YOUTH, SPORT AND HEATWAVES IN THE CITY

A Participatory Approach with Young People on their Physical Activity in a Warming Climate

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INTRODUCTION

In recent decades, climate change has intensified the frequency, duration, and severity of extreme heat events across the globe. Switzerland is no exception: national climate projections indicate a sharp rise by mid-century, particularly in urban areas where the urban heat island effect amplifies temperatures. These shifts have direct implications for human health, well-being, and everyday activities, such as physical activity. Youth, in particular, are physiologically vulnerable to heat stress and, at the same time, heavily dependent on physical activity for their physical, mental, and social development. This dual reality places young people at the intersection of climate vulnerability and developmental needs. Urban environments are central to this challenge. Cities concentrate both exposure and opportunities. While their dense infrastructure retains heat, they also provide public spaces, sports facilities, and community programs that can influence the effects of rising temperatures. Sport plays a dual role here. It contributes to health, social cohesion, and community identity, but it also exposes participants to physical effort in potentially dangerous thermal conditions. In this context, the safety, accessibility, and inclusivity of sports practices during heat waves appear to be urgent concerns for urban adaptation.

Despite a growing body of research on climate adaptation and urban design, critical gaps remain. There are few studies few in Europe, and barely any in Switzerland, examining how heatwaves influence youth sport participation. Furthermore, there are even fewer studies on how to listen to young people about how infrastructural and practices adaptations could be tailored to their needs. In terms of practices, there is little research on personal cooling practices among young people. From an infrastructure perspective, the literature on urban adaptation rarely considers how interventions align with young people's actual spatial and temporal habits in terms of sports participation. Moreover, youth are too often positioned as passive recipients of adaptation strategies rather than as active contributors with lived expertise. Addressing these gaps requires not only technical interventions but also approaches that meaningfully engage young people in shaping solutions.

This thesis responds to that need by adopting a Participatory Action Research (PAR) approach to investigate how youth perceive and contribute to the development of climate-resilient and inclusive sports practices in the face of increasing heatwaves. The research focuses on the Quartier de la Jonction, a diverse neighbourhood in Geneva where rising summer temperatures

interact with a dense urban area. The study's central question is: *How do youth perceive and contribute to the development of climate-resilient and inclusive sports practices in response to the increasing frequency of heatwaves in Quartier de la Jonction, Geneva?* Three sub-questions guide the research: (1) How do heatwaves impact the physical activity of youth aged 14–20 in the neighbourhood? (2) What environmental, social, and infrastructural factors influence their ability to stay active during extreme heat? (3) What adaptive strategies do they propose to maintain safe and accessible physical activity?

The study was conducted within the broader SWICE research initiative (*Sustainable Well-being for the Individual and the Collectivity in the Energy Transition)* coordinated by EPFL and the Smart Living Lab, and supported by the Swiss Federal Office of Energy's SWEET program. Within SWICE, it aligns with the Outdoor Comfort Living Lab based in Quartier de la Jonction, which explores participatory strategies for improving thermal comfort in public spaces during extreme heat. My contribution centred on engaging local youth (ages 14–20) through participatory workshops combining heat mapping, collaborative problem-solving, and testing of personal cooling materials. These activities generated spatial insights, identified infrastructural and social barriers, and co-developed feasible interventions for more climate-resilient and inclusive sports practices. Collaboration with local networks, notably the City of Geneva's *Travail Social Hors Murs* (TSHM) and the youth association Rookie Slash, ensured that participation was rooted in existing community relationships.

LITERATURE REVIEW

Climate Change & Urban Space

Understanding how extreme heat affects youth sport practices first requires situating these experiences within the broader environmental and urban landscape. This section explores Cities are both disproportionately exposed to climate change impacts and central to developing spatial and infrastructural adaptation strategies.

Climate Change, Heatwaves, and Urban Vulnerability

Climate change has led to a steady rise in the frequency and intensity of extreme weather events worldwide, including a marked increase in the number of warm days and nights and in the

prevalence of heatwaves (IPCC, 2014, 2023). These changes have already generated significant physical and mental health impacts globally and are expected to intensify in coming decades, particularly for disadvantaged populations. When climate hazards coincide with high social vulnerability, they can trigger humanitarian crises, compromise food security, disrupt livelihoods, and undermine economic stability. Environmental consequences include altered water cycles, biodiversity loss, and degradation of ecosystem services (IPCC, 2014, 2023).

Internationally, the Paris Agreement committed signatories to limiting global warming to well below 2°C and pursuing a 1.5°C cap above pre-industrial levels. However, national pledges have repeatedly fallen short (UNEP, 2023), placing the planet on a trajectory toward a potential 3–4°C temperature increase (du Pont & Meinshausen, 2018), with associated "Hothouse Earth" scenarios (Schröder & Storm, 2018). In Switzerland, climate change is causing a clear upward trend in average temperatures. Projections from the National Centre for Climate Services (NCCS, 2018) indicate that, without significant mitigation, the country will face a sharp rise in hot summer days (above 25°C) and tropical nights by 2060. Overall, average temperatures may rise by 3.3°C under a high-emission pathway by 2060, whereas strong mitigation could limit the increase to 0.7–1.9°C (NCCS, 2018).

Although the impact if climate change is global, it is unevenly distributed, with intensified and prolonged heat waves being more frequent in urban areas (Dong et al., 2024). Cities experience the "urban heat island" (UHI) effect, in which built environments, dense with heat-retaining materials such as asphalt, concrete, and dark roofing, absorb and radiate more heat than natural landscapes (NASA, 2017). Limited vegetation exacerbates these effects, producing urban "islands" of elevated temperature. These conditions have direct public health consequences, with extreme heat events linked to higher mortality rates (Gasparrini & Armstrong, 2011) and increased hospital admissions (van Loenhout et al., 2018).

In Geneva, especially in the Quartier de la Jonction where this research is based, urban heat island effects are worsened by local urban form and infrastructure. According to the City of Geneva (Ville de Genève, 2018), Jonction is one of the most densely populated neighborhoods in the city, combining high concentrations of housing, jobs, and local businesses within a compact area. It also has a notable deficit of green space, limiting natural shade and cooling potential. Without effective mitigation measures, these conditions lead to increased vulnerability of the local population to extreme heat. Addressing these challenges is at the heart of my research.

Urban Strategies Against Heatwaves

Mitigation of greenhouse gas emissions remains the ultimate goal for addressing climate change, yet urban adaptation measures are critical to manage already-unavoidable heat impacts. Architectural interventions are central among these strategies.

