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Temporary cultural interventions in urban public spaces: sustainable design approaches for resilient communities in climate-sensitive areas

Interventi culturali temporanei negli spazi pubblici urbani: approcci progettuali sostenibili per comunità resilienti in aree sensibili al clima

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ABSTRACT AND KEYWORDS

Temporary cultural interventions in urban public spaces
In the context of the global climate crisis and the need for liveable and adaptable urban public spaces, this paper identifies cultural and creative events as essential prerequisites for creating resilient cities. Given their dynamism as 'social condensers' and 'urban animators', as well as their active role in addressing climate change, the paper emphasizes the need for cultural actions to develop environmentally conscious and climate-positive/adaptive approaches in order to maintain their liveability. Through an analysis of case studies, built on temporary cultural installations in outdoor urban spaces, the research explores emerging design tools for climate-sensitive cultural interventions. Drawing on records and interpretative information derived from online architectural and urban design platforms, the study identifies adaptive design tools that mitigate specific climate change effects, i.e. rising temperatures and UHI phenomenon. The findings highlight the potential of cultural interventions to shape sustainable microclimatic conditions through the application of resilient design strategies. These 'cultural/urban retreats' enhance the value of climate-degraded public spaces, sustaining participation, inclusivity and the well-being of communities.

Keywords: urban public space, climate change, temporary cultural installations, thermal adaptation strategies, resilient communities

Interventi culturali temporanei negli spazi pubblici urbani
Nel contesto della crisi climatica globale e della necessità di spazi pubblici urbani vivibili e adattivi, il presente contributo identifica gli eventi culturali e creativi come prerequisiti essenziali per la creazione di città resilienti. Dato il loro dinamismo come "condensatori sociali" e "animatori urbani", nonché il loro ruolo attivo nell'affrontare i cambiamenti climatici, il paper sottolinea la necessità che le azioni culturali sviluppino approcci consapevoli dal punto di vista ambientale e che siano positivi/adattivi al clima, al fine di mantenere la loro vivibilità. Attraverso l'analisi di casi di studio, relativi a installazioni culturali temporanee in spazi urbani all'aperto, la ricerca esplora gli strumenti di progettazione emergenti per interventi culturali sensibili al clima. Attingendo a registrazioni e informazioni interpretative derivate da piattaforme online di progettazione architettonica e urbana, lo studio identifica strumenti di progettazione adattivi che mitigano gli effetti specifici del cambiamento climatico, cioè l'aumento delle temperature e il fenomeno dell'Isola di Calore Urbano. I risultati evidenziano il potenziale degli interventi culturali per modellare condizioni microclimatiche sostenibili attraverso l'applicazione di strategie di progettazione resilienti. Questi "rifugi culturali/urbani" valorizzano gli spazi pubblici degradati dal clima, sostenendo la partecipazione, l'inclusività e il benessere delle comunità.

Parole chiave: spazio pubblico urbano, cambiamento climatico, installazioni culturali temporanee, strategie di adattamento termico, comunità resilienti

1. Introduction

1.1 Urban public space, culture, events, and climate crisis

Public spaces are vital constituents of urban environments. For this article, public spaces are defined as open areas within cities that are accessible to all individuals. In this framework, urban public spaces are regarded as shared places and key carriers of urban life, embodying a wide range of uses, expressions, and meanings while reflecting the diverse socioeconomic, cultural, and political dynamics and challenges of urban environments. Public spaces are social places (Jacobs, 1961; Kohn, 2004) in constant evolution. Lefebvre (1991), in his foundational exploration of the production of space, argues that public spaces are socially constructed through the interplay of their physical form, the representations attributed to them by planners and authorities, and the lived experiences and interactions of diverse users. Similarly, Kevin Lynch (1972) in his book *What time is this Place?*, emphasises the continuous transformation of public spaces driven by their users and the ways they engage with space. High-quality public spaces support a range of everyday needs, including necessary, optional and social activities (Gehl, 1987), are safe, comfortable and relaxing, and generate conditions for cultural exchange (Carmona, 2019). Cultural exchanges and interactions in public spaces can support meaningful connections between citizens, thereby strengthening social bonds and cultivating a sense of community and belonging, which are key elements for promoting an overall sense of well-being (Dines et al., 2006).

Moreover, beyond the social and collective benefits associated with the use of public spaces, a growing body of research highlights its positive impacts on the physical and mental health of the citizens. Well-designed public spaces encourage physical activity, reducing the risk of chronic illnesses (Boarnet et al., 2011) while, particularly green public spaces, play a significant role in enhancing mental well-being by improving mood, reducing the risk of depression and anxiety, and offering opportunities for relaxation and social interaction (Kondo et al., 2018). These environments also promote cognitive restoration and emotional well-being by providing calming settings that alleviate stress and foster meaningful social connections (McCay et al., 2017). While natural elements undoubtedly offer considerable benefits to individuals, the therapeutic potential of other forms of urban space, such as streets, markets, and plazas, lies "more in the shared elements of public space, in the social vibrancy of urban life and seeing other people" (Dines et al., 2006, p.26).

However, urban public spaces as receptors of intense pressures and charges, political, environmental and socio-economic, often become contested sites and fields of conflict (Mitchell, 1995). Here, the success of public spaces hinges on their ability to adapt to change and demonstrate resilience in the face of pressures (Carmona, 2019), which is closely linked to their inherent flexibility and capacity to accommodate diverse uses (Madanipour, 2017). This intertwined relationship between the needs of societies, urban life, and planning is encapsulated in the concept of the city introduced by the Situationist International, a movement that emerged in the aftermath of World War II, during a period of rapid economic reconstruction in Western Europe. The Situationists proposed the concept of a unitary urbanism and framed urban environments as participatory domains where inhabitants play an active role in shaping and transforming their urban space. They sought to challenge the dehumanising effects of capitalism, reclaiming cities as spaces for creativity, freedom, and genuine human interaction (Pinder, 2005). This concept continues to inspire activists, artists, and urban theorists seeking to

reimagine the relationship between people and their environments through culture and creativity.

