, considers the authentic inclusion and engagement of all stakeholders (regardless of socio-demographic factors) in the environmental decision-making process regarding greenspace management, access to park features, and use of park resources [51]. In addition, interactional justice measures the interactions of people in existing greenspaces, explores whether greenspaces are safe and welcoming, and promotes social justice ideals for a diversity of site users [52].

A significant number of studies have focused on the distributive justice of urban greenspace, as both the distribution of urban greenspace and proximity to it are important determinants of use and environmental benefits received [53]. However, previous studies on the inequitable greenspace distribution based on socio-economic findings were not always consistent. In some cases, less tree cover (which provides regulating ES) and park space (where multiple ES are provided, including cultural ES) exists in disadvantaged communities (e.g., [54]), while in others, there is at least an equivalent distribution, yet disparities still existed regarding the access to parks of higher quality (e.g., [55,56]). A study among minority and marginalized residents in Houston (TX) corroborated such distributive justice issues over the quality of urban greenspace [57], as they overwhelmingly preferred park management to invest in quality improvement of existing parks rather than developing new parks. Clearly, distributive justice trends across ES are context-specific [39].

Numerous studies [8,40,58] emphasize that interactional and procedural justice concerns within existing urban greenspace also merit attention. For example, in places where interactional or procedural injustice exists, nearby residents may be discouraged from visiting neighborhood parks, regardless of the distribution or accessibility of such urban greenspace. In a study of parks in Chicago (IL), Mexican–American youth were found less likely to participate in outdoor activities due to interactional justice (i.e., widely held fears of sexual assault and gang activity [59]), while another study on restored parks in Harlem, NYC (NY), revealed procedural justice issues as these parks favored the cultural

preferences of newer, more affluent users through park rules that catered to these new residents [60].

Furthermore, the components of EJ and the location of urban greenspaces are often related, with socio-demographic characteristics being the underlying factors. Urban greenspace occurring in low-income and historically disadvantaged communities is less likely to meet EJ considerations [61]. When urban greenspace does occur in such areas, however, it is often lower in quality than those in more affluent communities [53]. Poorly maintained or broken equipment, unkempt park facilities, brownfields, and other contaminated green sites are more frequently found in poor and minority (e.g., Hispanic, Black) communities than in predominantly White ones [53,60]. These are linked to a legacy of racism within the U.S., characterized by historical practices of racial segregation, financial redlining, and disinvestment in communities of color [38,62].

1.3. Need for Study

The complicated, context-based nature of the distribution of greenspace and environmental benefits points to the importance of including EJ considerations in the management and decision-making processes for existing and new urban greening projects [47,63]. The preferences and perceptions of stakeholders (e.g., proximate residents) regarding urban greenspace can inform development efforts and ensure EJ with procedural justice being addressed in the process [9,22]. Such processes are particularly important in shrinking communities where greening projects are underway, as these developments often occur in low-income and high-minority areas [60]. Through this study, we sought to better understand EJ components of urban greenspace by examining resident preferences for and perceived access to ecosystem services. Specifically, residents were asked about their perceptions of proximate urban greenspace in areas where vacant land revitalization projects exist in a shrinking urban city through 27 in-depth interviews.

2. Methods

2.1. Study Setting

St. Louis, MO (USA), is located on the western bank of the Mississippi River, just south of its confluence with the Missouri River. For over 100 years, from the mid-1800s to the mid-1900s, St. Louis experienced booming growth and industrial development as the city capitalized on the transportation potential provided by these major rivers [64]. Due to the nationwide social trends in the 1950s and 1960s of urban White populations fleeing to the suburbs and the economic recession in the next two decades, the city dropped almost half its size in terms of population, from over 850,000 residents in the 1950s to 450,000 in the 1980s [65]. Today, the population of St. Louis has decreased to just over 286,578, with another 4.5% drop since the 2017 census [66]. Major population groups in the city include White (46.3%), followed by Black (44.8%), Hispanics and Latinos (4.2%), and Asian (3.4% [66]). Approximately 19.6% of the city residents live below the federal poverty level, with a median household income of $48,751 [66].