Urban greening, such as adding trees, vegetation, and parks, has been shown to significantly reduce surface and air temperatures, while also offering psychological and physiological benefits (An & Dedekorkut-Howes, 2025; Aram et al., 2020; Gao et al., 2022). Large urban parks, in particular, combine cooling effects with spaces for recreation and social interaction, which can be especially valuable for youth sport participation.

Modifying urban surfaces offers another avenue for adaptation. Increasing the reflectivity of roofs, pavements, and façades through lighter materials or coatings reduces heat absorption and lowers ambient temperatures (An & Dedekorkut-Howes, 2025). “Cool” roofs, light-colored pavements, and sunshading structures are cost-effective tools in dense city contexts. Integrating shade—via tree-lined streets, pergolas, or canopies—both mitigates heat and enhances public comfort and mental well-being (Ren et al., 2022). Such approaches are often grouped as “green” infrastructure (vegetation-based) and “grey” infrastructure (built shading and reflective surfaces). Blue infrastructure, incorporating water elements like rivers, ponds, fountains, or misting systems, also contributes to cooling through evaporation and improved air circulation (Ahmed et al., 2024). While these interventions can reduce air temperatures and increase comfort, they may also raise humidity levels which can, in turn, impair the body’s ability to dissipate heat via sweating (Dong et al., 2024).

In Geneva, and specifically in the Quartier de la Jonction where this study is based, these urban heat dynamics are particularly present. The City of Geneva (Ville De Genève, 2018) identifies Jonction as one of the most densely populated neighborhoods in the city, concentrating housing, employment, and local businesses within a limited space. It also has a documented lack of green areas, which may exacerbate the urban heat island effect. In summer, the dense built form, heat-retentive surfaces in public, and lack of vegetative cover combine to increase thermal stress, also for young people engaged in outdoor physical activity. These conditions highlight the need to focus on the co-development of adaptive, inclusive, and climate-resilient public spaces with local communities. Insights from this research, particularly those generated through youth-led observations and recommendations, will contribute directly to these adaptation strategies. The following section turns to practices and lifestyle adaptations,

specifically in the realm of youth sport, that complement structural interventions in coping with extreme heat.

The Body in the Heat

While urban infrastructures shape the material conditions of climate resilience, they are ultimately experienced through the body. This section examines how heat affects youth bodies, lifestyles, and movement, and explores the adaptive practices they use in everyday life.

Heatwaves, Youth, & Physical Activity

Vulnerability to heatwaves varies by population. Socioeconomic disparities intersect with heat risk, as marginalized neighborhoods often have uneven land use and limited vegetation coverage, making them more susceptible to urban heat island effects (Harlan et al., 2015). Age also plays a critical role: while older adults are among the most heat-vulnerable groups (Falchetta et al., 2024), children and adolescents are also physiologically susceptible. Compared to adults, they generate more heat relative to body mass, begin sweating at higher core temperatures, sweat less efficiently, and adapt more slowly to rising temperatures (UNICEF, 2022).

This vulnerability is particularly significant given the central role of physical activity in youth development. Regular physical activity supports cardiovascular and muscular fitness, strengthens bones, and reduces the risk of chronic illnesses such as obesity and type 2 diabetes. It also contributes to mental well-being, reducing anxiety and depression, particularly when activities involve social interaction through team or group sports (Biddle & Asare, 2011). The World Health Organization (WHO, 2020) recommends that children and adolescents engage in at least 60 minutes of moderate to vigorous physical activity daily.

However, high temperatures create specific risks for youth engaging in sport. Morrison et al. (2021) note the lack of comprehensive data on balancing the benefits of physical activity with the risks of heat exposure in young populations. Seasonal data suggests that children's physical activity levels decline during summer holidays, periods prone to heatwaves. A study conducted in Slovenia found an approximate 18% drop in physical activity and a 5.5% rise in inactivity among students during summer breaks (Volmut et al., 2021). These declines may intensify as summers become hotter and heatwaves more frequent. In a related finding, Morrison (2022) reports that today's children are about 30% less aerobically fit than their parents were at the

same age. Interestingly, the author stresses that preserving and enhancing childhood fitness is essential for protecting youth from heat-related health issues in a warming world. Data from Canada's 2024 ParticipACTION report echo these concerns: only 39% of children and adolescents aged 5–17 meet the daily 60-minute activity guideline recommended by WHO, with significant gender and socioeconomic disparities: Only 31% of girls meet the benchmark compared to 57% of boys, and newcomer girls are even less likely to do so (ParticipACTION, 2024). In Switzerland, similar trends are reported, with adolescent physical activity declining steadily with age, particularly among girls (Delgrande Jordan et al., 2024).

While heatwaves may discourage activity, sport participation is strongly linked to social cohesion and mental health. The SPARK (2024) pilot initiative in Vaud, Switzerland, found that regular physical activity reduced feelings of depression and social isolation among adolescents. Globally, sport is recognized as a driver of the United Nations Sustainable Development Goals (SDGs), advancing Good Health and Well-being (SDG 3) and Quality Education (SDG 4) through improved health outcomes and skills such as teamwork and discipline (Office of Disease Prevention and Health Promotion, 2020; Biddle & Asare, 2011). Sport also contributes to Gender Equality (SDG 5) by fostering leadership among girls and young women, with research linking early sport participation to confidence and empowerment (Sharrow et al., 2024). Finally, community sport programs enhance Sustainable Cities and Communities (SDG 11) by offering safe spaces for engagement, promoting inclusion, and strengthening urban resilience (Akinwale, 2024; United Nations, n.d.).

Practices during Heat Waves

While architectural adaptation is essential, personal cooling practices also play a critical role in enabling safe physical activity, particularly for youth. Public health authorities, including the Canton of Geneva, emphasize the risks of exercising in extreme heat, such as dehydration, heatstroke, and recommend avoiding peak heat hours, maintaining hydration, and using cooling techniques such as spray bottles or wet cloths (République et canton de Genève, n.d.). Sports medicine guidelines similarly recommend that children drink water consistently during activity in hot weather (Lawrenz, 2019).

Rescheduling activities to cooler times of day is also widely supported in the literature. Research advocates for shifting outdoor training to early mornings or late afternoons and incorporating frequent shaded rest breaks to reduce heat stress (American Academy of Pediatrics, 2011; Armstrong et al., 2007; Hossain et al., 2024; Lawrenz, 2019).

