

Shading Urban Heat: Exploring Public Perception
and Design Preferences for Urban Green Spaces

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Abstract:

Urban heat islands (UHIs) pose significant challenges in urban environments, exacerbated by the scarcity of urban green spaces (UGSs). This research investigates public perceptions and preferences regarding UGSs and their role in mitigating UHIs. Survey results indicate limited familiarity with UHIs but strong engagement with UGSs, despite gaps in understanding broader environmental benefits. In-person interviews underscored the importance of convenience, accessibility and productivity-oriented amenities in UGS selection. A follow-up survey emphasized functionality and natural elements in UGS design, with minimal consideration for sustainable features. While respondents acknowledged UGS benefits, there was a disconnect between understanding and practical application of the concepts. Targeted educational efforts are needed to enhance public awareness of UHIs and UGSs, along with considerations for sustainable design practices to encourage involvement with green space planning that attracts users.

Keywords: Urban Heat Islands, Urban Green Spaces, User Engagement, Accessibility, Sustainable Design, User Trends

Introduction:

In urban environments, particularly in arid regions like Arizona, a significant concern arises from the abundance of impervious surfaces—those that allow little to no water infiltration—and the scarcity of urban green spaces. Impervious surfaces, such as concrete and asphalt, prevent natural water infiltration and exacerbate the urban heat island effect (UHI). UHI is characterized as a phenomenon where “urban areas experience higher temperatures compared

to their surrounding non-urban areas” (Rizwan, 2008). This is due to the use of materials that are highly efficient in absorbing and radiating heat from the sun, such as concrete and metals. Impervious surface area (ISA) is the most significant variable that contributes to Land Surface Temperature (LST) variance, or UHI effect. ISA refers to built-up areas, pavements and roads and the darker ISA’s such as asphalt that “decrease the amount of albedo of Earth’s surface and increase LST” (Morini, 2016). Albedo is the reflectivity of a surface, and it is typically measured as a percent ranging from 0-100%, 0 being complete absorption, no reflection and 100 being complete reflection and no absorption. “ISA is the primary driver for increase in temperature explaining 70% of the total variance in LST” (Imhoff, 2009). This phenomenon not only compromises human comfort but also escalates energy consumption for cooling purposes, exacerbating environmental challenges. The scarcity of urban green spaces, or areas with high vegetation, including parks, gardens, meadows, green patios or green roofs, further amplifies this effect.

The scope of the identified problem extends beyond local boundaries, encompassing regional and global implications. The negative consequences of the UHI effect are not confined to specific states or climates, but are pervasive challenges that extend to urban environments worldwide. While UHIs affect cities worldwide, “vulnerability to heat is not equal for all city residents. Risk is increased by degree of exposure to heat (eg, living in heat island neighborhoods, lack of tree cover, lack of air conditioning, living on upper floors of buildings, and working outdoors), susceptibility (young and old people and those with low education attainment, ill health, or lacking adequate healthcare), social isolation, and a lack of material resources” (Tong, 2021). These factors are important to consider because a city might not be more susceptible to UHIs just because it’s in a warm climate but additional factors could put one

user group at higher susceptibility than another user group. Another study found that “the effects of heat on mortality were higher in cities with a higher level of inequality, higher exposure to air pollution, fewer green spaces, and lower availability of health services” (Tong, 2021). In the last 30 years, there have been several severe heat waves that have resulted in the deaths of thousands of people, such as the 2003 European heatwave and the 2018 Japan heatwaves. “One study reported that the UHI effect accounted for over 50% of the total heat related mortality in the West Midlands, UK, during the 2003 heatwave. Another study indicated that vulnerable populations (such as elderly people and those on low incomes) are often concentrated in areas where the heat island effect is highest” (Tong, 2021). As climate change becomes a more prominent aspect of our lives and we face increasing global temperatures, it’s important that we consider the possibilities of sustainable and innovative solutions to mitigate UHIs.

