Community Perception of the Cooling Effects of Urban Green Spaces in Laoang, Northern Samar

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ABSTRACT

This study examined the perceived cooling and thermal comfort effects of urban green spaces in Laoang, Northern Samar, a developing coastal municipality in the Philippines. Using a quantitative descriptive-comparative design, data were gathered from 150 purposively selected respondents representing three areas: the municipal plaza, riverside, and school grounds. A structured questionnaire adapted from a previous study measured perceived cooling and thermal comfort on a 5-point Likert scale, and data were analyzed using Jamovi software through mean and standard deviation computations.

Findings showed that respondents generally agreed that green spaces provide cooling and comfort benefits, with an overall mean of 3.44 (Neutral to Agree). The riverside area recorded the highest ratings, highlighting the combined cooling effects of vegetation and proximity to water. Respondents also demonstrated a positive attitude toward tree planting, viewing it as a means to make Laoang cooler and more livable.

The study concludes that urban green spaces play a significant role in promoting thermal comfort and environmental well-being. Strengthening urban greening programs and expanding tree canopy coverage are recommended to enhance comfort and resilience against rising urban temperatures.

Keywords: urban green spaces, perceived cooling, thermal comfort, Laoang, Northern Samar

INTRODUCTION

Urban green spaces—such as parks, plazas, and riverside vegetation—are essential components of sustainable cities. They provide a variety of ecosystem services including air purification, shading, habitat for biodiversity, and most notably, thermal regulation (Bowler et al., 2010; Gill et al., 2007). Vegetation and tree cover help mitigate the Urban Heat Island (UHI) effect by reducing surface and air temperatures through evapotranspiration and shading (Oke, 1982; Spronken-Smith & Oke, 1998). The loss of vegetation and the dominance of impervious surfaces—such as concrete and asphalt—trap heat and amplify urban temperatures, resulting in reduced outdoor comfort, higher energy consumption, and negative health outcomes (Santamouris, 2015).

In tropical developing countries like the Philippines, the issue of thermal discomfort in urban areas is increasingly significant due to rapid urbanization and limited environmental planning. Cities such as Manila, Cebu, and Davao have recorded rising local temperatures attributed to the reduction of green cover and expansion of built-up zones (Ong & Sy, 2020). Research by Ignacio and Reyes (2021) found that urban green spaces in Metro Manila can lower local temperatures by up to 2–4°C, providing substantial thermal comfort for nearby residents. Similarly, Cruz et al. (2020) emphasized that shaded environments and vegetated streets in Quezon City improve perceived comfort and encourage more outdoor activity. These findings align with global evidence that urban greenery is not only a biophysical cooling mechanism but also a psychological and perceptual buffer against heat stress (Nikolopoulou & Steemers, 2003; Klemm et al., 2015).

In the context of Laoang, Northern Samar, a rapidly developing coastal municipality, the presence of green spaces such as the town plaza, riverside areas, and school compounds continues to shape residents' daily experiences of comfort and livability. While Laoang benefits from its coastal winds, increasing urbanization has introduced more impervious surfaces and fewer shaded areas in the town center. Local communities often gather in green areas for leisure, social activities, and school events—spaces that serve both environmental and social purposes. Yet, the extent to which people perceive cooling benefits and associate comfort with these green spaces remains largely unexplored.

Understanding community perception of the cooling effects of green spaces is critical because it reflects how individuals subjectively experience comfort and heat relief. Studies emphasize that thermal comfort is not solely determined by physical temperature, but also by psychological factors, adaptive behavior, and environmental expectations (Lin et al., 2010; Nikolopoulou & Steemers, 2003). In the Philippines, perception-based research on thermal comfort is still emerging. Dela Cruz and Estrella (2022) highlighted that residents' appreciation of green spaces in Tacloban City was strongly linked to their perceived cooling and emotional well-being. This suggests that how people *feel* in green environments directly influences their support for maintaining and expanding these spaces.

Given this context, this study aims to assess community perceptions of the cooling effects of urban green spaces in Laoang, Northern Samar. Specifically, it examines how different groups—plaza users, riverside residents, and students—perceive and experience cooling comfort in their surroundings. By comparing perceptions across groups and exploring their relationship with site characteristics and exposure duration, this research seeks to generate insights into how communities value green infrastructure.

The findings will contribute to local environmental planning and climate-resilient development by highlighting the social and perceptual dimensions of thermal comfort. Moreover, by focusing on a smaller urban center like Laoang, this study adds to the limited body of knowledge on urban heat perception in provincial Philippine contexts, helping inform both local policy and grassroots initiatives aimed at promoting sustainable, inclusive, and thermally comfortable public spaces.