In recent decades, *culture* - in all its multiple dimensions - is increasingly recognised in key documents as a critical factor for cities facing socio-economic and environmental imbalances. Its adoption as the fourth pillar of sustainable development, by the Hangzhou Declaration (UNESCO, 2013), next to economy, environment and society, reflects the international community's recognition of *culture* as a driving force and enabler for effective and sustainable solutions to current and future challenges, pointing the way towards a renewed development agenda. Additionally, both the revision of the *Work Plan for Culture* (European Union, 2020) and the European Commission's report (European Union, 2022) on the cultural dimension of sustainable development in EU actions, put culture at the forefront of any transformational path to current and future challenges.

UNESCO, in the *Universal Declaration on Cultural Diversity* (2001), defines culture as "the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs", This perspective highlights the multifaceted nature of culture and positions public spaces as vital arenas where these diverse dimensions converge, providing a fertile ground for cultural production, exchange, and innovation. Cultural events in public spaces are ephemeral expressions of culture, "social occasions" (Richards, 2020), that transcend their temporary nature, leaving lasting impacts on individuals and societies. Lefebvre's concept of the production of space (1991) highlights events' potential to influence people's perceptions, generating new spatial experiences and producing new spaces. In this context, events are not merely activities that occupy space; rather, they are key actors in the redefinition of its form and meaning. Despite their ephemeral nature, cultural events have the potential to become drivers for transformative change in urban life (Hall & Page, 2020; Lefebvre, 1991). They provide a breeding ground for the development of creative thinking and imagination (Landry, 2000; Evans, 2009), which in turn generates a multifaceted array of long-term positive effects for cities. (Light et al., 2019).

The contribution of events to social sustainability and citizens' well-being has been acknowledged in numerous academic papers and reports. These exceptional occasions, concentrated in time and space, provide opportunities for entertainment, socialisation and a temporary escape from routine, while encouraging self-expression and the acquisition of new lived experiences (Getz, 1993). Such moments of simultaneous engagement with space and others, usually under a shared purpose, create opportunities for new collective memories, which in turn foster a sense of belonging and identity (McClinchey, 2008; Jaeger & Mykletun, 2013), strengthen social ties among participants, promote cultural diversity (Lee et al., 2012; Hassanli et al., 2021), and enhance social cohesion (Blessi et al., 2016).

Events held in outdoor public spaces of cities have significant personal and collective value, as they motivate individuals to engage actively with their communities. Inclusive events in public spaces create the appropriate conditions for participation across all socio-economic backgrounds, thereby democratising access to cultural experiences (Derrett, 2003) and building bridges between different communities and cultures, thus promoting cultural inclusion (Quinn et al., 2021). The encounter between cultural action, citizens and public space serves to augment the social dynamics and transformative capacity of both culture and public space. The acknowledgement of this dynamic synergy, with its lasting positive effects on individuals and societies, has inspired experimental bottom-up and top-down

initiatives, resulting in a shift in urban design thinking and the advent of new development concepts such as ‘place-making’ and ‘eventful cities’.

Concurrently, in the context of unprecedented environmental disruption and the climate crisis, the role of culture is underscored as twofold. The IPCC report (2023) identifies human values, practices and behaviours as the primary drivers of greenhouse gas emissions and global warming, demonstrating both the cultural dimensions of the causes of climate change and the cultural dimension of the adaptive responses to climate-related risks. In 2014, the United Nations *Sustainable Lifestyles and Education Programme* (UN Environment Programme, 2014), launched with the aim of promoting and adopting sustainable lifestyles as the global norm at all levels and in different contexts, emphasises the necessity to change our worldview and value system, i.e. our culture. The role of cultural actions as drivers of change in this direction has been extensively acknowledged by scholars, key documents and policy initiatives. According to Light et al. (2019), the incorporation of creative practices into climate change mitigation strategies enhances citizens' motivation to engage in environmentally conscious behaviours, thereby facilitating long-term lifestyle change and broader societal transformation. The report *Culture and Climate Change* (World Cities Culture Forum, 2018) acknowledges the potential of cultural and creative activities in public spaces as a means of fostering awareness and educating the public. It identifies shared public spaces in cities as collaborative laboratories capable of accelerating cultural actions to address climate change by promoting public engagement in environmental development actions. Furthermore, the report illustrates the potential of these initiatives to inspire, influence and inform future policy agendas aimed at addressing environmental and climate challenges. Additionally, the *New European Bauhaus* (European Union, 2021), an interdisciplinary policy initiative of the European Commission, builds upon the potential of cities to act as hubs of innovation and creativity and promotes the development of cultural actions in their public spaces. The encounter of cultural participation in public space facilitates collaboration among citizens, experts, artists and institutions, thereby promoting the green transition, experimentation, co-creation, and connection while building sustainable and inclusive communities. Both *Culture and Climate Change* and *New European Bauhaus* highlight the significance of the use of outdoor public spaces in hosting cultural events/activities and generating new resilient processes for addressing climate change. Both promote the dynamic encounter of culture, public space and citizens in order to disseminate knowledge and shared learning, to stimulate new attitudes towards change, vulnerability, adaptation and mitigation.

However, the overarching concerns with regard to the loss of public space in cities, stemming from the broader crisis that characterises contemporary societies (Mitchell, 1995; Putnam, 2001; Zukin, 2010; Daniil, 2011; Athanassiou, 2017), are amplified by the impacts of climate change. The intense and long-lasting heat waves, which exacerbate the frequency of urban heat island (UHI), act as a deterrent to the inhabitation of open public spaces during summer and, thus, to the development of favourable conditions for socio-cultural interactions. Therefore, the degradation and 'crisis' of public space and social public life assumes a renewed concern in the context of climate change. The critical synergy between culture and public space is inevitably affected during summer, undermining their active role in sustainable development processes and in raising awareness and educating on climate issues and in mitigating the causes of climate change.