The significant population loss and economic decline, even to this day, has turned St. Louis into a "shrinking city". Although citywide, St. Louis has more than 20,000 vacant lots, most are disproportionately located north of the "Delmar divide" (i.e., Delmar Boulevard), where neighborhoods have about a 50% vacancy rate and the population comprises predominately low-income, Black residents [67–69]. In response, in 2017, the city initiated a multi-year vacancy reutilization project with one objective being to rehabilitate lands that have been contaminated or left vacant and fallow because of the city's shrinkage [67], and a particular focus on historically redlined neighborhoods [70,71]. Toward this effort, the Metropolitan St. Louis Sewer District (MSD), which was previously sued over discharging wastewater into the Mississippi River, was ordered to invest in the development of an underground water control structure in the city, as well as demolish vacant homes to absorb rainwater and build green infrastructure on some of the vacant lots [72,73]. Recognizing this as an opportunity to transform the city's vacant lots into urban greenspace, the City

of St. Louis, St. Louis Development Corporation, Missouri Department of Conservation, and MSD formed the Urban Vitality and Ecology Initiative, which expanded into the Green City Coalition that works collaboratively with local organizations and residents to convert abandoned and vacant properties into community-owned green spaces (e.g., butterfly garden, produce garden, rain garden, play space, urban orchard, gathering space) [74]. To accomplish this, the Green City Coalition has taken a community-based participatory approach (e.g., partnered with local neighborhood residents, held multiple community meetings and workshops, documented concerns, conducted resident surveys, and held votes on priority issues for the community) to engage other residents and understand the community landscape [75]. Wells-Goodfellow and Baden are two of the neighborhoods targeted for urban greening by this initiative and, therefore, selected for this study (Figure 1; Tables 1 and 2). Both neighborhoods are predominantly Black communities, characterized by high poverty rates, numerous vacant lots and abandoned buildings, and declining infrastructure [62], and were shaped by historical, social, and political processes (e.g., legalized segregation, homeowner covenants, and financial redlining). Wells-Goodfellow and Baden have seen population losses of 28% and 23% between 2000 and 2010, respectively [76].

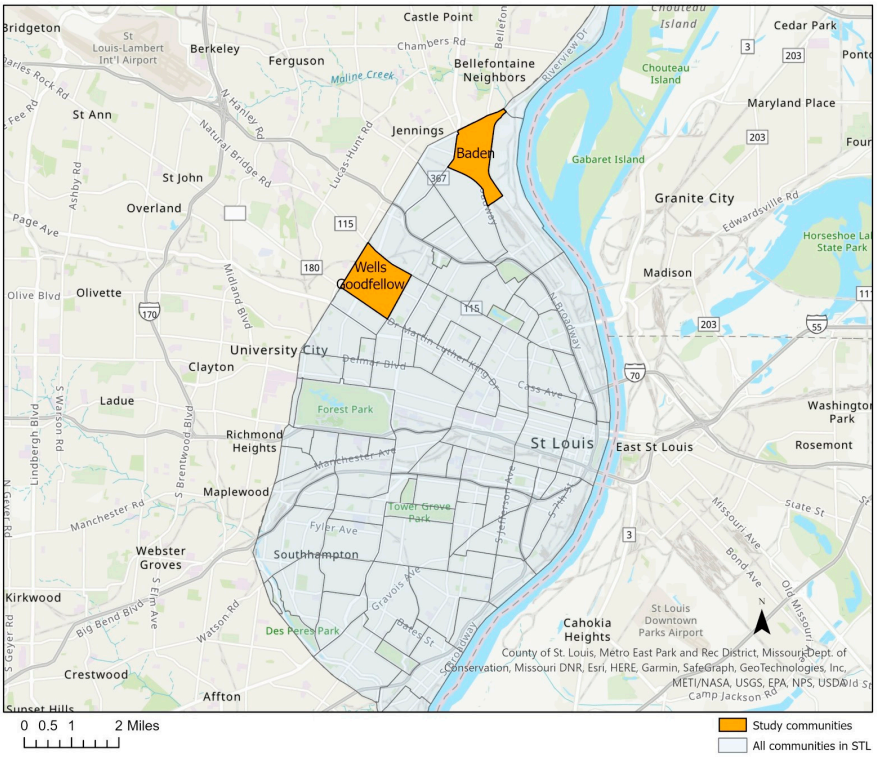

Figure 1. Map of study communities (St. Louis, MO, USA).

Table 1. Neighborhood Population Demographics.