Interestingly, the literature also refers to technological solutions. Air conditioning, for exemple, provide indoor cooling but have limitations. AC use contributes to night-time UHI intensity by releasing waste heat and has environmental costs due to high energy consumption and CO_2 emissions (Grignon-Massé et al., 2011; Mughal et al., 2020; Zhang et al., 2015). For youth active outdoors, low-tech, portable, and sustainable methods may be more accessible. Handheld fans, electric or manual, can increase airflow over the skin, enhancing sweat evaporation and lowering perceived temperature (Meade et al., 2024). While culturally significant in many societies (Davies, 2019), there is little research on their everyday use among European youth as adaptation tools to heat. Clothing is another interesting tool of cooling. Lightweight, breathable clothing that facilitate heat reduction are recommended for youth in sport (Havenith, 2002; Lawrenz, 2019). Wetting cloths or the skin can significantly reduce heat strain (Song et al., 2019). Cooling towels or neck wraps applied to temperature-sensitive areas, such as the carotid region, are simple yet effective (Cao et al., 2022). More advanced methods, such as cooling vests containing ice packs or phase-change materials, have shown benefits for young adults' thermal regulation and performance (Arngrímsson et al., 2004; Mokhtari Yazdi et al., 2014). Misting the body or surrounding environment can also enhance evaporative cooling, with studies supporting its thermal comfort benefits (Nishimura et al., 1998; Wong & Chong, 2010), though its application in youth sport remains underexplored (Trbovich et al., 2019). While hydration and reduced outdoor activity are widely promoted, these strategies alone are insufficient for all populations. Their effectiveness depends on environmental and social contexts, such as access to shaded areas and safe cooling spaces (Hossain et al., 2024).

Despite a growing body of literature on climate adaptation, urban planning, and youth well-being, notable gaps persist. No research systematically examines how UHI effects influence youth physical activity or how built-environment interventions could mitigate these impacts. Studies on personal cooling often focus on older adults or elite athletes, with little attention to adolescents in European urban contexts. Youth-specific adaptations, such as changes in activity timing, space use, and urban navigation during heatwaves, remain underexplored. Moreover, existing urban design literature rarely addresses how cooling interventions align with youth sport patterns. Finally, youth are frequently positioned as passive recipients rather than active co-creators of adaptation strategies. This study addresses these gaps by centering youth perspectives on personal cooling, practice adaptation, and spatial use during heatwaves in Geneva's Jonction neighborhood.

Public Participation in Climate Adaptation

Effectively addressing climate change requires not only technical solutions but also meaningful public engagement in adaptation planning. Understanding how communities, including youth, perceive climate risks is essential for developing strategies that are both sustainable and socially relevant.

Climate Change & the Public

While reducing the drivers of climate change is critical, adaptation strategies are equally necessary to address impacts that are already unavoidable (Biesbroek et al., 2009). The development of such strategies is shaped by how different stakeholders perceive risk and uncertainty (IPCC, 2014). For instance, some actors may focus on immediate infrastructure damage from extreme weather, while others consider broader consequences such as economic losses or declines in quality of life (Becker et al., 2015). Cultural values, beliefs, and personal experiences with climate hazards strongly influence how communities approach adaptation.

For these reasons, the academic literature emphasizes the importance of involving the public in adaptation planning. Participatory governance has been shown to enhance both the sustainability and effectiveness of climate initiatives (Wamsler & Raggers, 2018; Sarzynski, 2015). In research and social planning contexts, engaging citizens can reshape research questions to make them more relevant to the lived realities of affected communities (Hernandez et al., 2018). Public involvement has also proven valuable in resource management and environmental modeling (Voinov et al., 2016). Institutional frameworks have embedded participation into environmental governance for decades. The European Union's Water Framework Directive (2000) and the United Nations' Aarhus Convention (1998) are prominent examples, establishing legal foundations for citizen involvement in environmental decision-making (Collins & Ison, 2006).

However, public engagement is not without challenges. It can complicate sustainability efforts due to issues such as lack of trust, delays, or deeply rooted conflicts (Wamsler et al., 2019; Saengsupavanich et al., 2012). Another challenge lies in the ambiguous and often overly inclusive use of the term *participation*, which can mask significant differences in the extent and nature of people's involvement, particularly for youth (Cahill & Hart, 2006). Participation alone does not guarantee empowerment; it often operates within existing power structures that limit its transformative potential (Cornwall, 2008).

Participatory Action Research & the Youth

One research methodology that addresses these challenges while amplifying public voices is Participatory Action Research (PAR). PAR is a qualitative approach rooted in the democratization of knowledge production and the promotion of social change. It draws inspiration from grassroots activism and social justice movements, including Paulo Freire's pedagogy of the oppressed ([1970] 1997) and Arnstein's "Ladder of Citizen Participation" (1992). PAR challenges traditional research norms by actively involving participants at all stages, moving them from the passive role of *researched* to active co-researchers (Pain, 2004). A core principle is reciprocity: ensuring that outcomes benefit the communities involved. This collaborative model emphasizes mutual learning, action, and the co-production of knowledge (Breitbart, 2003; Pain, 2004). PAR challenges traditional research norms by actively involving participants at all stages, moving them from the passive role of *researched* to active co-researchers. A core principle is reciprocity: ensuring that outcomes benefit the communities involved. This collaborative model emphasizes mutual learning, action, and the co-production of knowledge (Breitbart, 2003; Pain, 2004).

In the context of heatwave adaptation, participation has proven particularly relevant. Palermo and Hernandez (2020), for example, conducted focus groups with stakeholders in Malaysia to design a climate adaptation plan for extreme heat. Contrary to the researchers' expectations, participants expressed a clear preference for moderate to high levels of involvement during planning stages. In Czech cities, Lorencová et al. (2018) used participatory assessments to evaluate heat vulnerability, with stakeholder input proving essential for identifying heat-prone areas and proposing nature-based solutions such as urban greening and water retention systems. Ziegler et al. (2019) further demonstrated how participatory methods can address inequalities. They highlighted the difference between "community-placed" research, where studies occur in a community without substantive involvement, and "community-based" research, where local actors are genuine co-researchers. This distinction is crucial for ensuring equitable power distribution and effective adaptation outcomes, particularly in disadvantaged urban areas.