Given the widespread impact and urgency of addressing UHIs, exploring sustainable and innovative solutions becomes increasingly imperative. “Unplanned urbanization, and conversion from green to gray structures have damaged natural environmental resources” (Jabbar et al., 2021). The potential of using vegetation cover, green roofs, living walls and other landscape design methods to cool residential and commercial buildings and reduce energy consumption remains a subject of interest. The cooling effect of vegetation “results from remitting less energy due to evapotranspiration in tandem with cutting down short-wave radiation” (Kim, 2014). Although air temperature measurements may not be an effective method of data collection for this study, “air temperature-based studies have found that green space can be 1–3 °C, and sometimes even 5–7 °C, cooler than surrounding built-up areas” (Chow et al., 2011; Spronken-Smith & Oke, 1998; Upmanis et al., 1998). With a conscious design implementation, urban green spaces can assist their environment by “negating urban heat, offsetting greenhouse

gas emissions, and attenuating storm water, while also providing urban residents spaces for physical activity and social interaction and allowing psychological restoration to take place.” (Lee et al., 2015). Green spaces in cities can strengthen surrounding ecosystems by limiting floods and erosion and binding CO₂; reducing smog and ground-level ozone (Figure 1). Urban heat islands can be schematically visualized as peak temperatures in urban centers and lower temperatures found away from the urban center where more vegetation may be located (Figure 2).

To address the escalating concern of UHIs and contribute to sustainable urban development, this research aims to explore how residents currently perceive urban green spaces and how strategically designed green spaces can impact user experience. Understanding public perception on urban green spaces and user preferences is crucial for informing design decisions aimed at mitigating the negative effects of UHIs. Despite the increasing prevalence of green space construction, there remains a significant number of projects that become underutilized, as exemplified by the London Green Belt, where “green spaces are avoided by people due to poor management that have made them less accessible and attractive to be in. Residents may feel insecure and fearful of crime in unmanaged green spaces with short view distances. So called ‘boundary parks’, located between vastly differing neighborhoods, are particularly susceptible of being underutilized which in turn can contribute to the decline of parks” (Colding, 2020). This underscores the need for not only recognizing the challenges but also exploring innovative solutions to ensure the effective utilization of urban green spaces.

Urbanization, a global phenomenon characterized by the rapid expansion of people and cities, brings forth a myriad of challenges, including the exacerbation of the UHI effect in metropolitan environments. In addition to exacerbating emissions, “a city devoid of quantity and

quality Urban Green Spaces (UGS) becomes a concrete jungle or a polluted city vulnerable to calamities, behavioral vices, and low livability index. UGS provides benefits to the city that helps mitigate these negative effects” (Ridder, 2004; M’Ikiugu et al., 2012). The justification for investigating UGS and public perception lies in their multifaceted benefits. Beyond their role in offsetting greenhouse gas emissions, green spaces are captivating getaway spaces that enrich urban landscapes. While existing research has explored the potential benefits of passive cooling through vegetation in urban areas, there remains a notable gap in understanding the specific design principles that enhance public appeal and maximize societal benefits. Recognizing the multifaceted factors shaping the use and perception of urban green spaces underscores the importance of adopting well-informed strategies for constructing green infrastructure globally. As more attention is directed toward a sustainable future, it is imperative to identify the elements that draw people to green spaces and understand public perception. Analyzing public attitude and user trends could inform building regulations and urban planning divisions, ultimately inspiring thoughtful design considerations that foster resilient and usable urban environments.

Purpose of the Study/Research Questions:

The purpose of this study is to delve into public perception of urban green spaces and their role in mitigating urban heat island effect. The report seeks to explore people's comprehension of urban green spaces and their benefits, while simultaneously examining how people interact with UGS and what features they are attracted to. By exploring individual's tendencies and identifying valued elements, this research seeks to provide insights that inform the design process of future urban green spaces. The research conducted will assess public awareness and opinion, desired elements, educational needs and potential disconnects regarding

urban green spaces, ultimately contributing to the sustainable development of urban areas through informed green infrastructure design.