Population Demographics	Wells-Goodfellow	Baden	City of St. Louis
Residents	4473 [1]	5465 [1]	301,578 [1]
% minority	99% [1]	96% [1]	56% [1]
Age (Median)	34 [2]	43 [2]	37 [1]
Median income	$36,660 [2]	$34,334 [2]	$52,847 [1]
Poverty rate	31% [2]	36% [2]	20% [1]
High school graduation rate	57% [2]	46% [2]	76% [1]

[1] United States Census Data (2020) [77]. [2] US Census Bureau, American Community Survey (2022) [78].

Table 2. Neighborhood Greenspace Profile.

Neighborhood Greenspace Profile	Wells-Goodfellow [1]	Baden [1]
Total neighborhood acreage	780	700
% Neighborhood park acreage	1.8%	3%
Park acres per 1000 residents	2	3
Number of Vacant lots	1413	292
% Land covered by vacant lot	26%	11%

[1] Green City Coalition (2019) [76].

2.2. Participants, Data Collection, and Analysis

Altogether, 27 interviews were conducted among residents engaged in vacant lot rehabilitation and community development in the two selected neighborhoods [79]. Many interviewees had attended participatory planning meetings sponsored by the City of St. Louis and partnering agencies and were identified through either key informants (e.g., neighborhood organizations) or a snowball sampling approach. A gift card incentive ($10) was provided to each participant. The 27 study participants (21 Black, 6 White; Table 3) included 16 females and 11 males. Participants averaged 60.4 years old, ranging from 40 to 89 years in age, and were rooted in their neighborhoods, ranging from 5 to 67 years (averaging 31.8 years) in their length of residence. All participants but one were homeowners split into these two neighborhoods (13 in Wells-Goodfellow, 13 in Baden). One interviewee—a real estate agent, was not a resident of either neighborhood but owned many rental properties in the area and was considered a prominent community member in Wells-Goodfellow and, therefore, included as a participant.

Table 3. Profiles of interview participants.

Participant Profile	Wells-Goodfellow (n = 14)	Baden (n = 13)	Total (n = 27)
Gender			
Male	6	5	11
Female	8	8	16
Race			
Black	13	8	21
White	1	5	6
Average Age	59 years old	62 years old	60 years old
Average Years in Neighborhood	37.9 years	29.4 years	/
Home Ownership Percentage	100%	100%	/

This study took a semi-structured interview approach, which allowed participants to drive the discussion, resulting in "complicity in research" [80] (p. 33). As part of a larger study, the interview protocol examined residents' perception of their neighborhood, the vacant lots, the wildlife and vegetation in these lots, and the present and future vacant lot use [81]. The interview protocol did not include questions specific to ES or EJ. Each interview lasted about an hour.

Interviews were audio-recorded and transcribed verbatim. Two researchers experienced in qualitative research and familiar with the topic context conducted thematic analysis, using Nvivo 12 software. Coding employed a constant comparative method. To ensure trustworthiness, the two researchers coded independently and met multiple times to compare and discuss codes for possible merging and categorization [82]. Inductive coding was conducted initially, with major themes aligning well with the ES and EJ theoretical frameworks. The researchers then re-examined the codes for the representation of ES and EJ dimensions, which captured all previously identified themes. All participant quotes are presented verbatim, without edits to grammar or tone.

3. Results

In total, four major themes (Table 4) emerged from the data: "green benefits" (e.g., space to exercise, play areas for children), "green costs" (e.g., unkempt greenspaces, nuisance animals), "injustice issues" (e.g., exclusion from decision-making for new greening projects, lack of quality parks in neighborhoods), and "changes in the community" (e.g., increase property values, too few/many residents). These major themes and related sub-themes are summarized in the following section.

Table 4. Interview results.