PAR has emerged as a particularly interesting approach for engaging young people. Conventional research methods often treat youth as passive subjects, whereas youth-specific PAR recognizes them as active agents capable of defining, investigating, and transforming the social realities affecting their lives (Ozer, 2016; Ginwright & James, 2002). Ozer (2016) describes youth PAR as a cyclical process of questioning, action, and reflection, giving young

people opportunities to lead research while fostering critical thinking, independence, and civic engagement. Cahill (2007) notes that PAR encourages young people to critically examine structural conditions and imagine alternatives, while also developing transferable skills such as communication, leadership, and problem-solving. Richards-Schuster and Pritzker (2015) observe that youth-led PAR projects often generate more meaningful results because they are grounded in the lived experiences of participants. For example, Trott (2021) documented a participatory after-school program in which 10- to 12-year-olds designed and implemented climate actions in their homes and communities, improving their physical activity, social influence, and overall well-being. An equally important dimension of youth PAR is capacity-building and co-learning, where youth and adult facilitators build knowledge together. Seballos and Tanner (2011) argue that this process is most effective when it embraces flexibility and creativity, transforming research into an ongoing cycle of mutual learning for both youth and adults.

In the context of this thesis, youth-focused PAR offers a practical and context-sensitive approach to addressing climate adaptation challenges in Geneva's Quartier de la Jonction. As further explained in methodology section, involving young residents as active co-researchers not only captures their lived experiences of sport and heat but also channels their insights into concrete recommendations for municipal policy and urban planning.

Youth, Sport, and Participatory Action Research

Positioning youth at the center of climate adaptation efforts in sport requires methods that value their lived experience. Participatory Action Research (PAR) offers a diverse toolkit of approaches that actively engage young people in identifying problems, generating knowledge, and co-creating solutions based on their contexts.

PAR and Climate-Resilient Youth

The relevance of youth-centered PAR is increasingly apparent in the context of climate adaptation, particularly in sport. As noted earlier, rising global temperatures and the increased frequency of heatwaves pose urgent challenges to the safe practice of sport, especially for young people. Yet, as ENGSO Youth (2021) asserts, youth are often excluded from formal decision-making processes that directly affect their access to safe and sustainable sport environments. Their position paper advocates for recognizing youth as equal stakeholders in

the design of "green sports futures," moving beyond mere consultation toward co-creation and shared governance.

The broader academic literature supports this approach: public participation in climate adaptation is consistently associated with improved technical effectiveness and greater social legitimacy (Sarzynski, 2015; Voinov et al., 2016; Wamsler & Raggers, 2018). Youth participation combines intergenerational justice with experiential knowledge of how climate impacts intersect with everyday life (Hernandez et al., 2018). In sport, this perspective can help identify specific heat-related risks in recreational spaces, such as the absence of shade or unsafe scheduling, and co-develop strategies that address both physical safety and social inclusion.

Despite growing recognition of youth vulnerability to extreme heat and the well-established benefits of physical activity, few studies have integrated these issues holistically. This gap reflects a broader fragmentation in research on climate resilience and youth engagement. PAR offers an opportunity to bridge these domains. By involving youth in co-designing sport programs, climate-resilient infrastructure, and adaptive practices, PAR not only improve the relevance of interventions but also fosters a sense of ownership among participants. In other words, PAR enables a "double transformation": it empowers youth as agents of change while producing contextually responsive solutions to environmental challenges. It should thus be seen not only as a research methodology but also as a political and ethical commitment to the democratic co-production of knowledge.

Participatory Exercises and Tools Used with Youth

A variety of participatory exercises and tools have been used in PAR projects with youth, particularly in areas related to sport, health, and climate adaptation. These methods are designed to be both engaging and accessible, while generating data and insights that inform practical action. Below, I present common tools, supported by examples from the literature, and explain the rationale for those used in this study.

Photovoice is a widely used PAR method in which participants capture photographs that document issues in their lives or communities, later discussing the meaning of these images in group settings. It has proven effective for exploring environmental and health challenges with youth. For example, Abraczinskas and Zarrett (2020) implemented a PAR program with middle school students to investigate physical activity inequalities. Participants used photovoice to highlight barriers and facilitators in their school environment. It revealed gender disparities in access to sports facilities and provided a narrative to present to decision-makers.

Video-making can also serve as a powerful engagement and advocacy tool. Youth participants are trained to plan, script, and film videos about issues they care about. In Arctic Canada, MacDonald et al. (2015) worked with Inuit youth to co-create videos documenting climate change effects and cultural resilience. This process deepened participants' understanding of local climate impacts and built adaptive capacities such as confidence, communication skills, and problem-solving. The finished videos also served as advocacy tools to communicate Indigenous youths' adaptation ideas to policymakers and the public. Interactive workshops offer spaces for learning and co-creation.

Some initiatives combine educational modules on climate science with participatory activities like theatre skits, role-playing, or model-building. For example, in the United States, the Climate Justice Youth Summer Institute engaged middle school students, teachers, and researchers in co-designing a climate curriculum while conducting local environmental research (Holden, 2024). In sport contexts, youth sport leadership councils or inclusive sport workshops provide similar opportunities. The Game Changers PAR project in Canada included regular meetings where students with disabilities, teachers, and researchers collaboratively designed more inclusive school sport activities (Robinson et al., 2023). Focus groups, used both for data collection and as an intervention, helped assess changes in participants' sense of belonging and leadership over time.

Participatory Mapping is another interesting PAR method. It enables youth to spatially identify and analyze local climate impacts, safe versus unsafe play spaces, or resource distribution. Creative adaptations combine mapping with arts and technology. In Kenya, Logie et al. (2023) co-developed a multimedia mapping approach with adolescents, integrating GIS tools, drawing, music, and video to visualize climate-related issues. The result was a set of maps enriched with personal narratives, offering a deeper understanding of youth climate experiences. Some projects incorporate hands-on scientific data collection. In Roanoke, Virginia, Lim et al. (2022) trained adolescents to use thermal cameras, weather sensors, drones, and GPS to map urban heat hotspots. Participants linked their personal experiences with broader environmental data, producing results directly relevant to city planning.

In summary, participatory tools in PAR with youth range from visual and media-based methods to mapping, workshops, and citizen science. The common thread is that these exercises are experiential and youth-friendly, allowing young participants to investigate issues that matter to them using methods that leverage their creativity and curiosity. In this thesis, methods were

adapted to the Geneva context to ensure cultural and logistical relevance. The next chapter explains how approaches were chosen.

METHODOLOGY

Conceptualising the Approach

This study employed a Participatory Action Research (PAR) framework to investigate how extreme heat affects young people's engagement in physical activities in Geneva's *Quartier de la Jonction*. The focus was on identifying challenges and co-developing solutions through the lens of the urban environment and everyday practices. Data were collected during a participatory workshop in which local youth were invited to engage in structured discussions and activities.