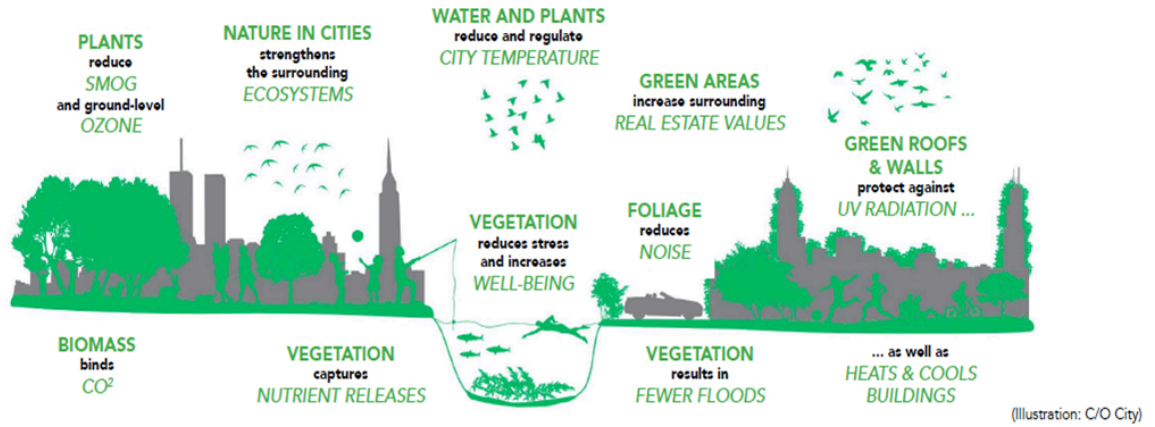


Figure 1. Benefits of green infrastructure (C/O City, 2020).

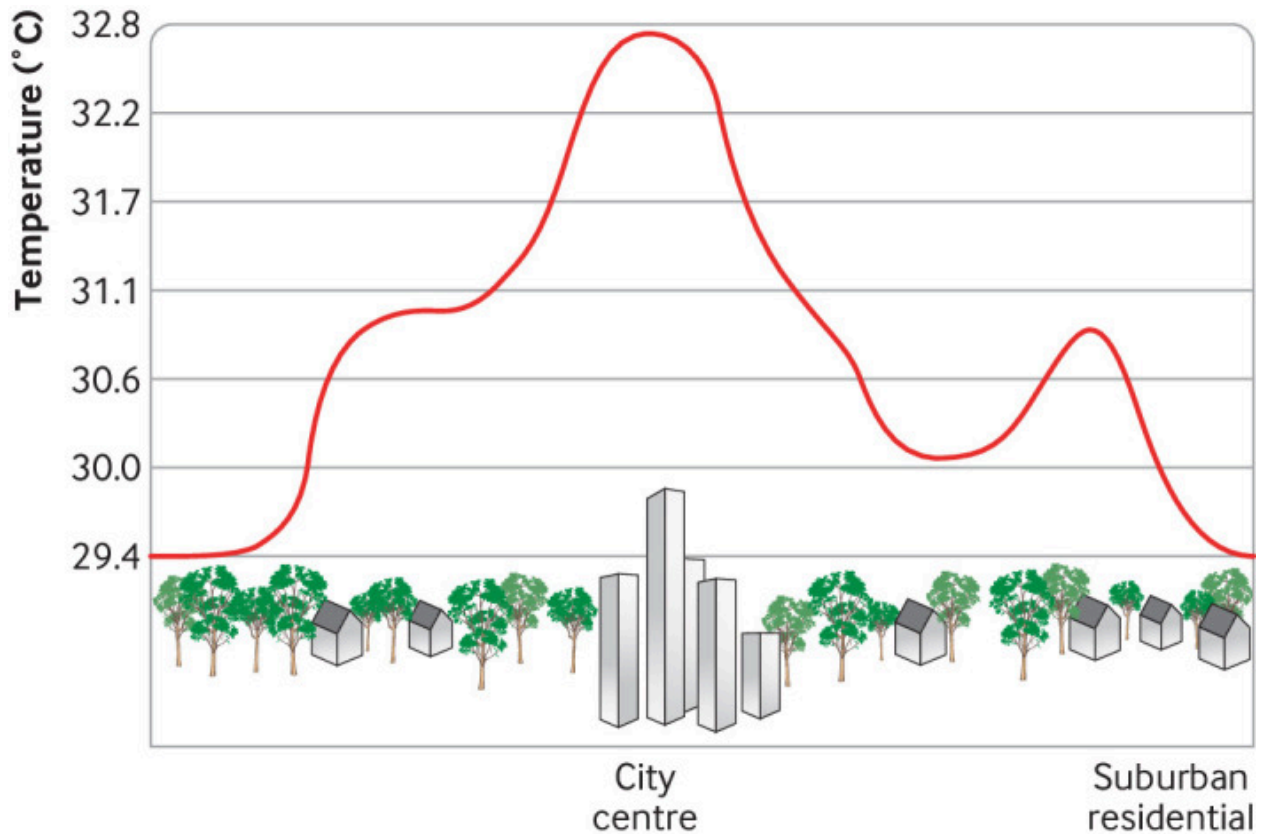


Figure 2. Schematic profile of urban heat island effect (Tong, 2021).