1.2 Objectives and research outline

Rising temperatures and the effects of UHI are exerting increasing pressure on all forms of expression in urban public spaces, often rendering them unusable, uncomfortable, and, at times, dangerous for residents, affecting engagement with public space. These challenges reshape the priorities of all interventions in these spaces, focusing on ensuring their continued functionality, their livability and their vital contribution to urban environments and social public life. Cultural actions, as essential expressions of social public life in urban environments and powerful agents in shaping spatial perception and urban life, are also recipients of the same pressures and challenges, necessitating the urgent need for their sustainability. In response, it is imperative that they optimise their management in climate-vulnerable public spaces and develop environmentally conscious, climate-positive and adaptive approaches in order to enhance both their own operational performance and that of the spatial system that encompasses them. Such approaches would support the role of cultural events in public spaces as 'social condensers' and 'urban animators', while maintaining the critical synergy between public space and cultural activities in fostering socio-cultural sustainability, as well as in promoting climate change awareness and education. Within this framework, this paper aims to identify cultural design strategies that upgrade localised microclimatic conditions during the summer, creating safe outdoor cultural places for the community, thereby enhancing the functional, social and cultural value of urban public spaces and contributing to the overall well-being.

Although many cultural sustainability studies develop environmental perspectives, they predominantly highlight mitigation strategies, including, among others, the carbon footprint of events/sustainable consumption and production (Cavallin Toscani et al., 2024), the dynamism of culture in raising awareness and educating on environmental and climate issues (Galafassi et al., 2018), leading and inspiring sustainable urban policies and initiatives (Chrysikou & Luciani, 2024). This focus leaves a research gap in the area of adaptation strategies aimed at alleviating climate change impacts. Studies exploring the effective contribution of temporary cultural actions/events to the environmental (spatial) aspects of cities are limited to the re-appropriation of abandoned, underused and marginalised sites (Stevens, 2018) and to ephemeral cultural heritage-led actions (Boeri et al., 2020). The resilience of cultural events within the framework of climate change, along with their potential contribution to the environmental (spatial) redevelopment, is still explored to a lesser degree in the academic discourse. This paper, therefore, seeks to address this gap by examining the interconnections that emerge between urban public space, cultural actions, and community well-being, at the intersection of environmental science, sustainability, and climate change.

The work presented here is further inspired by Gerlach-Hansen's (Gerlach-Hansen, n.d.), argument that culture (institutions in the cultural sector) "can make sustainability culturally attractive" (p.8), posing the converse question: *How can sustainable spatial practices make cultural events more attractive and resilient in the context of climate change*? Placed in this scenario, an enhanced bidirectional confluence between cultural action and environmental sustainability emerges. To answer the question, the research draws on evidence-based practices and effective design tools for climate adaptation and environmental upgrading of outdoor urban spaces and focuses on the adaptive implementation of these strategies in temporary cultural installations with a climate-sensitive focus. More specifically, through an analysis of case studies, the research is centred around the identification of climate-responsive design tools that these projects apply in order to adapt to and mitigate

specific impacts of climate change, i.e. rising temperatures, UHI phenomenon, improving microclimatic conditions and outdoor thermal comfort. The article aims to shed light on the new qualities of public spaces that stem from these projects and to unfold their multifaceted contribution to environmental and climate aspects and the well-being of communities.

The remainder of this article initially outlines the research background (section 2), which particularly comprises reviews of the relevant literature and applied design solutions in order to facilitate the grounding of the research. It studies temporary interventions in urban public spaces, highlighting their adaptive and transformative dynamic in responding to specific problems, constituting an effective sustainable solution (section 2.1). Moreover, section 2.2 focuses on effective strategies and effective design tools for the urban retrofitting of outdoor spaces, providing the basis for the case study analysis. Section 3 develops the methodology for the selection and analysis of the examined case studies, while section 4 presents the analysis and the climate-responsive design tools developed by these temporary cultural installations in order to maintain their essential functionality and effectiveness within public spaces. Finally, section 5 is a discussion of the research findings, including further works and future perspectives for advancement.

2. Research background

2.1 Temporary interventions as responsive tools

Urban environments are in constant evolution through the interaction of people, space, and time. The concept of globalisation, along with the utopia of a non-place where anyone could be anywhere, as the *Archizoom* group envisioned in their *No-Stop City* project in 1970 (Branzi, 2006), forewarned the contemporary transient urban habitation, the great flexibility for moving across the world, sharing domestic places for temporary living and urban public places for temporary actions, reflecting the ephemeral nature of cities and their dynamism; to be anything, anytime.

Ephemeral constructions are inherently linked to time, as they are built with either a predictable or unpredictable expiry date. They are also closely linked to space, as they are housed in a specific location until they accomplish their purpose. This temporary yet integral connection with space creates opportunities to re-examine architectural, spatial, and social structures and re-evaluate connections in the context of time, providing an experimental and innovative medium to re-shape them anew, thus constituting a tactical move, as described by Vysoviti (2002).

In recent decades, temporary interventions in urban environments have been realised worldwide, fuelling the discussion on their dynamics, opening up new avenues for architectural and urban research and attracting increasing policy and academic attention. In the urban context, the idea of temporary interventions encompasses a heterogeneous variety of practices and projects (Oswalt et al., 2017), both bottom-up and top-down. Among others, they have been used as vehicles for the re-activation of neglected, underused, and marginal sites, (e.g., the *Bentway Staging Grounds* by Agency-Agency & SHEEEP), for urban regeneration, responding to the deficiencies of the urban environment (e.g., temporary gardens and playgrounds, pop-up shops and cafes), for re-appropriation of the public space of cities (e.g., *Paris plages* by Jean-Christophe Choblet), for experimentation, nurturing visions of the future (e.g., *(W)ego* by MVRDV proposing a new model for urban living) and for cultural actions fostering urban experience, participation, and socio-spatial engagement (e.g., artistic and event installations, outdoor cinemas). The list of

examples could be extended to include cases of temporary interventions in urban space through participatory projects and initiatives that strengthen social bonds and promote participation and inclusion (e.g., the transformation of *Passage 56* in Paris into a collectively-managed ecological garden), or by activist actions aimed at claiming rights (e.g., the *Esta es una plaza!*, a neighbourhood self-management initiative to reclaim an urban plot in the centre of Madrid).

These temporary acts not only redefine the spatial identity of public spaces but also invite new forms of participation, transforming the perception of space. As symbolic displays in public spaces (Amin 2008), they exert a considerable influence on socio-spatial perception, shaping expectations related to the intended purpose of these spaces and the groups they target. In this context, the implementation of temporary urban interventions introduces new narratives and symbolic meanings to these sites, shaping a more inclusive production of space. Their redefinition as places of creativity and cultural exchange promotes engagement and reshapes the way these environments are perceived and experienced, leaving an imprint on collective memory and expectation.