The choice of PAR was grounded in literature showing that participatory approaches improve both the long-term impact and practical benefits of climate adaptation measures (Wamsler & Raggers, 2018; Sarzynski, 2015). Given that youth are frequently excluded from formal planning processes that affect their well-being (ENGSO Youth, 2021; UNICEF, 2022), PAR was chosen not only to generate contextually relevant data but also to position youth as co-producers of knowledge (Ozer, 2016; Cahill, 2007). This aligns with prior research indicating that youth-centered PAR fosters social learning, civic engagement, and local ownership of solutions (Pain, 2004; Richards-Schuster & Pritzker, 2015). In this project, the participatory approach was designed as a space of co-creation, enabling youth to articulate challenges, envision solutions, and reflect critically on their urban environment in relation to extreme heat.

Among the many participatory methods discussed in the literature, such as photovoice (Abraczinskas & Zarrett, 2020), youth-led video-making (MacDonald et al., 2015), and technology-enabled environmental monitoring (Lim et al., 2022), a youth workshop format was selected for both practical and theoretical reasons. While photovoice and video-making can give rich narratives, they require time, equipment, and digital skills. This potentially reduces accessibility in short-term projects. Similarly, high-tech mapping using drones or sensors can generate precise environmental data but demands significant preparation, training, and resources.

In contrast, workshops offer a flexible and time-efficient structure. It can integrate multiple participatory tools, such as mapping, group discussions, and idea generation, all that within a single session. They also promote peer interaction and collaborative interpretation, which are key to maintain engagement among youth, particularly when creativity and active participation are encouraged. For these reasons, this study prioritized interactive workshops (Holden, 2024) and participatory mapping (Logie et al., 2023). Because cooling practices and urban climate adaptation measures are often specific to culture and location, mapping outputs can serve as effective communication tools. They allow youth insights to be visually accessible to decision-makers, strengthening the link between lived experience and practical urban planning. This approach reflects commitment of youth climate research to co-design processes (Richards-Schuster & Pritzker, 2021).

Finding the Youth

The study targeted young people aged 14 to 20 who lived in, or regularly spent time in, *Quartier de la Jonction*. A total of 10 participants attended the workshop: three girls and seven boys. The majority (80%) had immigrant or refugee backgrounds. The two remaining participants were Swiss-born youth actively involved in a local basketball team. Most of the other participants were skateboarders, with additional involvement in football, volleyball, boxing, and informal swimming activities in the neighborhood.

Participants were recruited via multiple channels, including flyers posted in public spaces, direct contact with neighborhood sports clubs, and short presentations during local sports training events. The aim was to reach youth already engaged in physical activities who could speak to the specific challenges of exercising during hot weather. High participation of refugee and migrant youth was made possible through collaboration with the local association *Rookie Slash*, which works to integrate refugees through sport in the region. The researcher's existing role within this association provided privileged access to its participant network.

Figure 1 : *Flyer used to recruit participants for the participatory workshop*

The Workshop

The core data collection activity was a three-hour participatory workshop, held the 14th of May 2024 at the 3DD community center in the Jonction neighborhood. The workshop was co-facilitated by myself, the lead researcher, Nytaï Aidlin, along with four trained facilitators: Oscar Krakover, Nicolas Cotte Cabarcas, Luana Pagin, and Léo Fluckiger.

Due to time constraints, youth were not directly involved in formulating the initial research question. However, they were invited to review and approve the workshop structure beforehand and were encouraged to modify or adapt it during the sessions. The workshop was designed to be inclusive and dialogue-oriented, providing a space where participants could share experiences, express ideas, and co-develop responses. A welcoming atmosphere was maintained through informal elements such as an opening icebreaker, snack breaks, and a shared pizza meal. Data sources included, field notes, photographs of materials produced, participatory maps, and direct observation. Although youth did not take on formal data collection roles, they were central to generating content through their active participation in the exercises. As presented later, each activity concluded with a debrief session, where participants summarized key insights, which were recorded on boards, on post-it notes and organized in real time.

The workshop included four main activities:

First, the Heat Mapping Exercise. In this case, participants were divided into two groups and invited to choose from a variety of map formats retrieved from SITG (https://map.sitg.ge.ch/app/). There was different possible format: satellite, simplified, neighborhood-scale, or city-wide). Using colored markers and post-it notes, participants identified places where they felt safe or unsafe being physically active during heatwaves. Second, the Challenges and Obstacle. Participants reflected on the difficulties they face during extreme heat, such as physical discomfort, lack of appropriate infrastructure, or experiences of social exclusion. These challenges were written on post-it notes and later grouped together into broad thematic categories with the participants. Third, the Cool Hackathon. Building on the identified challenges, the youth worked together to suggest solutions to them. These solutions, also written on post-its, included both practical ideas, like water sprayers or shaded sports courts, and more creative suggestions, such as umbrella-equipped skateboards or a swimming pool in the city center. Fourth and final, the Try of Cooling Tools. Participants tested a selection of personal cooling tools, such as misting cloths and portable fans, and evaluated how useful they might be in everyday situations.

Thematic analysis began during the workshop itself, as participants and facilitators collaboratively identified categories and emerging insights throughout each activity. This live sorting allowed youth to see their contributions directly shaping the study's findings, and helped research to keep interpretations closely aligned with participants' own meanings. Following the workshop, I conducted further thematic coding to refine categories and identify patterns across activities. In general, this research began with clear guiding questions on how youth experience heat and what strategies they support more climate-resilient sport practices. However, the approach was deliberately participatory and exploratory. The workshop created space for co-design, with participants helping to shape both the understanding of the problem and the direction of potential solutions.

Figure 2: *Youth participants engaging in group mapping during the Heat Mapping Exercise*

Ethical Considerations

Participatory research is guided by ethical values that prioritize participant agency and respect for lived experience. Key principles, such as autonomy, justice, empowerment, shared power, and respect for experiential knowledge, are fully part of the study design (Banks et al., 2013; Flicker et al., 2007). While participatory methods can support empowerment and social inclusion (Ozer, 2016), implementing them, particularly in a youth-focused workshop format, requires careful ethical reflection. Issues such as power dynamics, the potential for meaningful participation, and the creation of a safe and inclusive space were actively addressed throughout this study. For participants aged 18 and over, written informed consent was obtained. For those under 18, both written parental consent and youth assent were required, in accordance with institutional ethical guidelines. The consent form can be found in Annex I, and signed forms can be seen upon request.

To promote autonomy, consent was treated as an ongoing process rather than a one-time agreement, as recommended by Moore (2019). Participants were regularly reminded of their right to withdraw from the study at any time without consequence. All information about the study was presented in accessible French, with the option for English translation. Time was

also set aside for questions and clarification to ensure informed participation. Anonymity, when required, was preserved across all research materials. These anonymization procedures were clearly explained to participants during the consent process.