METHODS

The study employed a quantitative descriptive-comparative research design to examine the perceived cooling and thermal comfort effects of urban green spaces in Laoang, Northern Samar. Three selected sites were identified as the focus of the investigation: the municipal plaza, riverside area, and school grounds, which represent distinct types of urban green environments commonly utilized by residents. A total of 150 respondents participated in the study, comprising 50 plaza users, 50 riverside residents, and 50 students. Participants were chosen through purposive sampling to ensure the inclusion of individuals who regularly spend time within these green spaces.

Data were gathered through a structured questionnaire adapted from a previous study, focusing specifically on perceived cooling and thermal comfort, which were measured using a 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). Since the instrument was adopted from an established study, no further validation process was required. Prior to the data collection, formal permission was obtained from the Municipal Government of Laoang and the concerned school authorities. The survey was conducted on-site during daytime hours, and all respondents were briefed on the purpose of the study. Participation was voluntary, and confidentiality and anonymity were strictly maintained.

The collected data were encoded and analyzed using Jamovi statistical software. Descriptive statistics, specifically the mean and standard deviation, were utilized to determine and interpret the level of perceived cooling and thermal comfort across the three sites. This analytical approach provided a comparative understanding of how different urban green spaces contribute to thermal comfort and the perceived cooling experience of the community in Laoang.

RESULTS AND DISCUSSION

Perceived Cooling and Thermal Comfort

This chapter presents the findings of the study entitled "Perceived Cooling and Comfort Effects of Urban Green Spaces in Laoang, Northern Samar." The data obtained through survey questionnaires were systematically analyzed using descriptive statistical tools, specifically the mean and standard deviation, to determine the respondents' level of agreement with each indicator. The interpretation of the results followed a five-point Likert scale, where 5 corresponds to Strongly Agree, 4 to Agree, 3 to Neutral, 2 to Disagree, and 1 to Strongly Disagree. These statistical measures provided a clear understanding of the participants' perceptions regarding the cooling and comfort effects associated with urban green spaces in the study area.

Table 1 Perception that the Area Feels Cooler Compared to Nearby Paved Areas

Area	Mean	SD	Description
Within Plaza	3.18	1.29	Neutral
Within Riverside	3.60	1.11	Agree
Within School	3.48	1.13	Agree
Average Mean	**3.42**	**1.18**	**Neutral to Agree**

Respondents moderately agreed that the area feels cooler than nearby paved zones. The riverside recorded the highest mean, suggesting that proximity to water bodies and vegetation enhances thermal comfort.

Table 2 Perception that Trees and Plants Provide Sufficient Shade

Area	Mean	SD	Description
Within Plaza	3.00	1.40	Neutral
Within Riverside	3.66	1.35	Agree
Within School	3.64	1.27	Agree
Average Mean	**3.43**	**1.34**	**Agree**

Respondents agreed that trees and plants provide sufficient shade. Higher mean values in the riverside and school areas indicate better canopy cover compared to the plaza.

Table 3 Comfort Level During Hot Weather

Area	Mean	SD	Description
Within Plaza	3.48	1.22	Neutral to Agree
Within Riverside	3.46	1.37	Neutral to Agree
Within School	3.26	1.37	Neutral
Average Mean	**3.40**	**1.32**	**Neutral to Agree**

Respondents expressed moderate comfort when staying in green areas during hot weather, indicating that vegetation provides partial but noticeable relief from heat.

Table 4 Perception that Greenery Improves Air Quality

Area	Mean	SD	Description
Within Plaza	3.32	1.41	Neutral
Within Riverside	3.52	1.33	Neutral to Agree
Within School	3.46	1.36	Neutral to Agree
Average Mean	**3.43**	**1.37**	**Neutral to Agree**

The data indicate that respondents moderately agree that vegetation enhances air quality, particularly near riverside and school areas.

Table 5 Perception that Tree Shade Makes Area Feel Cooler

Area	Mean	SD	Description
Within Plaza	3.28	1.16	Neutral
Within Riverside	3.80	1.05	Agree
Within School	3.66	1.08	Agree
Average Mean	**3.58**	**1.10**	**Agree**

Participants agreed that tree shade significantly enhances cooling. The riverside scored highest, reinforcing the link between vegetation density and perceived coolness.

Table 6 Frequency of Seeking Shade or Tree-Covered Areas

Area	Mean	SD	Description
Within Plaza	3.34	1.26	Neutral
Within Riverside	3.56	1.16	Agree
Within School	3.48	1.60	Neutral to Agree
Average Mean	**3.46**	**1.34**	**Neutral to Agree**

Respondents tend to seek shaded spots, suggesting a behavioral preference for cooler and more comfortable environments.