The ephemeral may even act as an urban stimulus and inspiration for permanent interventions (e.g., the *Escaravox* by Andrés Jaque Arquitectos, an urban activator for the courtyards of the Matadero Cultural Centre, in Madrid, Spain). Moreover, this list can be further enriched with temporary interventions that are implemented until permanent environmental regeneration projects are completed. The example of *Air Trees,* designed by Ecosistema Urbano and installed in Madrid, Spain, is a notable case. *Air Trees* are temporary prostheses in the existing urban fabric, which through the incorporation of various sustainable principles and with the use of technology, act as ephemeral climate regulators of the outdoor urban space, while the environmental regeneration process of the area evolves. Once this process is complete, these autonomous portable structures can be disassembled and relocated to sites with similar needs.

Finally, the employment of temporary installations in urban spaces has already been used as a tool for rapidly applicable and responsive short-term solutions to specific problems or due to urgent conditions that arise. In cases of wars, political tensions and natural disasters, which often lead to the displacement of people from their homes or sites of origin, temporary shelters appear as effective short-term solutions. An additional example of this need for urgent response was the recent experience of the health crisis of covid-19. The unexpected health crisis, accompanied by the shortage of beds in the existing hospitals, generated the need for additional medical infrastructure. The appropriate space was found in the then-liberated urban public space of the cities. Indicative examples, such as the inflatable hospital in the city of Pachuca, Mexico by Tecnodisión, the portable epidemiological insulation unit in Bogota, Colombia, designed by Colombia's La Salle University School of Architecture, and the portable Covid testing clinics in various locations inside urban fabrics, provide key insights into what a city requires to adapt to emerging challenges (Chrysikou & Sakantamis, 2022).

The COVID-19 pandemic served as a catalyst, revealing several challenges for urban environments, highlighting their vulnerabilities and potentialities inherent in the conception and planning of contemporary cities. The pandemic restrictions that were implemented caused extreme changes worldwide during a very short time, creating deserted cities that constituted the canvas for new temporary cultural/urban interpretations. A previously conducted research by the authors (Chrysikou & Sakantamis, 2022) explored the “new cultures” that emerged during the period March - September 2020, as well as the temporary spatial transformations of the

urban landscapes they produced. Bottom-up and top-down ephemeral creative and innovative cultural responses were developed in order to create opportunities for contact, action, interaction and entertainment. The study identified cultural and spatial shifts that produced the following temporary, creative and adaptive strategies:

- the web stage (e.g., *From us, for you,* a Dutch orchestra put on one of the first virtual concerts during this period);
- the urban balcony stage (e.g., the *Eurobalcony,* an initiative of the *Conservatoires Nationaux Supérieurs* in Lyon and Paris, established a performance inviting musicians to play at their balconies each Friday);
- the urban rooftop stage (e.g., DJ Francesco Cellini played for his neighbours from the rooftop terrace of his apartment building in Rome);
- the moving stage (e.g., a famous Greek singer travelled around different neighbourhoods of Athens using a truck in order to entertain the residents);
- the floating cinema (e.g., the floating cinema of *Paris-Plages* on the Seine);
- the pandemic theatre (e.g., Marvel's concept for open-air theatres involves the conversion of shipping containers into stages);
- the bubble concert (e.g., the rock band *The Flaming Lips* organized an innovative concert in 'space bubbles', in Oklahoma);
- the drive-in concert (e.g., the drive-in concert in the Czech Republic in May 2020).

The research highlighted that (i) cultural participation and access to open, vibrant, and social public spaces are essential prerequisites for resilient communities, (ii) cultural actions unveiled their potential to develop creative and adaptive responses to address the challenges revealed by the health crisis, preserving their active role in public life and enhancing their resilience, and (iii) temporary cultural actions and their associated transformations have upgraded the functional values of urban/common spaces and contributed to the preservation of experientially rich urban environments, increasing their resilience.

All of the above support the proposition that temporary structures are flexible models with an active role in spatial and social production. For Pogačar (2014), temporary interventions can act as urban activators, as they provide effective tools for short-term spatial reorganisation and constitute pilot projects for assessing the success of long-term future projects. Their characteristics of autonomy, flexibility, reversibility, and reusability allow them (a) to embrace and produce change using non-invasive construction methods, respecting the existing spatial settings, and (b) to be exported in different locations, thus achieving low environmental impact and a sustainable philosophy. Vera & Mehrotra (2015) argue that sustainability is not determined by the act of constructing new built environments but by how effectively we repurpose and adapt the spaces that already exist, which is a call for rethinking the way we approach the concept of sustainability in existing - and future - cities. Alongside altering spatial dynamics, Madanipour (2017) emphasises that temporary interventions have the capacity to advance, strengthen, and leverage a range of communal goals, addressing the evolving needs of the city and its inhabitants, while questioning established ideas of permanence in urban planning and design. In an era where urban environments face constant change and uncertainty, properties such as adaptability, reversibility and immediate and rapid implementation are emerging as essential qualities in building resilient cities and communities. The concept of temporary installations incorporates the necessary attributes/qualities to form effective and sustainable solutions in response to the urgent socio-economic and environmental conditions confronting contemporary cities.

2.2 Climate-responsive design tools for the thermal retrofitting of urban spaces

In the context of the climate crisis, the spatial and material configuration of urban environments, as well as anthropogenic activity, exacerbate the cause-and-effect relationship of the UHI phenomenon during summer days, making outdoor urban spaces hazardous to the health and well-being of the citizens. To address the predicted increase in global temperatures (IPCC, 2021) and the significant threats related to the environmental quality, the implementation of thermal retrofitting techniques in open public spaces is a major challenge for cities. Today, different types of evidence-based research and guidelines are informing urban design theory and practice about permanent and temporary thermal adaptation of public spaces in order to mitigate UHI and the consequent urban discomfort (Chatzidimitriou & Yannas, 2015; GLA, 2006; C40 Cities, 2021). These studies propose climate-responsive urban design strategies aimed at mitigating UHI, mainly focusing on (i) the control of solar radiation, providing shade, (ii) the physical properties of the materials used in urban environments, focusing on absorption, reflection, emissivity, and permeability and (iii) the balancing of air temperature and humidity by enhancing evapotranspiration and vaporization, favouring wind and heat dissipation. The strategies applied to modify microclimatic parameters in outdoor urban public spaces are site-specific depending on varied elements, such as geographical location and local climate, space's orientation, urban morphology and geometric and physical features of the surrounding environment (Chatzidimitriou & Yannas, 2016). The tools used for heat mitigation and improvement of thermal comfort during summer can be summarised to the following three main climate-responsive and adaptive approaches.