Themes from Interviews	Examples/Quotes	Corresponding ES, EDS, or EJ Dimensions
green benefits	"[green development]. . . transform these fields and these lots into something positive. Maybe some fresh vegetables, fruits, some peach trees, cherry trees"	Provisioning ES
	"The city got to have trees . . . to keep the city cool"	Regulating ES
	"[urban greenspace] take away . . . the pollution" and "help you breathe more"	Cultural ES
	"flowers, trees, benches, flowering trees"; "little water fountains . . . where people can just go sit" at neighborhood greenspaces.	Supporting ES
	"[opportunities for people] to view wildlife, meditate, or have a quiet place".	Cultural and Supporting ES
green costs	"end up a set for the gangs" or allow people to "hide [in existing vacant lots] and sit around and use their drugs and even do sexual favors".	EDS (safety and security)
	look "cluttered"; were too "wild" for "the middle of the city".	EDS (aesthetic)
Injustice issues	"[xxx] is the only park in this area. . . you should have more of a choice".	Distributive EJ
	"[After] bringing us in halfway through. . . You think they get us together to ask our advice? They get us together to OK their projects, that's all".	Procedural EJ
	"[neighborhood park being] not safe no more",	Interactional EJ
	"Every now and then you might get a flare-up [shooting, armed robbery]. . . but that's about the only thing that's in this area right now . . . you have to go to that park just to play basketball or get on the swings and take the kids . . . that's it".	Interactional and Distributive EJ
Changes in the community	"[vacant lots as a] great development opportunity"; "perhaps help [the community]"; "[hopes to see] a nice, beautiful field with wild grass and wildflowers on it".	Positive: Various ES
	"Yeah, ok, well that's all park area and that looks good. I'm not saying it doesn't but I thought you were talking about what I'd like to see in this area. I want to see businesses. I want to see stores. I want to see stores so that the people who still live here won't move out. And that other people want to move in again".	Negative: EDS (economic/financial)

3.1. Green Benefits

Residents recognized diverse benefits associated with existing and planned urban greenspace, either formal or informal. One participant (Wells-Goodfellow) commented that green development could ". . . transform these fields and these lots into something positive. Maybe some fresh vegetables, fruits, some peach trees, cherry trees" and potentially supply fresh food for residents. Another participant (Baden) noted that Missouri natives (e.g., pawpaw trees) could be added to the food supply and be grown in urban gardens or food forests. Participants also recognized the critical habitat offered by "pollinator-friendly plants", "natural forest", "natural prairie landscaping", and different "natural animals" (e.g., birds, opossums, insects, bees). One participant (Baden) stressed the importance not to "interrupt any bee activity" by removing honeysuckle, as one has "got to love the polli-

nators". These direct outputs from the ecosystem were the most visible benefits repeatedly brought up by participants.

Others expressed their awareness of temperature regulation and air quality benefits provided by urban greenspace. "The city got to have trees . . . to keep the city cool", as one participant stated (Wells-Goodfellow). A fellow participant from the same neighborhood extended to acknowledge urban greenspace's ability to "take away . . . the pollution" and "help you breathe more" and hoped to see more trees and natural areas. Residents from Baden were on the same page, noting that trees reduce the "heat island you have when everything is paved over and built on".

Additionally, mental health benefits provided by time spent in formal greenspace were explicitly underscored by a participant (Wells-Goodfellow) who felt that time in nature was an important aspect of urban life, providing opportunities for people to view wildlife, meditate, or have "a quiet place". Participants also shared development ideas ("an area with a playground", "walking trails", "football or baseball fields", and places to host activities such as outdoor films, theater, and yoga) for community engagement that could be achieved through the rehabilitation of the vacant lots. Residents acknowledged the benefits of formal greenspace in bringing different members of the community together. One participant (Wells-Goodfellow) noted such greenspace serves as "a bridge" for her community:

> *"It's nice to have a space of land in an urban area where you have greenery to enjoy nature . . . I would like to have something' that would benefit the community . . . you need something for the children, you need something for families. You can't have a community without it, right?"*

Another participant from the same neighborhood echoed, "I always talk about growing a community. We don't grow plants and trees and grass but we grow it for people. . . People are what make a neighborhood. People are what make a community. It's about people".

3.2. Green Costs

Residents also spoke of costs associated with formal and informal greenspaces. While many expressed a desire for community spaces, others were wary of externalities associated with such spaces (e.g., doubts about the community/city's ability to maintain). Most of these concerns were about the existing safety and security issues, which may be exacerbated by unmaintained urban greenspaces. One participant (Baden) feared that an orchard would attract unwelcome outsiders into the community, as "you could be robbed" in his neighborhood's existing parks, while another one (Wells-Goodfellow) feared that unmaintained bushes/trees compromised community safety and that she "might get molested" while exercising in her neighborhood park. Other residents from Wells-Goodfellow also worried that new greenspaces could either "end up a set for the gangs" or allow people to "hide [in existing vacant lots] and sit around and use their drugs and even do sexual favors".