Although participatory research aims to challenge traditional hierarchies between researchers and participants, power imbalances can still emerge, particularly when working with youth, who may see adult researchers as authority figures (Wong et al., 2010). To address this, facilitators intentionally adopted a posture of ally and co-learning, rather than authority. This approach was designed to foster a sense of shared ownership over the workshop and encourage youth to contribute freely. It reflects best practices in youth participatory action research, where meaningful power-sharing is essential for authentic engagement (Ozer et al., 2020). Recognizing the contributions of participants is also an ethical priority. As Rowland, Wills, and Ott (2024) emphasize, fair acknowledgment of participants' time and insights is crucial. In this study, all co-researchers were invited to share a meal following the workshop and gifted some cooling tools. This gesture was not presented as compensation for participation, but as recognition of their role as contributors.

AI technologies, including DeepL and ChatGPT, were used as support tools during the writing of this research project. They assisted with translation (French–English and English–French), writing support, brainstorming and summarizing academic research. All content generated was based on materials and guidance provided by the researcher. These tools were not involved in the source collection, data collection, interpretation of data or any part of the participatory process. No personal data of participants, such as name, age, or address has been shared online. AI technology use is acknowledged here in the interest of transparency and academic integrity.

ANALYSIS

This section provides a step-by-step analysis of the four activities carried out during the workshop. For each activity, a brief summary of the data collection process is provided, followed by a summary of the data collected. Finally, key themes and lessons are extracted and highlighted through a brief analytical interpretation. These elements will then be connected with the literature in the "Discussion" section. Images and tables are included as data visualisation.

Activity 1: Heat Map

DATA COLLECTION

The first dataset was generated through a Heat Map exercise, in which participants visually represented places and routes in the Quartier de la Jonction where they enjoy or avoid engaging in sport during periods of high temperature. Each participant received a printed neighborhood map and was encouraged to annotate it freely using markers and post-it notes. Green dots and lines were suggested to mark cool and pleasant areas, while red dots and lines were used for spaces perceived as too hot or uncomfortable for physical activity. Post-it notes allowed for the addition of context, specific activity types, or personal anecdotes, capturing not just location but also the reasoning behind participants' perceptions. Although guiding instructions were provided, the exercise remained open and creative. Some participants worked directly on individual maps, while others collaborated in small groups, discussing and negotiating their choices as they went. This process created a mix of individual and collective spatial knowledge. The original hand-drawn maps were later digitized by the researcher using ProCreate to consolidate and clarify contributions while preserving participants' original intent. Annotations and symbols from the workshop were kept, and arrows connect participant comments to their precise map locations. Figures 3 and 4 present these consolidated maps. Photographs of the original materials are included in Annex II for reference and transparency.