2.2.1 Green approaches

Vegetation, such as trees, grasses, potted and climbing plants, acts as a regulator of the urban microclimate (Skoufali & Battisti, 2019). By absorbing a significant portion of the solar radiation for evapotranspiration, it produces a cooling effect on the surrounding environment. Through the evapotranspiration process, green approaches achieve both air flow control and greater radiative flow (Santamouris et al., 2016). Trees, in particular, intercept direct solar radiation, providing shade and reducing the amount of radiation absorbed by ground surfaces, buildings and other urban components. They appear to have the largest cooling effect on surface, air and globe temperatures, compared to other elements (Chatzidimitriou & Yannas, 2015). The magnitude of this effect depends on the geometric characteristics and distribution of the plants/trees. Additionally, the use of soft and permeable ground surfaces enables evaporative heat losses, which in turn influence ambient air temperature and thermal comfort.

2.2.2 Blue approaches

The water element has great potential to regulate local climatic conditions. The cooling effect produced is attributed to its high thermal inertia, which allows the maintenance of a lower temperature compared to the environment. Therefore, through the convective heat transfer processes, water contributes to reducing the ambient temperature (Álvarez & Sánchez de la Flor, 2016). Additionally, due to its low reflectance, it absorbs solar radiation and its latent heat facilitates evaporation, thereby cooling the ambient air and modifying the relative humidity. When natural water bodies are absent, water is frequently introduced in various forms, passive or active systems, such as fountains, ponds, water curtains, and water misting systems,

among others. These water-based approaches exhibit localized cooling potentials (Chatzidimitriou et al., 2013; Ulpiani & Zinzi, 2023), primarily due to the evaporation process, where ambient heat is absorbed during the phase change.

2.2.3 Grey approaches

Grey approaches are related to material and diverse infrastructure, including among others, shading devices, cool pavements, low-energy ventilation systems and fans and other technology-based tools and strategies. Although trees appear to be the most effective solution to reduce solar gains and thermal radiative flows during summer, man-made shading devices, such as pergolas and canopies of different forms, shade gradients, and materials, provide an effective and adaptive alternative.

In addition, surface materials influence microclimatic conditions through their optical and thermal properties, namely albedo and emissivity. These properties determine the amount of solar radiation absorbed/reflected and the longwave radiation emitted by a surface, respectively. Materials with high albedo and emissivity (cool materials) can keep urban surfaces cooler in summer (Santamouris et al., 2011). However, when shaded, the significance of these properties is reduced. (Tamminga et al., 2020). Moreover, hard and impervious grounds exhibit increased thermal conductivity (Gui et al., 2007), transferring heat when in direct contact with cooler elements. Although the development of material technologies offers new possibilities for adaptive strategies in urban design and provides appropriate solutions for urban paving (Skoufali & Battisti, 2019), permeable and soft ground surfaces are more effective and sustainable strategies for addressing UHI (Chatzidimitriou & Yannas, 2015; Reis & Lopes, 2019).

Technology-based tools, such as misting nozzles to enhance vaporization and fans to promote wind currents, are also employed to decrease ambient temperature and regulate humidity levels. When combined, their efficiency is improved, significantly reducing heat stress (Farnham et al., 2015).

3. Case Studies

To achieve the objectives outlined in Section 1.2, the methodology draws inspiration and guidance from the research of Requena-Ruiz et al. (2023). Their work explores emerging design approaches for the thermal retrofitting of public spaces as presented in urban design media, concluding that such media "present the parts and criteria that are helpful for the design process" (p.24) and serve as a source of inspiration for climatic urban design. The present study adapts the web-research method, data collection approach, and inductive methodology from observatory sciences used by Requena-Ruiz et al. (2023) for the qualitative analysis of the case studies applied by the aforementioned research.

Initially, a web research on internationally built temporary installations was conducted using popular image-based search engines (Google Images and Pinterest) and online architectural and urban design platforms (Archisearch, Deezen, and Designboom). Specific key parameters were applied during this exploration process, such as outdoor/urban public space, temporary/ephemeral/cultural and installation/pavilion.