Along the same lines, residents raised the issue regarding the trash dumping issue in informal greenspaces in their communities, toward which they have conflicted views. On the one hand, trash and debris (e.g., mattresses, tires) were frequently dumped in vacant lots, lending an air of neglect, which negatively impacted proximate property values. Residents feared that dumping would continue unless these vacant lots were better managed (e.g., by building fences around them). On the other hand, they worried that property values could rise to unaffordable levels if green development attracted more affluent residents. One participant (Baden) referenced high-dollar developments in a previously declining area of St. Louis that has become "a trendy place to live" and "didn't want anyone to develop [Baden] that way".

Some residents were concerned that unmaintained green areas, including native plantings in a formal greenspace, could look "cluttered"; one participant felt that landscapes maintained for environmental benefits alone were too "wild" for "the middle of the city" (Baden). Others feared that greenspaces developed in such a way would attract "nuisance" and unwanted "natural" animals. One resident questioned whether attracting wild animals

into Wells-Goodfellow would be "fitting for a neighborhood", with the concerns for the health of community members embedded.

In addition, residents noted the degradation of the living environment and their living standards. One resident (Wells-Goodfellow) lamented that poor upkeep of the lots "... really depletes the value. It really makes it [Wells-Goodfellow] look like it's not a very desirable place to be", and explained this impact in further detail:

> *"... The worst vacant lot I have seen is actually a city-owned property behind me and I pretty much have ... animals, dogs, possums, rats, all coming onto my place from that. Property is overgrown, it's actually encroaching on my land ... It really hurts the value of my land."*

Overall, residents emphasized a need for improved management of informal greenspaces, as the lack of care imposes substantial burden on community members. Interviews were replete with resident observations about overgrown and unkempt vegetation, an increase in nuisance animal populations, illegal activities (e.g., dumping, drug sales, prostitution), and a negative impact on nearby property values resulting from non-rehabilitated urban greenspace. For example, one resident (Wells-Goodfellow) stated:

> *"They [the city] don't cut it [nearby vacant lot] properly. It looks a mess once that grass gets tall. The trash they put in the street. So from the dumping, the city don't clean up, they just cut the grass and they don't get up the grass ..."*

3.3. Injustice Issues

The safety and security concerns (as part of EDS) spilled over when residents talked about the dearth of accessible, inclusive greenspace within their communities. For example, the primary neighborhood park in Wells-Goodfellow has a reputation as being "not safe no more", yet residents have limited formal greenspace options otherwise.

> *"Every now and then you might get a flare-up [shooting, armed robbery]... but that's about the only thing that's in this area right now ... you have to go to that park just to play basketball or get on the swings and take the kids ... that's it."*

Many residents mentioned that they were too afraid (due to safety concerns) to even go to the only neighborhood park. The critical need for more urban greenspace in the neighborhood was emphasized repeatedly in interviews. "[xxx] is the only park in this area... you should have more of a choice". Residents also spoke about equity issues pertaining to the development of urban greenspace, such as a lack of meaningful involvement in the city's process for greening projects, in spite of their attendance at green development meetings.

Some residents preferred greenspaces that would provide community and recreational use rather than focusing on environmental benefits, yet felt that their preferences were not heard, as the city "wasn't looking at the resident" when it came to green development of the vacant land (Wells-Goodfellow). One participant (Wells-Goodfellow) stated: "... with the couple times I did go, they were showing us these same things, 'It's going to be this and this'." Many felt that urban greenspace planning meetings involved residents simply as a matter of course. Another participant (Wells-Goodfellow) commented, "[After] bringing us in halfway through... You think they get us together to ask our advice? They get us together to OK their projects, that's all."

3.4. Changes in the Community

Participants expressed both positive and negative viewpoints regarding potential changes that may result from greening projects in their neighborhoods. For example, one participant (Wells-Goodfellow) viewed the vacant lots as a "great development opportunity" for the city. Another participant in the same neighborhood remained hopeful that urban greening projects would "perhaps help" his community despite many challenges (e.g., equity). He hoped to see "a vibrant, healthy place for people", a greenspace with dif-

ferent recreation facilities (e.g., tennis courts, playground areas), and even "a nice, beautiful field with wild grass and wildflowers on it".

Many residents from the same neighborhood also worried that greening projects were being leveraged as a tool to "deplete the community": "Of course, there's always people that live on that greenspace, that have to move. . . the only reason they would come up with pocket parks now is to get [a developer's project] soon." Specifically, participants in both communities worried that greening projects could lead to higher property values and, subsequently, higher property taxes, which could push residents out.