Methodology:

This research revolves around analyzing public perception of urban green spaces and identifying features that attract users. The study is designed to investigate the following objectives and research questions through surveys, interviews and literature review:

- 1. Public Awareness of Urban Green Spaces:** Assess the level of public awareness regarding urban green spaces (UGS) and their familiarity with associated benefits and terminology such as “urban green space” and “urban heat island”. This involves exploring how much individuals associate cooler air temperatures with urban green spaces.
- 2. Perceptions and Desired Features of Urban Green Spaces:** Delve into the benefits commonly associated with urban green spaces and identify the specific elements that users seek when selecting an urban green space to spend time in.
- 3. Educational Needs and Disconnects:** Identify key knowledge gaps and disconnects in public understanding of urban green spaces and urban heat islands. Understand where educational efforts are needed to bridge these gaps in knowledge.

Research Design:

The study employed mixed methods to answer these research questions. Qualitative data was gathered through surveys, site visits, and interviews with UGS users. The research design aimed to provide a comprehensive understanding of user preferences and trends, while also analyzing current perspectives and societal disconnects regarding urban green spaces. Because

the phenomenon of UHI is not constrained to one location, collecting data from around the United States was particularly important. A nine-question survey was assembled and distributed to college-aged students around the United States via social media. With the study being conducted on the University of Arizona campus, it was most viable to target college students to get a large number of participants. Social media was an easy and effective method to reach the targeted demographic. The initial survey intended to gather information on the public's knowledge surrounding urban green spaces and associated terminology. Some questions aimed to learn more about people's understanding of UHI effect and UGS. Other questions asked participants about their behaviors, how often they visit local green spaces and what kinds of benefits they typically associate with urban green spaces.

Following the initial survey, in-person interviews were conducted to gather more input about UGS users' experience in order to identify additional points of interest, such as their willingness to visit UGS' and design elements they enjoy. Four participants were encountered at the Environment and Natural Resources 2 (ENR2) building on the University of Arizona campus, as well as one participant in Mansfield Park in Tucson. The ENR2 building stands out as an exemplary urban green space and an ideal location for in-person research and interviews. Its sustainable design features include a green roof, living walls, native landscaping, and a rainwater harvesting system. Moreover, ENR2 serves as a vibrant hub for interdisciplinary collaboration between students, professors and researchers. In selecting participants for in-person interviews, an observational approach was utilized. Individuals who were actively engaged in a range of activities were chosen, ensuring diversity across disciplines and perspectives. Five participants were approached and volunteered to take part in the interview, providing valuable insights into their experiences and perceptions of the green space. The interview consisted of

seven questions, such as how often they frequent the space and what brought them to that location that day. Participants were asked how far away they live, which established if there may be a convenience or proximity factor in their visit. Other questions asked what type of activities they like to engage in when in these spaces and if there are other green spaces that they frequently visit for the same reasons. The final questions aimed to learn what design and layout characteristics of the space appeal to them, as well as if there's anything they would change about the space to improve it.

Participant Profiles:

Participant #1: College aged female studying in the Environment and Natural Resources 2 Building. The participant revealed that they're a regular visitor, as she has class in the building and only lives five minutes walking distance away. She enjoys coming to the building early to do classwork in the green space. They appreciate the plants and that it feels outdoors while also covered and protected. She also mentioned the convenience of being able to plug in her laptop while working outside. She wishes it was easier to locate restrooms.

Participant #2: College aged female taking photos in the Environment and Natural Resources 2 building. The participant noted that she's an architecture student and she was there photographing for an assignment. It was not her first time in the building, and she noted she had first seen the building on a visit to the school and later walked through it. She lives 20 minutes walking distance from the building and goes there to walk and take photos and to study. She loves the plants and the beauty of the building and didn't have suggestions to improve the site.

Participant #3 and #4: College aged male and female having lunch in the Environment and Natural Resources 2 building. Daily or every other day visitors. One participant was a

graduate student in the building, and the other participant stated that they work in the Gould-Simpson Building next door. They frequent the area often on their breaks to chat with friends and/or get lunch at the Slot Canyon Cafe. They love the plants and believe the Slot Canyon is a cool building to spend time in on campus. They also noted the wildlife, particularly the snails that climb the concrete walls of the building after it rains. They each must drive 20 and 25 minutes to the site from their homes. They had no suggestions to add.