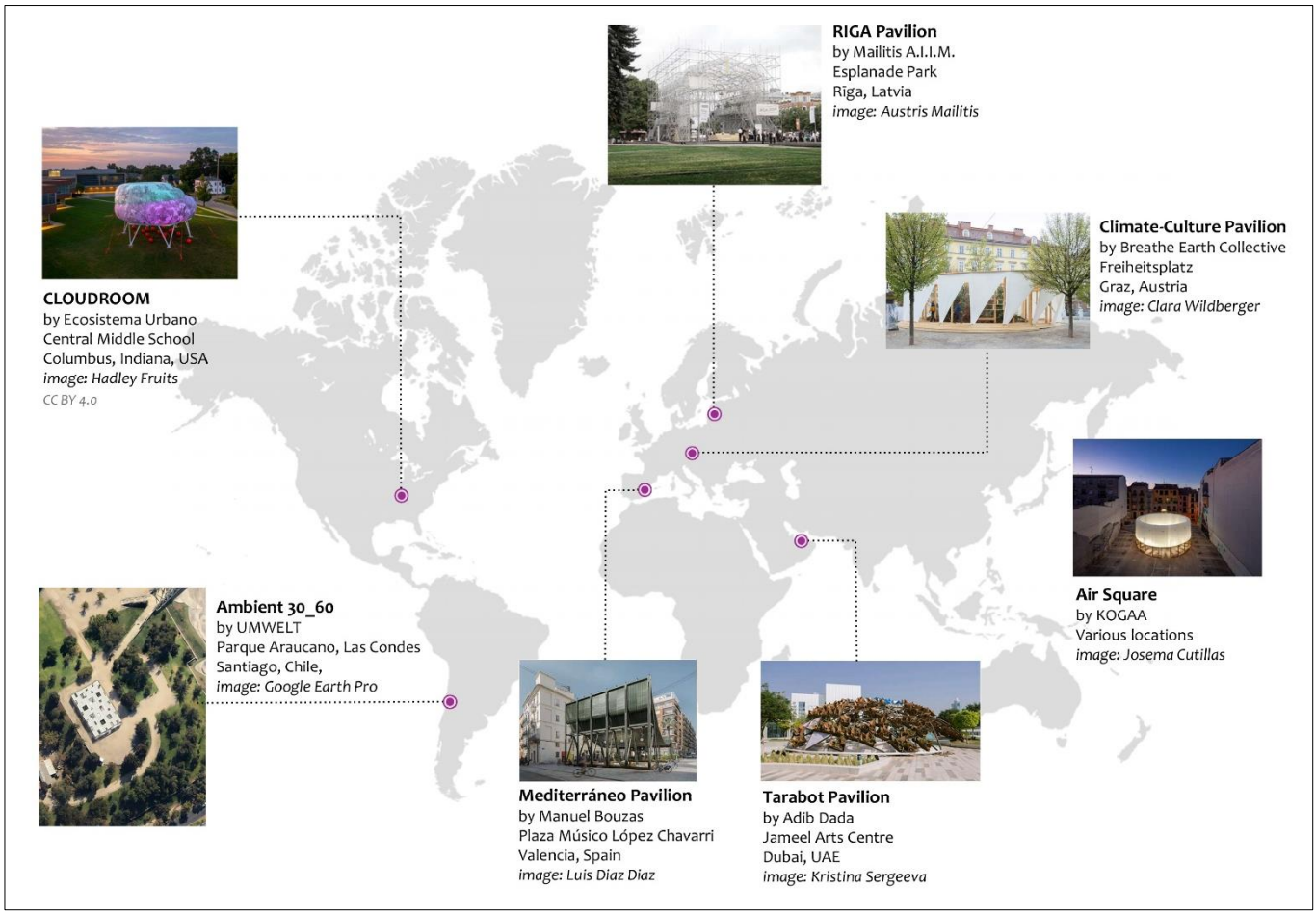
This was followed by a rapid qualitative assessment of the results, focusing on thumbnails, titles, and short descriptions of the projects, with the following inclusion criteria:

– The installation must be a built project located in an outdoor urban public space;

– The installation must be small to medium in size (to ensure applicability in dense urban environments);
– The installation should be intended for cultural activities/events;
– The installation must incorporate design tools that address climate factors, particularly those related to high summer temperatures.

This process led to the selection of seven case studies (Figure 1), identified as exemplary climate-responsive practices and valuable opportunities to explore potential adaptive design strategies for temporary cultural interventions in climate-sensitive environments.

Figure 1. Selected case studies



Source: Chrysikou, 2024

Further information on these selected projects was then sought from several online sources. Data collection for the selected cultural installations focused on: (a) general spatio-climatic information, (b) the duration of the installation and the range of cultural activities offered, and (c) strategies employed to mitigate urban heat. The data collection process was based on: (i) a systematic and thorough review of the records, textual descriptions, interpretative information, and the cultural programmes provided by online platforms, and architects' websites, (ii) a critical investigation of the technical drawings (plans, sections and details, where available) and the photographs/videos (depicting installation and space, construction phases, used materials, hosted events) of the projects sourced from the same platforms, and (iii) an exploration of the urban context (spatial characteristics of the site, existing materials, and orientation) for each project using the *Google Earth Pro* application's

'street view' tool.

Although the detailed spatial documentation and the microclimatic conditions of each location are crucial parameters for the development and implementation of effective adaptation strategies - ensuring the performance of the intervention and enhancing outdoor thermal comfort - this study does not include related data. Instead, it is based on the assumption that these factors were considered during the design process by the architects/specialists involved, and focuses primarily on the tools that were applied.

Finally, the collected data were coded and organized for further analysis, as presented in the following section.

4. Analysis and results

The analysis started with cataloguing the general spatio-climatic data of the selected projects, including location (city-country), geographical coordinates, climatic zone (based on the Köppen climate classification), and the general urban context, as shown in Table 1.

Table 1. Spatio-climatic data

Project	Location	Latitude, Longitude	Climatic zone	Urban context
Cloudroom	Columbus, Indiana, USA	39.2040335, -85.9148401	hot-summer humid continental	school park
Ambient 30_60	Santiago, Chile	-33.4019831, -70.5709040	warm-summer Mediterranean	public park
Riga Pavilion	Riga, Latvia	56.9541197, 24.1131717	warm-summer humid continental	public park
Climate-Culture Pavilion	Graz, Austria	47.0727597, 15.4409784	warm-summer humid continental	public square
Mediterráneo Pavilion	Valencia, Spain	39.4767133, -0.3805250	cold semi-arid	confined public square
Tarabot Pavilion	Dubai, UAE	25.2288577, 55.3410047	hot desert	coastal cultural square
Air Square	various	-	-	various

Source: Chrysikou, 2024

The cultural installations that implemented urban cooling strategies were located between latitudes 33,40° S and 56,95° N, spanning climatic zones ranging from hot desert to warm-summer humid continental, indicating a need for heat mitigation measures even in cooler climates. All projects were established in clearings or open areas within city parks or squares, sites that offer suitable spatial layouts for hosting cultural events and activities. Despite variations in spatial configurations and orientation, all of these urban settings appear vulnerable to solar radiation, particularly during summer. An exception is *Air Square*, which was not confined to a single site but was an experimental project designed to activate various underused urban public spaces, under the influence of the heat island effect and the impacts of

climate change, emphasizing the installation's flexible and adaptive properties.
The cataloguing of collected data related to the duration of the installations and the diversity of cultural activities they hosted is presented in Table 2.