Some residents pointed out that there were more pressing issues that needed to be addressed in their neighborhood to improve their quality of life, other than urban greening projects. Another resident (Wells-Goodfellow) noted, "We got some other issues out here in this world that precedes lots of birds. I mean we are the caretakers on this planet for a lot of the animals, but the human animal got some issues." Residents from Baden shared a similar outlook, as one participant voiced the need for high quantity and vitality of businesses.

> *"Yeah, ok, well that's all park area and that looks good. I'm not saying it doesn't but I thought you were talking about what I'd like to see in this area. I want to see businesses. I want to see stores. I want to see stores so that the people who still live here won't move out. And that other people want to move in again."*

In addition, residents were unable to acquire capital to facilitate development and revitalization themselves, as referenced lenders who wouldn't finance in the neighborhood until it was perceived that "certain groups" (Wells-Goodfellow) would make the area a worthy investment opportunity. Others worried that such lender-approved developments would change the character of the neighborhood by leading to development that catered to a more affluent population or reduce neighborhood quality further by catering to landowners who "just worry about the rent" (Wells-Goodfellow), not maintenance or aesthetics.

4. Discussion

4.1. Perceptions of Ecosystem Services and Disservices

Residents recognized that urban greenspace provides diverse benefits across all four ES categories to their communities (Table 4), especially regarding the cultural ES aspect (e.g., opportunities for recreation, outdoor education, and social bonding) proximate to their communities. This is consistent with previous research that cultural ES were valued by community members of gentrifying neighborhoods [37], and stakeholders of diverse backgrounds [20], and that the proximity (of urban greenspace to their neighborhoods that provide cultural ES) matters [83]. The focus on cultural ES, which emerged from residents' interviews in this study, could be attributed to a general sense that they conceive the city as a space that must serve the well-being of people first. Residents' preference for urban greenspace being anthropocentric oftentimes got complicated by the associated EDS in the meantime [49]. In this study, residents noted a variety of tangible EDS in both communities. Cultural values for landscapes (e.g., scenic nature; neat, maintained, and safe greenspaces) influence residents' perceptions of the attractiveness of natural areas, which was found to be highly correlated with perceptions of care and "a good place to enjoy nature" in previous research [84] (p. 762). The findings that residents in both study communities preferred well-kept vegetation and limited wild plantings in urban greenspace were also corroborated by previous research that "context in a natural area clearly matters" [84] (p. 763).

Residents of the two study communities that were predominantly Black, socio-economically disadvantaged with high levels of vacancy, were concerned about their personal safety in proximate greenspace. This result is also consistent with previous studies on minority communities (e.g., [59]) and recent literature regarding EDS in declining neighborhoods (e.g., concerns over changes to property values and the character of the study communities [9,85,86]). Further, although development targeting residential and commercial growth was named as a primary way to revitalize the communities, residents felt that such an investment strategy would be unlikely to be pursued, corresponding with financial/economic EDS, which have sometimes been recognized in the literature

regarding greenspace limiting more profitable possible land uses [25,36]. Residents' worries over EDS were substantial, complicating the discourse around the role of urban greenspace in these communities. However, absent green development and inequitable access to potential benefits across all ES persisted.

4.2. Environmental Justice and Equity

Residents' interviews also revealed distributive, procedural, and interactional EJ, as delineated by the EJ framework [49] (Table 4). Gaps in park access and quality were consistent with recent research (e.g., [87]), which pointed to a higher propensity for environmental inequities to occur in historically disadvantaged, minority, or low-income communities [39]. In relation to interactional justice, safety concerns were repeatedly brought up by residents, which is consistent with another park study in Kansas City [88], even where accessibility was not ostensibly an issue.

Carnahan et al. [58] pointed out that although the inclusion of proximate communities in park planning is a key component of procedural justice, participants involved in such processes may still not feel heard, which is certainly the case in this study. Residents mistrusted the city's planning process and the outcome of the slated green development despite their participation in city-sponsored meetings. Without a focus on EJ and the inclusion of the voice and interests of residents, it is possible that planning and communication efforts may (or are perceived to) focus on the wrong thing—such as providing water management, pollinator habitat, etc., when the community members want more focus on how they can use the space to recreate and interact with others in their community (i.e., cultural ES). ES are often bundled, so it is not necessarily a trade-off between different ES [89,90], but how the focus of green projects is communicated can influence how well the community feels they are being heard. Research that overlooks the ability of nearby communities to self-determine their urban greenspace needs may undervalue the role cultural ES can and should play in the socio-ecological functioning of communities. In this vein, residents in this study expressed the view that the city's vacancy revitalization plan was focused too narrowly on ecological rather than social outcomes, while assessments of urban ES require equal consideration of social and ecological functioning. Likewise, if resident concerns are not included, the negative impacts (ESD) of well-intentioned green projects could be overlooked [26]. These results revealed the connection between ES and EJ regarding urban greening projects [47,63]. Specifically, our findings suggested that EJ, through inclusive planning and community engagement, is critical to ensuring ES are maximized and EDS are minimized (see Figure 2).