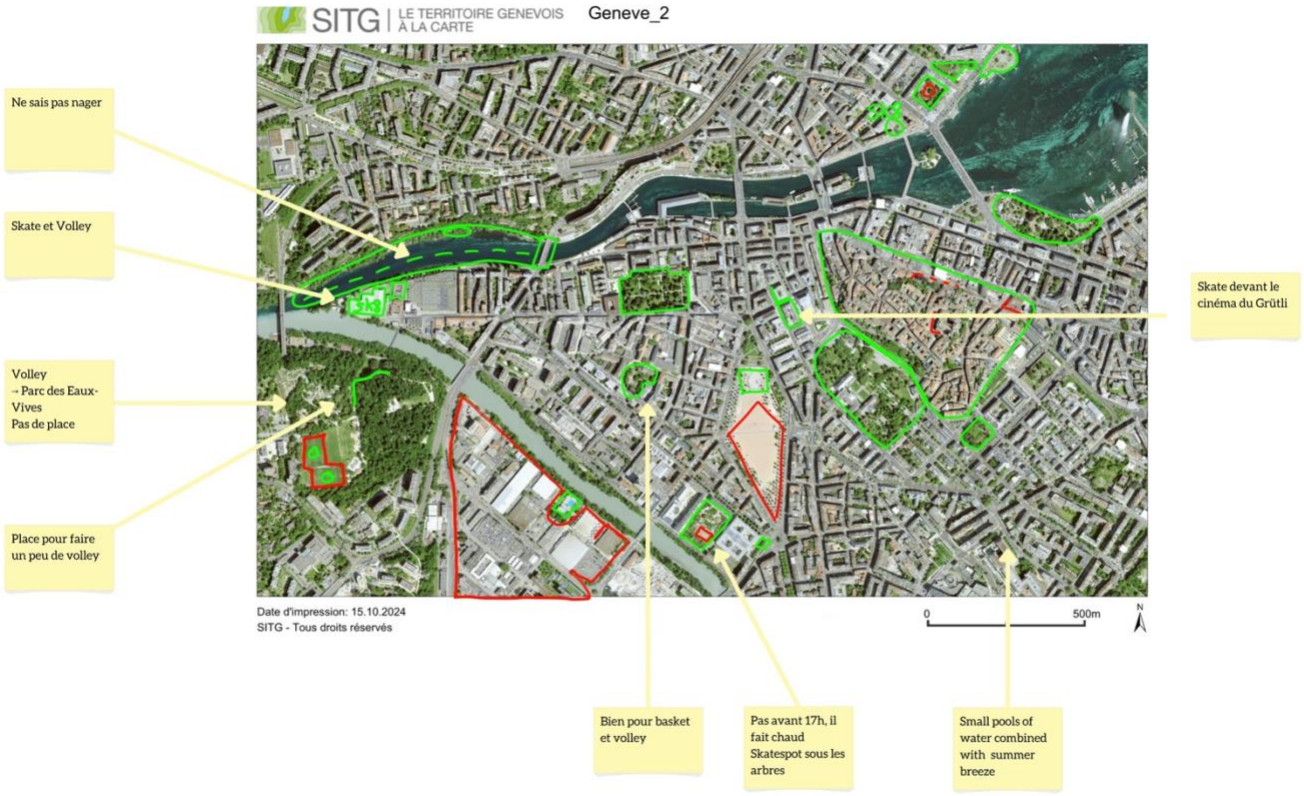


Figure 3: Digitized version of Group A's Heat Map

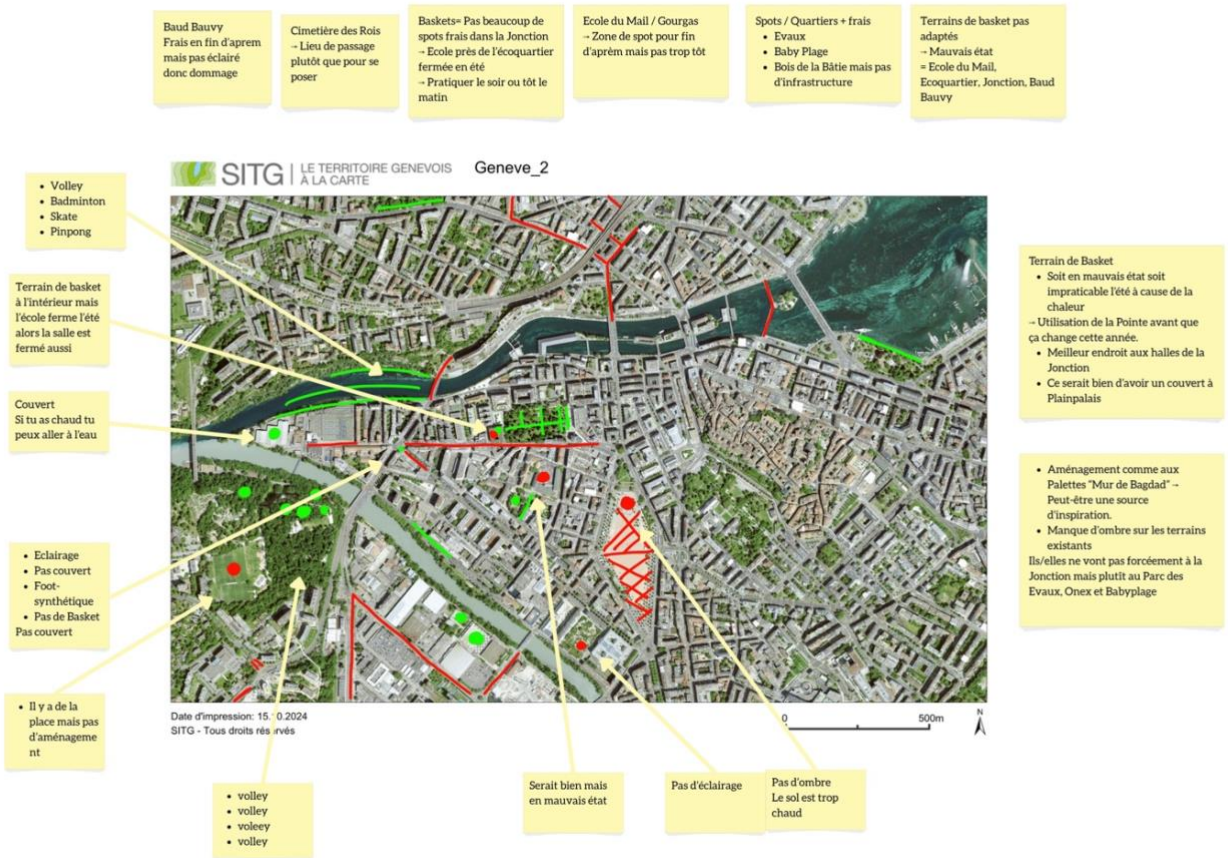


Figure 4: Digitized version of Group B's Heat Map

OVERVIEW OF THE DATA

Across both groups, several consistent patterns emerged in the distribution of "hot" and "cool" zones. Participants identified several heat-intense areas where practicing sport was considered difficult or even impossible. These included the Plaine de Plainpalais, especially at the skatepark, where "there is no shade and the ground gets too hot"; the industrial zone of Vernets, excluding the swimming pool, and multiple football fields, notably those at Bois de la Bâtie and Parc Baud-Bovy, described as lacking any form of adaptation. In the case of Baud-Bovy, a post-it noted that the space becomes "cooler in the late afternoon but is not lit, which is a problem." The basketball courts in several locations were also criticized, particularly those at the École du Mail and Écoquartier de la Jonction, due to either poor condition or inaccessibility during the summer months. Some streets and public infrastructure were also marked as hot zones, including Pont Sous-Terre and Boulevard Saint-Georges.

Cool zones are well spread on the map. The Pointe de la Jonction was frequently mentioned as a place to both swim and cool off, with notes highlighting that it is "covered and close to the water." The formerly covered sports space at the Pointe de la Jonction, known as *l'Asphalte* and located beneath the old TPG bus hall, was frequently mentioned with regret by participants, who recalled it as one of the best places to play before its closure. Other cooler areas included the Piscine des Vernets**,** both banks of the Rhône, the Bois de la Bâtie (excluding the football field), and Cimetière des Rois, though the latter was described as a "passing space" rather than a place to stay. The Parc Gourgas and parts of the Quai Ernest-Ansermet were also identified as fresher zones.

ANALYTICAL INTERPRETATION

Sport Infrastructures and Thermal Comfort

The data illustrate that the availability of sport infrastructure does not guarantee its usability during heatwaves. Participants' annotations on the maps make clear that many spaces typically designated for sport become effectively unusable during periods of extreme heat.

For example, the skatepark at Plaine de Plainpalais was described as intensely uncomfortable. Similarly, the football pitch at Bois de la Bâtie, while appreciated for its open space and greenery, was seen as largely inaccessible during summer afternoons due to direct sun exposure and heat accumulation. This internal contrast within Bois de la Bâtie, largely recognized as a cool spot, and the football pitch at its center, challenges simplified planning assumptions that green spaces are inherently climate adaptive. Even locations with suitable sport installations, such as the basketball courts in the École du Mail, Ecoquartier, and Baud-Bovy, were consistently described as "too hot," or "badly maintained". In contrast, the spaces marked as

“cool” or inviting for activity were consistently associated with environmental features that provide passive cooling: the Pointe de la Jonction was repeatedly praised for being both “covered” and “close to water,” while the banks of the Rhône or Piscine des Vernets were similarly highlighted for their shade, water access, or both

However, although the Rhône was one of the most frequently cited cool zones on the heat maps, not all participants felt able to take advantage of it. One post-it note placed directly on the riverside stated: “I can’t swim.” In this case, the space is open, accessible, and perceived as thermally comfortable, yet the ability to swim becomes an obstacle to fully benefiting from it.