Participant #5: Adult male walking dog in Mansfield Park, Tucson. He frequents the area every day or other day for many recreational reasons as it's only a five-minute walk from his home. He appreciates having a large field space with recreational amenities such as the playground, baseball diamond, and basketball courts. He stated he takes his kids there often, as well as his dog. The kids enjoy having a large space to run and bicycle around in and the playground and basketball court are fun additions. His only suggestion was the possibility of adding more light fixtures for nighttime activities.

In the follow-up phase of the research project, attention was directed towards formulating a second online survey designed to delve deeper into emergent trends observed during the in-person interview. Of particular interest was the exploration of how functional amenities and considerations of convenience might influence individuals' perceptions and usage of such spaces. Questions intended to learn more about factors influencing a user's willingness to travel to a UGS, as well as variables affecting their length of stay. Questions were designed to identify elements that individuals prefer when choosing a green space to spend time in. A particular question provided participants with two photos of two very different urban green spaces and asked them which they would prefer to spend their time in. The first photo depicted a leisure space with comfortable lounge chairs and minimal table space for productivity and aimed to

capture preferences for relaxation and socializing. In contrast, the second photo depicted a study space with ample seating and table space conducive to studying, along with visible charging stations for laptops, emphasizing productivity-oriented features. Another question gave participants the freedom to describe their own hypothetical design for an urban green space. These exercises provided valuable insights into how individuals prioritize different aspects of green spaces, gauging participants' preferences and perceptions regarding the balance between leisure and productivity-oriented amenities within such environments. Moreover, analyzing participants' responses allowed for a deeper understanding of the factors that contribute to the attractiveness and effectiveness of UGS in meeting diverse needs and preferences. These findings inform the broader research objective of investigating the role of functional amenities and convenience in shaping individuals' perceptions and experiences of urban green spaces. Through this research, design strategies that enhance the usability and enjoyment of urban green spaces can be better understood.

Research Results:

About 65% of respondents claimed that they were not familiar with the concept of UHIs. This reveals a significant gap in understanding among respondents regarding a critical environmental phenomenon. Only 18% were not at all familiar with the concept of UGSs. However, 27% of respondents indicated that they had heard of the concept but were unfamiliar with it, suggesting that the average park goer isn't as familiar with UHI or UGS as expected. Around 71% of respondents were still visiting their local green spaces weekly or monthly. One question also prompted participants to select all the benefits they associate with UGS, yielding noteworthy responses. The most common answers were the space's beauty and improved mental

well-being, which received 41 selections each, indicating that 91% of respondents associate these factors with local urban green spaces (Table 1). Other response options, while equally important, were selected less frequently. It's worth noting that the two responses with the least selections were reduced energy consumption and cooler air temperature. However, in a later question assessing participants' ability to predict air temperatures in a green space, 87% of participants selected the correct answer (Figure 3). This suggests that while respondents understood the concept of green spaces lowering air temperature, they did not readily associate cooler air temperatures with urban green spaces in the earlier question that asked about associated benefits. This outcome suggests that respondents possessed a basic understanding of the potential benefits of UGS but struggled to fully connect the concept with all its implications. In the survey, responses regarding attitudes towards green initiatives revealed a spectrum of concern regarding water consumption. While some participants expressed support or the need for more information, a notable portion displayed minimal concern (Figure 4). This observation highlights a potential gap in understanding, as respondents readily endorsed green initiatives with little deliberation, yet a significant portion expressed minimal concern regarding water consumption. While it was encouraging to observe a majority of respondents regularly visiting green spaces, the results exposed a disconnect between the perceived benefits of urban green spaces and the awareness of their broader implications, such as reduced energy consumption and cooler air temperatures. Responses highlighted the need for targeted education and awareness campaigns to promote sustainable practices, showcasing how green spaces not only draw residents but also offer eco-friendly attributes. These findings highlight the ongoing need for initiatives aimed at enriching public comprehension and involvement in sustainability endeavors.