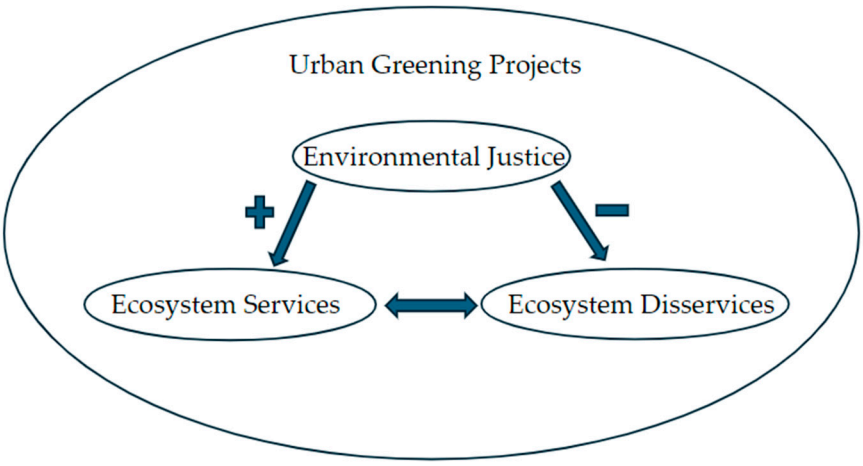

Figure 2. Environmental Justice, Ecosystem Services, and Ecosystem Disservices in Urban Greening Projects.

4.3. Green Gentrification and Urban Planning

Residents of both communities expressed frustration over the negative impacts that the vacant lots had on their communities, yet simultaneously recognized that a solution predicated on urban greening projects carried inherent risks for the community. Urban greening projects throughout the U.S. have led to green gentrification (e.g., in Atlanta, Chicago, New York, New Orleans), the processes by which historically disadvantaged residents are made vulnerable to displacement [9,49,91,92]. As greenspace is developed or rehabilitated to provide vital ES to surrounding communities, the cost of living often rises in correlation with the improved aesthetics and quality of life, thereby "pricing out" and displacing the neighborhood's resident population [8]. The impacts of urban environmental planning, or the "privileging of natural resources" [93] (p. 630), make it difficult for the less privileged, historical residents to maintain a residence in the transformed neighborhood. This can be especially challenging in shrinking cities in which there are already social and environmental inequalities [94,95].

Recently, vacant land in shrinking cities has been valued for its potential to address greenspace inequalities and provide benefits in socio-economically disadvantaged and "park poor" neighborhoods [5,9]. Residents in this study expressed hope that green redevelopment of blighted areas in their neighborhoods would contribute to their individual and community well-being, as increased or transformed urban greenspace through vacant land development can promote healthy lifestyles [8]. Residents felt that vacancy revitalization would facilitate their ability to exercise and spend more time outdoors generally. Yet, attempts to improve public health through urban greening projects could potentially lead to worsened health outcomes for vulnerable communities because of green gentrification [8]. Such greening, riding on the popularity of contemporary sustainability discourses, often co-opts EJ concerns over the health and well-being of marginalized groups. Often, greening "eradicates equity concerns from sustainability initiatives" and "limits the capacity of EJ groups to resist gentrification" [96] (p. 77). Such themes emerged through participants' concern that green redevelopment would unrecognizably transform the two study communities. Therefore, residents' perceptions of urban ES, such as those offered by this study, are particularly critical in vulnerable, socio-economically disadvantaged communities, where strategic, encompassing, and environmental justice-minded urban planning may counter coincident gentrification or the perpetuation of environmental injustices [85].