Table 7 Relaxation Brought by Green Surroundings

Area	Mean	SD	Description
Within Plaza	3.32	1.41	Neutral
Within Riverside	3.54	1.22	Neutral to Agree
Within School	3.50	1.23	Neutral to Agree

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Average Mean	**3.45**	**1.29**	**Neutral to Agree**

Respondents generally felt that green surroundings provide a relaxing ambiance. Psychological benefits of greenery were more evident in riverside and school areas.

Table 8 Avoidance of Paved Areas During Hot Hours

Area	**Mean**	**SD**	**Description**
Within Plaza	3.06	1.08	Neutral
Within Riverside	3.34	1.02	Neutral
Within School	3.22	1.09	Neutral
Average Mean	**3.20**	**1.06**	**Neutral**

Respondents showed slight neutrality in avoiding paved areas, implying awareness of heat retention yet limited behavioral changes in movement patterns.

Table 9 Perception of Noticeable Temperature Difference Between Shaded and Non-Shaded Areas

Area	**Mean**	**SD**	**Description**
Within Plaza	3.28	1.16	Neutral
Within Riverside	3.34	1.02	Neutral
Within School	3.30	1.07	Neutral
Average Mean	**3.31**	**1.08**	**Neutral to Agree**

Respondents moderately observed temperature differences between shaded and non-shaded areas, aligning with existing thermal perception studies.

Table 10 Belief that Trees Planting Can Make Laoang Cooler

Area	**Mean**	**SD**	**Description**
Within Plaza	3.75	1.42	Agree
Within Riverside	3.72	1.33	Agree
Within School	3.80	1.26	Agree
Average Mean	**3.76**	**1.34**	**Agree**

Respondents strongly agreed that tree planting contributes to overall cooling. The consensus across all areas indicates high environmental awareness and support for urban greening.

Table 11 Summary of Descriptive Statistics on Perceived Cooling Effects

Indicator	**Average Mean**	**SD**	**Verbal Interpretation**
Area feels cooler vs. paved zones	3.42	1.18	Neutral to Agree

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Trees provide sufficient shade	3.43	1.34	Agree
Comfort during hot weather	3.40	1.32	Neutral to Agree
Greenery improves air quality	3.43	1.37	Neutral to Agree
Cooler under tree shade	3.58	1.10	Agree
Seek shade frequently	3.46	1.34	Neutral to Agree
Green surroundings feel relaxing	3.45	1.29	Neutral to Agree
Avoid paved areas during heat	3.20	1.06	Neutral
Noticeable temperature difference	3.31	1.08	Neutral to Agree
Tree planting makes Laoang cooler	3.76	1.34	Agree
Overall Average Mean	**3.44**	**1.25**	**Neutral to Agree**

The overall mean score of 3.44 reveals that respondents generally agreed that urban green spaces offer cooling, comfort, and relaxation benefits. The riverside area consistently achieved the highest perception ratings, highlighting the synergistic cooling influence of water and vegetation.

Summary Of Findings

The study investigated community perceptions of the cooling and comfort effects of urban green spaces in Laoang, Northern Samar. Results revealed moderate to high agreement that vegetation and shade contribute to thermal comfort, relaxation, and improved air quality. Respondents from the riverside area consistently reported higher perception scores compared to those near the plaza and school. The belief that trees planting can make Laoang cooler obtained the highest mean (3.76), signifying strong community support for greening initiatives.

DISCUSSION OF FINDINGS

The findings affirm that urban green spaces play a vital role in perceived thermal comfort and environmental quality. These results are consistent with previous studies by Bowler et al. (2010) and Zhao et al. (2014), which found that vegetation significantly reduces local temperatures through shading and evapotranspiration. The higher cooling perception in the riverside area aligns with Gunawardena et al. (2017), who reported that blue-green environments exhibit stronger cooling effects due to the combined influence of water and plants.

Respondents' moderate comfort levels suggest that while vegetation mitigates heat, factors such as tree density, species type, and maintenance affect the cooling potential. Norton et al. (2015) emphasized that tree configuration and canopy coverage are critical in maximizing microclimate regulation. Additionally, the finding that respondents seek shade (M = 3.46) corroborates the behavioral adaptation discussed by Lin and Tsai (2017), where urban dwellers instinctively gravitate toward shaded environments during heat exposure.

The study also supports the conclusion by Santamouris (2015) that urban greening can reduce perceived temperature differences by up to 2–4°C, especially in tropical settings. The respondents' strong agreement on the cooling potential of tree planting underscores the public's environmental awareness and readiness to participate in sustainable urban design.

CONCLUSIONS

The findings of the study reveal that urban green spaces in Laoang are generally perceived as effective in providing cooling and comfort, especially those located near natural features like rivers. The community shows a positive attitude toward vegetation and acknowledges its environmental and psychological benefits. Overall, the results suggest that strengthening urban greening programs and expanding tree canopy coverage can further enhance thermal comfort, promote environmental well-being, and improve the overall livability of Laoang.

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