The following in-person interviews provided valuable context and insights into UGS visitors' tendencies and behaviors. Participants varied in their frequency of visits, with some being more regular visitors than others. Activities engaged in included studying, capturing photos, socializing, having lunch, and dog walking. Participant #2 expressed her gratitude for an outdoor space that has a place to plug her laptop in, suggesting that she desires a place that enables her to be productive. Participants did have a couple of suggestions for improvements, such as more obvious restroom locations or signage, more seating space and improved nighttime lighting. Four out of five participants reported that they were there due to having other obligations nearby. The one participant who did not have to be in the area at a nearing time, was there to take photos of the rainwater collection basins for an architecture project. This revealed that the participant still had a reason to come to the area, while also appreciating the sustainable water harvesting features of the ENR2 building. All Participants in ENR2 expressed appreciation for the aesthetics and plant life in the Environment and Natural Resources 2 Building, particularly the living walls, which are vertical gardens growing on the interior walls of the building from floor to floor. Participants #3 and #4 noted specific conditions they enjoy to observe in the green space, such as after it rains when snails come out of the gardens to climb up pieces of wall. Multiple participants also mentioned how they enjoyed that the building feels both enclosed and outside, perhaps because it provides more protection from entirely outdoor conditions. Notably, participants in the in-person interviews highlighted the appeal of functional amenities such as outdoor power outlets for laptop use and the presence of a cafe with adjacent seating and restrooms at the ENR2 building. Suggestions for enhancing convenience, including the addition of more tables and improved signage indicating restroom locations, were also noted. Similarly, feedback from a park goer at Mansfield Park underscored the importance of

convenience with their recommendation for increased nighttime lighting. While it must be understood that no interview questions prompted participants to talk about the environmental benefits of UGS, there was no mention of any benefits other than the aesthetics of the vegetation.

Previous findings were considered when curating questions for a follow-up online survey. The second survey received 45 responses, the same number of responses as the first survey but not all from the same people. Because the quiz was distributed on the same social media account, it's likely that many of the same people participated in both the first and second online survey but the quiz was conducted anonymously so this cannot be confirmed or denied. A majority 42% of respondents reported that they travel on average 0 to 0.5 miles to visit a UGS, revealing that people are more likely to travel to a green space that is close to them in proximity. This observation suggests that the convenience of location significantly influences an individual's willingness to travel to a UGS. Another question revealed that a majority 42% of participants spend an average of one to two hours in a UGS when visiting. An additional 36% of respondents reported an average stay duration ranging from 30 minutes to one hour, with fewer votes received for durations less than 30 minutes or exceeding two hours. Another exercise presented participants with a choice between two images of UGSs, with no further context. The first image portrayed an outdoor UGS situated on a rooftop in a bustling city. It featured minimal shade, lounge seating and minimal tabletop space, suggesting an ambiance more associated with relaxation. The contrasting photo depicted a more enclosed UGS reminiscent of a library or a quiet study space. This image contained ample seating and shade, computer tables and visible wall outlets, evoking an atmosphere geared towards productivity. Among the 45 participants, 65% of respondents opted for the image associated with productivity.

A set of three free response questions was included in the follow-up survey to identify key elements that draw people to visit UGSs. The number of occurrences of varying responses were recorded to identify relevant themes. In the first open-ended question, participants were prompted to describe reasons why they might visit a UGS, revealing the most commonly cited reasons to be seeking fresh outdoor air, benefitting from improved mental health, enjoying greenery and utilizing the space for working or studying. Data indicates that many individuals enjoy completing work-related tasks in a quiet space while also reaping the health advantages of outdoor environments. The following question asked participants to list factors that influence their duration of stay when visiting a UGS, allowing them to identify as few or as many factors as they deemed relevant. Factors influencing length of stay with the leading number of occurrences, included schedule availability, weather conditions, crowd levels, and available activities. Charging availability, accessibility, and workload were each mentioned twice. This trend implies that individuals may actively seek conveniently located green spaces to accomplish work-related tasks. The final open-ended question asked participants to describe the components they would incorporate into a hypothetical UGS design of their own. Participants indicated their most desired feature to be an abundance of plant material. Other components frequently mentioned included a fairly balanced distribution of individuals emphasizing open and spacious areas and another group favoring private and enclosed spaces. Additionally, seating and shade availability were commonly cited, suggesting a desire for comfortable areas conducive to activities like picnicking or studying, possibly implying the desire for tabletop space. One component deserving of attention is charging availability, which was mentioned in only three instances. It is worth noting that one participant expressed interest in incorporating “hidden or camouflaged outlets for computer charging.” This observation underscores the importance of

accommodating productivity needs while preserving the natural ambiance of the environment. Besides the suggestions for native plants, rain harvesting emerged as the sole response related to sustainable design features, revealing a limited consideration for comprehensive environmental impact in design choices. The findings from the analysis of participant responses shed light on key preferences when it comes to UGS design. The data emphasizes the significance of factors such as seating and shade availability, charging accessibility, and the inclusion of natural elements to enhance the overall user experience. These insights are valuable for planners who aim to effectively meet the diverse needs and preferences of urban residents.