For historical reasons, St. Louis has been plagued by depopulation and significant disinvestment as political will and economic capital have flagged over the decades. Within such conceptual and physical voids, vacant lots remain. Thus, green development and the rehabilitation of vacant land in the city have been seen as a potential solution for urban revitalization. Curran and Hamilton [9] lambasted policymakers and urban designers in their seminal article for choosing "who gets to decide what green looks like" (p. 1027). Green development does not always satisfy the "image of the city" that communities near such developments may hold. Traditional images of cities involve bustling business districts and vibrant, fully populated neighborhoods. This viewpoint was reflected by participants' reference to residential and commercial development in attracting social and economic activities to their communities. However, planning could meet environmental health goals without initiating green gentrification if residents were activated to push for urban greening project strategies that benefited themselves and members of the industrial and working classes [9]. Likewise, despite the well-documented benefits that could be provided by urban greenspace for the vacant lots in both study communities, this analysis identified a lack of greenspace that delivers cultural ES as an inequity of primary stakeholder concern. Specifically, participants talked about not having the same quality green spaces that other communities have across the city. Some recent research [97] suggested potential urban sustainable development strategies that might aid the city of St. Louis' efforts to reduce inequalities between different parts of cities, including the 15-min city concept, for which locals can access life essentials (such as green spaces for recreation and socializing) at distances that take no more than 15 min to walk, cycle, or transit [98]. City planners

might also consider the concept of Crime Prevention Through Environmental Design (with measures of natural access control, natural surveillance, and territorial reinforcement), which has been found effective in reducing crimes and fear of crimes in cities [99].

4.4. Limitations and Future Research

As part of a larger study, this study re-examined interview data focused on a related topic. Although doing so helped reduce the burden on overly studied communities for the larger study, the use of this already-collected data from the larger study limits the possibilities for the authors to ask new questions or to follow up with participants regarding their answers. For example, many residents noted that they were involved in urban greenspace planning meetings, even though questions were not directly asked about this. Although that topic was of interest to this analysis, we were not able to ask respondents to elaborate further on the processes of planning/meetings/decision-making. As such, future research may consider collecting primary data on resident involvement, as well as perceptions of specific green project options such as community gardens [32]. Furthermore, study participants reflected a higher portion of White and older residents than demographics of the two neighborhoods, which may imply potential differences in residents' willingness to engage in research and with the study team. Additionally, while this study focused on homeowners, it is postulated that renters are more likely to be displaced by gentrification [100], and thus, future research could focus further recruitment on residents who are renters.

As this study revealed connections between ES and EJ, which has only recently received attention in the literature [47,63], it is suggested that future research should further explore the association between these two aspects more closely. Furthermore, this study mainly focused on residents' perspectives related to green development in St. Louis. It will be worthwhile for future research to include other shrinking cities in different regions across the U.S. or even different geographic or cultural contexts, especially in fast-urbanizing countries such as India and China [101] regarding ES preferences and environmental justice issues. Apart from the traditional interview and survey approach, it would also be interesting for future studies to explore residents' perceptions of urban greenspace as reflected on social media via comments and photos using the big data approach [102], providing broader involvement while retaining a lower burden on this heavily researched population. Additionally, given the spatial nature of urban greenspace and EJ and the suggested capacity of Public Participation GIS (PPGIS), future research might consider integrating PPGIS in engaging community residents, as key stakeholders of local development [103,104] in their interview participation, which could shed light on future urban greenspace planning efforts.

5. Conclusions

Our study reveals that residents recognized the ES provided by greenspaces in their neighborhoods, with a prevailing sense that urban environments are ultimately "for people". Consequently, some residents felt that urban greenspace should primarily serve human needs, and cultural ES, such as recreation and social interaction, were frequently emphasized. Importantly, the interaction between ES and EJ highlights how these concepts contribute to ecological and social well-being in urban areas. To achieve distributive, procedural, and interactional justice, it is essential for greening projects to incorporate community preferences for ES while addressing concerns about EDS, such as safety, property values, and neglect. Additionally, challenges such as displacement resulting from green gentrification must also be carefully mitigated. The well-being of urban residents depends not only on the presence of greenspaces but on ensuring that the types of ES provided, as well as how these projects are communicated, meet community needs. Urban greening, while often seen as a solution for addressing complex challenges in shrinking cities, is not a one-size-fits-all remedy, particularly when responding to environmental injustice. This study's findings emphasized that both the type of greenspace and the specific ES provided

require nuanced consideration. These insights could guide future urban greening projects in shrinking cities, ensuring that the social–ecological needs of communities are addressed.

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