Table 2. Duration of the installation and diversity of cultural activities

Project	Duration	Activities/Uses
Cloudroom	08/2021 - 11/2021	education, performances, recreation, community programs
Ambient 30_60	11/2013 - 02/2014	music, theatre, projections, education, workshops, exhibitions, talks, presentations, and recreation
Riga Pavilion	06/2013 - 09/2014	concerts, conferences, workshops, performances, cinema, reading-room, café
Climate-Culture Pavilion	04/2021 - 08/2021	education, talks, presentations, workshops, exhibitions, concerts, theatre, projections, library space, bar
Mediterráneo Pavilion	09/2023 - 10/2023	music performances, talks, presentations, projections, workshops, play
Tarabot Pavilion	12/2023 - 4/2024	talks, presentations
Air Square	varied	education, talks, performances, cinema, exhibitions, and recreation

Source: Chrysikou, 2024

The analysis highlights both temporal and functional variations among the cultural installations. Their duration ranges from one to fifteen months, typically aligning with the length of the associated cultural events, commonly spanning the summer season. Notably, the *Mediterráneo Pavilion* and *Cloudroom* implemented heat adaptation measures, even though they were not active during the hottest months. This suggests a need for cooling strategies beyond the summer season in certain locations to enhance thermal comfort during events.
The case studies further demonstrate the installations' capacity to support a rich cultural program for the community, including activities such as exhibitions, workshops, and performances, among others. Each of these cases, through the use of adaptable spatial arrangements, accommodates a variety of cultural activities, transforming the space to meet the specific needs of each event. Furthermore, these installations offer community-oriented amenities including libraries, cafés, bars, and areas for recreation and play, creating opportunities for spatial exploration and social interaction beyond the cultural programming. This diverse socio-cultural offering can be attributed to the installations' optimal size, flexible layouts, and the adaptability of the proposed cultural activities to the available space. Together, these elements enhance the installations' capacity to serve as dynamic and inclusive hubs of community life.
To identify the tools that temporary cultural events use to enhance outdoor thermal comfort and create viable conditions in public spaces, the cataloguing process is developed in the light of the thermal retrofitting strategies for open urban spaces discussed above (Section 2.2). The focus is on strategies that are critical for thermal adaptation. The cataloguing of the collected data centres on strategies that treat (a) solar radiation, (b) existing soils/surfaces and (c) air temperature and humidity. These strategies are presented for each project in Table 3.

Table 3. Microclimate redevelopment for heat mitigation: cooling techniques

Project	Solar radiation treatment	Soil treatment	Air treatment
Cloudroom	inflatable canopy	using the existing soft soil (lawn)	technology-supported ventilation
Ambient 30_60	horizontal and vertical perforated shades, use of trees	greening	evaporative cooling using vegetation and humidity sprinklers, natural ventilation
Riga Pavilion	vertical shades	elevating	evaporative cooling using vegetation, natural ventilation
Climate-Culture Pavilion	horizontal and vertical shades, use of trees	elevating, softening with green	evaporative cooling using vegetation and misting systems, natural ventilation
Mediterráneo Pavilion	horizontal perforated shade	elevating, using the existing soft soil (earth)	evaporative cooling using vegetation, natural ventilation
Tarabot Pavilion	perforated vegetated canopy	-	evaporative cooling using vegetated roof, natural ventilation
Air Square	inflatable vertical shade	-	natural ventilation

Source: Chrysikou, 2024

The analysis reveals several tools to control solar radiation and provide a shaded area for cultural activities. Among the case studies, horizontal shading emerged as the most common method for preventing solar radiation from reaching space. Vertical shades, as seen in the *Riga Pavilion* and *Air Square*, or a combination of both horizontal and vertical shading, used in projects like *Ambient 30_60* and *Climate-Culture Pavilion*, also appear effective solutions, particularly during the morning and afternoon hours or in high-latitude locations. Perforated shades were employed as well, reducing heat accumulation by allowing passive thermal release, while offering varying degrees of sun and shade. Green approaches for solar protection were also implemented. The *Tarabot Pavilion* featured a vegetated/green roof, while *Ambient 30_60* and *Climate-Culture Pavilion* utilized trees for shading. Notably, the latter project incorporated ten large trees and more than one hundred small to medium-sized trees and shrubs, achieving a cooling effect of approximately six degrees Celsius, according to the designers.

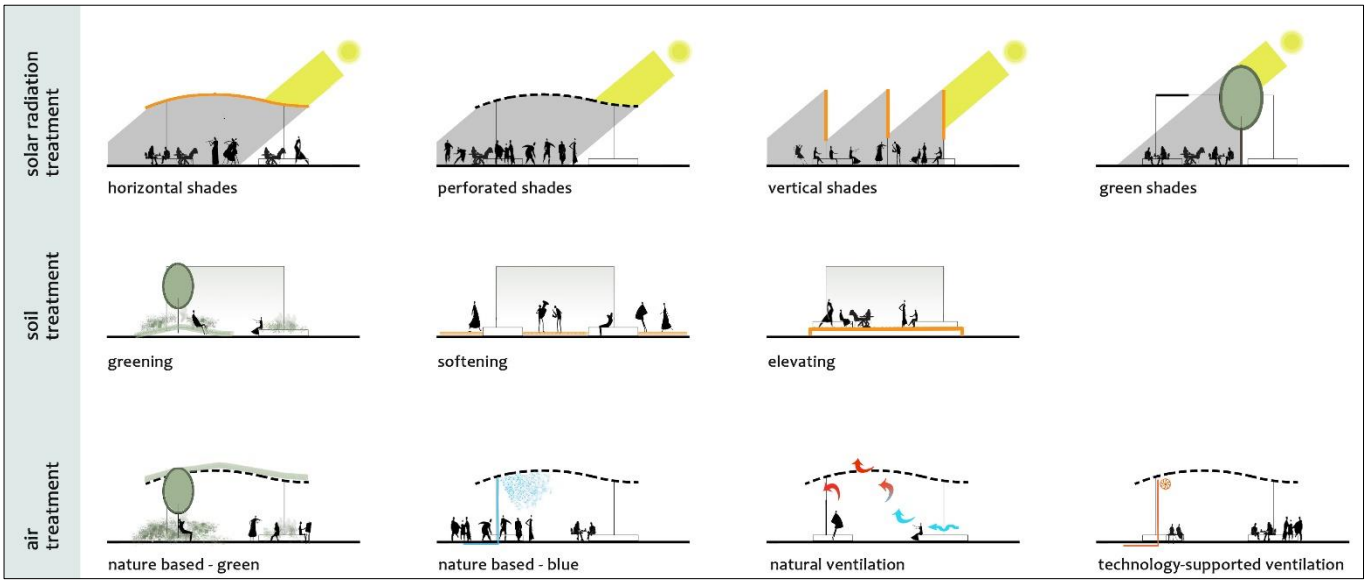
While shading reduces the absorption of solar energy by materials - thereby lowering thermal emission and transmission - some projects have implemented additional measures to enhance the thermal performance of their installations. The existing soil conditions in the case studies vary. In the cases of *Cloudroom* and *Mediterráneo Pavilion*, the soil was soft and permeable (lawn and earth, respectively), and the installations preserved these natural surfaces. Conversely, in the *Riga Pavilion*,

where the existing soil was sealed, the ground was covered with elevated platforms, a strategy that appears to have a positive impact as it mitigates heat transfer through conduction. Moreover, nature-based approaches were also employed. In the *Ambient 30_60* and *Climate-Culture Pavilion*, parts of the existing grounds were covered with soft and green elements, enhancing the thermal performance and the overall experience of the intervention.