Table 1. Distribution of Perceived benefits of urban green spaces.

#	Answer	%	Count
1	Improved air quality	66.67%	30
2	The space's beauty	91.11%	41
3	Cooler air temperature	35.55%	16
4	Reduced energy consumption	35.55%	16
5	Improved mental well-being	91.11%	41
6	Improved Physical health	64.44%	29
7	Promoting social interaction	55.55%	25
8	Improving environmental biodiversity	64.44%	29
9	Other (please specify)	4.44%	2

7.) There are two outdoor spaces in identical locations of the same city constructed primarily with concrete. One has heavy vegetation and landscaping and one does not (you can assume this is the only difference). The space with no vegetation has an air temperature of 94°F, what do you

think might be a realistic expectation for the air temperature of the space with heavy vegetation and landscaping?

#	Field	Choice Count
1	60° F	11.11% 5
2	89° F	84.44% 38
3	98° F	2.22% 1
4	110° F	2.22% 1

Figure 3. Distribution of predicting urban green space air temperature.

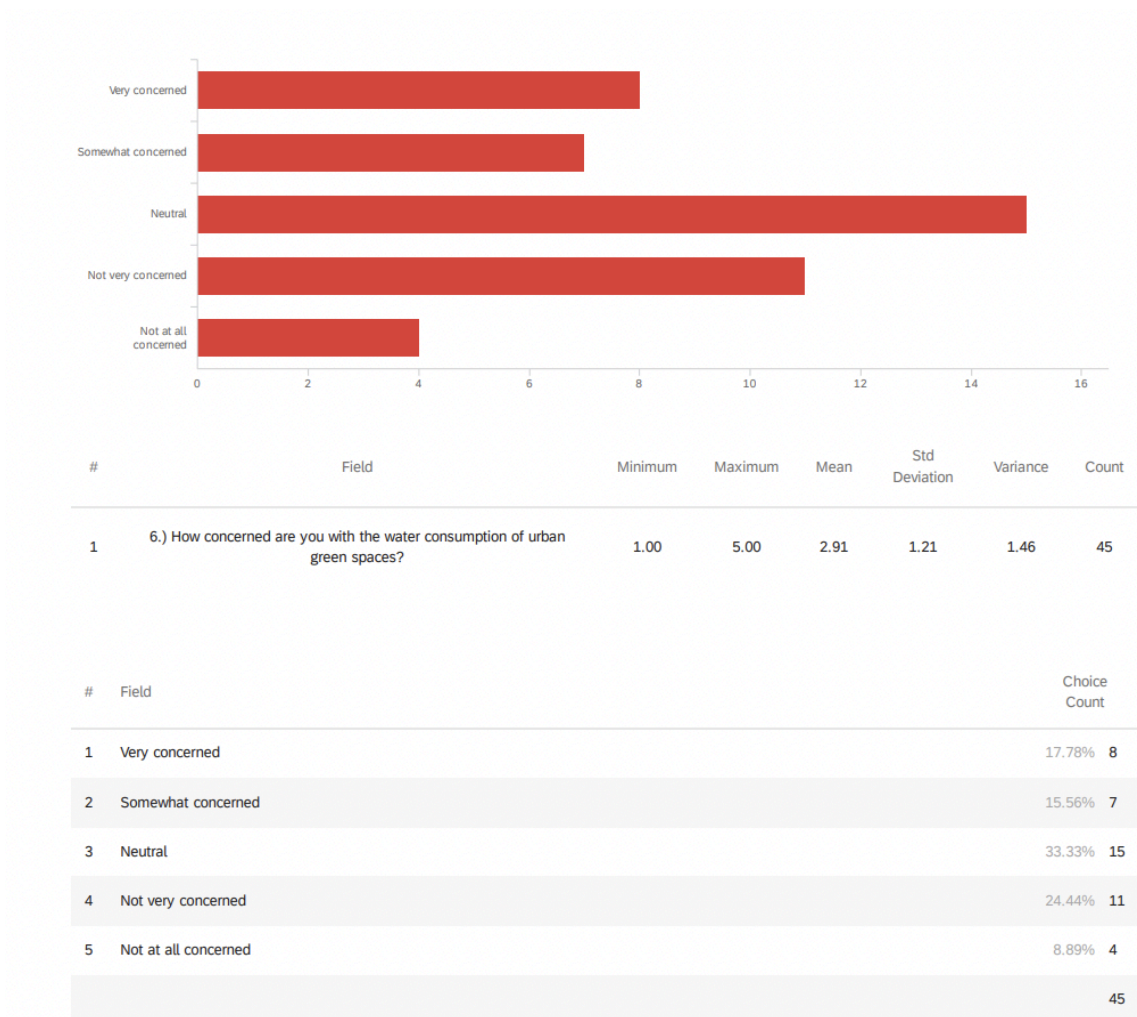


Figure 4. Distribution of water consumption concerns.