Balancing air temperature and relative humidity was achieved through the combination of strategies such as shading, evapotranspiration from vegetation, and natural heat release. To further reinforce evaporative cooling, the *Ambient 30_60* and *Climate-Culture Pavilion* incorporated technology-supported approaches, such as misting systems. In the case of *Cloudroom,* textile nozzles were used to induce a natural breeze, directing hot air upwards to dissipate through the central oculus at the top of the installation.

Most of the installations examined employed multiple cooling techniques to mitigate urban heat and improve thermal comfort. This combination of environmental approaches aligns with a more efficient and resilient strategy (Santamouris et al., 2016). The analysis highlights adaptive design tools for developing thermally sensitive cultural interventions, which are summarised in the following illustration (Figure 2).

Figure 2. Design tools for thermally sensitive temporary cultural interventions



Source: Chrysikou, 2024

The potential of urban interventions to shape public spaces in ways that mitigate climate challenges and influence citizens' everyday experiences of urban climate has been widely explored in various studies (Heschong, 1981; Roesler & Kobi, 2018). Scholars of public space and public life, such as Gehl (1987) and Whyte (1980), emphasise that comfortable thermal conditions in urban public spaces are closely linked to the presence of voluntary and social activities, which are crucial to fostering vibrant urban life.

The case studies analysed in this paper incorporate thermal retrofitting techniques (e.g. natural shading) to improve microclimatic conditions of urban environments, creating sustainable and adaptable open spaces. At the same time, through thoughtfully designed spatial settings (e.g. adaptable seating arrangements), these interventions actively encourage social interactions. These examples demonstrate

that by employing thermal adaptive design strategies, these temporary interventions not only address climate challenges but also act as cultural catalysts. Through diverse spatial configurations and rich cultural programming, they engage community and enhance the broader socio-cultural dimensions of public life. By adopting this holistic approach, these cultural interventions transform public spaces into more than just functional areas; they evolve into vibrant and meaningful hubs of urban activity, fostering connections between people, culture, and public space, ultimately contributing to more sustainable and resilient cities.

5. Discussion and conclusion

Given the current trajectory of the climate crisis, the need for mitigation, adaptation, and a proactive response is becoming increasingly urgent across all sectors. This article highlights the role of culture as a platform for resilience in the face of the global climate crisis, emphasizing the dual pathways of addressing climate change: mitigation and adaptation. On the one hand, the research underlines the importance of cultural actions in educating the public and raising awareness about climate and environmental issues, thereby fostering behavioural and social change. On the other hand, it demonstrates the potential of temporary cultural interventions to develop adaptive regeneration strategies through an integrated approach, which includes (a) the flexibility and transformative capacity of temporary constructions and (b) the reinterpretation, experimentation, and adaptive implementation of evidence-based environmental design strategies.

Cultural events in this paper assume the significant role of an arena where architecture, culture, environmental research, and technology converge to generate multifaceted solutions for sustainable communities. Capitalising on existing knowledge of ephemeral architecture, technology, and thermal retrofitting techniques for urban outdoor spaces, these installations creatively combine different design tools to create safe and appealing cultural venues. Due to their expanded and culturally oriented features, these short-term urban cool spots offer opportunities for diverse cultural activities and can be described as ‘cultural retreats’ in the context of climate change.

Moreover, these ‘cultural retreats’ can serve as powerful engines for reclaiming and re-appropriating degraded outdoor public spaces of cities during summer - and beyond -, temporarily transforming them into sustainable and inclusive environments. They acquire an active role in environmental spatial production by improving microclimatic conditions and enhancing thermal comfort. Additionally, by offering opportunities for sociocultural access and participation, these interventions upgrade the functional value and multi-meaningful concept of public spaces, maintaining their social character and their active role in socio-spatial engagement. There is, therefore, potential in exploring the concept of temporary cultural interventions in urban public spaces as a tactical strategy for climate-responsive urban regeneration, whilst simultaneously capitalising on their capacity for long-term social sustainability and legacy.

Furthermore, the educational impact of personal experiences offered by these ‘cultural retreats’ should not be disregarded. The lived experiences of change provided by temporary adaptive interventions in urban environments (evidence through design) can facilitate the desired societal shift towards sustainable thinking, values, and attitudes, thus facilitating long-term change.

In conclusion, this paper advocates for the inclusion of temporary cultural interventions in future research agendas on climate-sensitive urban design and the

mitigation of urban degradation. Directions for future research could involve monitoring, documenting and evaluating the real effects of these adaptive practices in specific regions (e.g., the Mediterranean). Alternatively, research could extend to case studies of cultural interventions that address other climate-related impacts (e.g., flooding). The knowledge gained could make these readily applicable and flexible 'cultural and urban retreats' exportable to environments with similar requirements. Finally, these findings can inspire policymakers and cultural leaders to develop a more intelligent management of the ephemeral nature of cities, fostering a shift towards change and more resilient communities.

Author Contributions

The current study is part of the doctoral research of the first author, conducted at the School of Architecture of the A.U.Th. under the supervision of the second author. Conceptualization: NC, KS; Methodology: NC; Formal Analysis: NC; Investigation: NC; Data Curation: NC; Writing - Original draft preparation: NC; Writing - Review & Editing: NC, KS; Visualization: NC; Supervision: KS, NC.

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Conflicts of Interest

The authors declare no conflict of interest.

Originality

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