Discussions:

The research findings shed light on public behaviors, opinions and preferences regarding urban green spaces and their implications for mitigating the UHI effect. Survey results revealed limited familiarity among respondents regarding associated environmental phenomena. This knowledge gap highlights the need for targeted educational efforts to increase public awareness of UHIs and their impacts on urban environments. Similarly, while respondents generally expressed familiarity with the concept of UGSs, there were still notable gaps in understanding, particularly the broader environmental benefits associated with these spaces. Additionally, the inconsistency between respondents' ability to associate cooler air temperatures with UGS in a predictive context but not in general perceptions suggests a disconnect between understanding and practical application. Despite this, the majority of participants reported regular visits to local green spaces, indicating a strong interest and engagement with these environments.

In-person interviews provided further context into UGS user behaviors and preferences. Interview participants highlighted the importance of convenience and accessibility in their choice of UGS, with closer proximity to where they need to be significantly influencing their willingness to visit. Additionally, elements linked to productivity received more consideration, such as seating and tabletop availability, shade, privacy and access to Wi-Fi and wall outlets. These elements were identified as key considerations impacting one's willingness to visit a UGS, as well as their length of stay. The findings from the follow-up survey reinforced the significance of these factors, with respondents expressing a preference for UGS designs that prioritize functionality, natural elements and elements associated with productivity, while simultaneously

neglecting consideration for sustainable design features. This suggests a potential opportunity for planners and designers to incorporate more sustainable elements into UGS designs, such as rainwater harvesting systems, native plantings, energy capturing systems and positive drainage. The multifaceted nature of urban green spaces emphasizes the importance of considering diverse user needs and perspectives in urban design. By understanding these user relationships with UGSs, designers can develop more inclusive and sustainable green spaces that enhance urban livability.

Conclusions:

The study revealed a strong interest and engagement with UGSs among participants, despite notable gaps in understanding regarding associated environmental phenomena. Key findings include the relevance of convenience and accessibility, alongside factors such as seating and shade availability and access to amenities, which play critical roles in attracting users and affecting duration of stay. Additionally, the research identified the need for targeted educational efforts to increase public awareness of UHIs and their impacts on urban environments, with UGSs serving as a potential mitigation tactic. By considering the diverse perspectives and needs of contemporary users, the construction of more sustainable green spaces can be guided by informed decision making and practices.

Limitations:

Limitations were encountered during the in-person interview phase of the study. It would have been ideal to interview subjects at various locations across Tucson. However, unforeseen weather conditions led to a limited number of subjects utilizing urban green spaces on the chosen interview day. This still made for a compelling study, as subjects located at the Environment and Natural Resources 2 Building on the University of Arizona campus were analyzed more closely.

While the information gathered from in-person interviews was enough to inform a subsequent survey, conducting more in-person interviews across a wider range of urban green spaces would have provided additional insights. Another limitation was the unequal distribution of participants across states. There was particularly high representation from Arizona, Washington and California, which may have skewed the results by overcompensating for trends that may be unique to specific regions. Given that individuals in different regions experience different climates and relationships with urban green spaces, conducting the survey on a website where people from across the nation can participate could offer a more comprehensive understanding of potential regional differences or similarities across the United States.

Future work:

Bringing this research to a larger scale is something that would greatly benefit the conclusions of this research project. While this study provided great insight into trends of college-aged students, many on the West Coast, there are many subject groups in the United States that were not represented. Quantitative data is another aspect of data research that could greatly benefit this research. Quantitative data may provide an analytical foundation for how green spaces may lower temperatures. Recording the number of visitations would also provide insight into the overall attraction and success of UGS in attracting visitors. A surface temperature reading of various conditions of urban green spaces could also prove useful for research, as temperature change in UGS could be quantified. With reliable land surface temperature reading devices, quantitative data results could help support the push for green initiatives by informing planners.

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