Temporal Dynamics

Interestingly, while based on maps, this activity extended beyond spatial analysis and introduced the role of time as a critical factor in shaping when and whether sport spaces are usable. As participants identified hot and cool zones, they frequently added time to their observations. For example, one noted that the football field at Baud-Bauvy was “cool in the late afternoon but not lit,” while another described the skatepark at Plainpalais as “too hot to use during the day.” Similarly, indoor school gyms near the Écoquartier and Mail were often reported as closed during summer. Some youth also explained that volleyball courts become unusable not because of temperature, but due to overcrowding during cooler hours, when everyone rushes to the few spaces that remain available. These comments highlight that youth sport is shaped not only by spatial constraints but also by temporal ones. The data also suggest that such adaptive practices are constrained by broader structural barriers.

Informality as Adaptation

While formal infrastructure is a recurrent theme in the mapping, participants repeatedly identified informal and improvised sport spaces which are more usable in hot weather than official facilities For example, participants identified shaded skate spots, informal urban spaces used for skateboarding, such as those in front of the Grütli cinema, at Place de Bel-Air, and beneath the trees at UniMail, as usable even during periods of extreme heat. In contrast, the main skatepark at Plainpalais, although purpose-built, was repeatedly criticized for being too hot. Although participants did not make direct comparisons between sites, their mapping choices suggest a prioritization of thermal comfort and adaptability over official designation. This suggests that youth actively re-appropriate urban environments in response to climate stress, prioritizing comfort and usability over official status. Such practices demonstrate spatial

agency and highlight the potential of recognizing and integrating informal sport sites into adaptation strategies.

Or Leaving

Although the focus of the workshop was on youth experiences within the Quartier de la Jonction, participants often mentioned leaving the neighborhood during hot. Places like Baby Plage, Jardin Anglais, and Parc des Evaux were identified on post-it notes as cooler and more comfortable alternatives. While this kind of spatial mobility shows agency and resilience, it also highlights the limitations of the local environment. If youth must leave their neighborhood to find thermally comfortable sport spaces, then local infrastructure is not meeting climate resilience needs. In particular, it raises concerns about the availability of inclusive and climate-responsive sport infrastructure within La Jonction itself.

Figure 4: Discussion group during Activity 1, Heat Map exercise.

Activity 2: Challenges & Obstacles

DATA COLLECTION

In Activity 2, participants were asked to identify challenges they recognized in the neighborhood, write each one on a post-it note, and place it on a shared whiteboard. This activity generated a range of contributions, which I initially coded based on whether the issue mentioned was connected to a specific sport or reflected a more general experience of heat and physical activity in the neighborhood. A single post-it could fall into both categories when appropriate. Photographs of the original materials are included in Annex III for reference and transparency.

OVERVIEW OF THE DATA

Out of the 15 problems identified, 6 were sport-specific. Among those, basketball was the most frequently mentioned, with 4 post-its describing degraded infrastructure, such as damaged or outdated hoops and unsafe playing surfaces. One of these also mentioned the lack of shade as an additional obstacle to safe play. Then, skateboarding was referenced three times. Participants pointed out how the skatepark becomes unusable during the day due to heat exposure, both because of the unshaded feature and because of the heated floor surfaces. One participant shared an anecdote that one day "the empty space with the gravel gets too hot and certain types of shoes might melt". Moreover, multiple youth noted that only limited time windows are suitable for skating (early evening), leading to a saturation during those hours. Boxing was referenced once, with the participant noting that while the boxing gym is indoors, it lacks sufficient ventilation. Different comments echoed what was said in the Heat Map activity. Volleyball was also mentioned once in relation to overcrowding. Similarly to the skatepark, most players use the court during the cooler evening hours, so access becomes limited. Also, a post-it referring to football linked to Parc de la Bâtie cited the absence of shade as the main issue.

In contrast, nine post-its referred to general issues not linked to any one sport. These ranged from broader concerns about the lack of vegetation and heat islands in areas like Vernet, to the inaccessibility of indoor sports halls during summer, and the progressive disappearance of key public spaces, such as Les Halles de la Jonction, which was once considered one of the most welcoming spots for sport in the area.

Table 1 : Problems identified in Activity 2, by category.

Category	Sport / Area	Mentions	Issues Identified
Sport-Specific	Basketball	4	Damaged/outdated hoops, unsafe playing surfaces, lack of shade
	Skateboarding	3	Unusable during day due to heat, heated surfaces, limited usable hours (early evening), crowding
	Boxing	1	Indoor gym lacks sufficient ventilation
	Volleyball	1	Overcrowding during cooler hours
	Football (Parc de la Bâtie)	1	Absence of shade
General Issues	Vernet / Indoor halls / Les Halles de la Jonction	9	Lack of vegetation, heat islands, inaccessible indoor halls during summer, loss of public sport spaces

ANALYTICAL INTERPRETATION

During the workshop, we encourage participants to create their own analysis themes. They grouped problems under two general headings: “Infrastructure” and “Vegetation.” While this structure helped during the workshop, further analysis shows it does not fully capture the complexity of the issues raised. For example, the closure of indoor gyms during summer is not merely a question of infrastructure but it reflects a usage problem. Moreover, discussions revealed temporal nuances in sports practices. Many participants reported playing sport only in the evening, when temperatures drop, but no one mentioned doing sport in the early morning. While this may reflect logistical or personal limitations, it also indicates that time-based adaptation strategies, like shifting activity schedules, remain underutilized.

Table 2 : Themes identified in Activity 2, by category.

Theme	Mentions	Description
Sports Infrastructure	8	Poor surface conditions, outdated/broken equipment, inappropriate materials
Shadow	6	Lack of trees or shading structures, leading to heat discomfort
Usage	3	Overcrowding, restricted indoor access, limited feasible time slots
Water	1	No access to water fountains or cooling features

Based on this, I identified four analytical categories to describe the nature of the problems raised and assigned each post-it to one or more of them. From these categories, two central analytical themes emerged: Material and Governance.

Material

One of the most striking patterns to emerge from Activity 2 was the repeated mention of discomfort caused by the materials used in sports infrastructure. Planning debates often focus on the *presence* of infrastructure, but participants highlighted a different concern: how surfaces themselves become unusable in heat.

Basketball and skateboarding were the sports most affected by this issue. Participants described how surface such as asphalt, concrete, or synthetic materials, absorbed and released heat. The basketball courts were criticized not only for its degraded condition but also for having a floor surface that intensified heat. Similarly, skateboarders reported that the open space at Plainpalais became too hot to use during the day due to both direct sun exposure and ground's heat absorption. In addition, both the basketball courts and the skatepark are seen as lacking shade. In this sense, the issue is not phrased as the absence of infrastructure, but the misalignment between material choices and climate-adaptive design. Interestingly, water was mentioned only once, in general terms, with no further discussion about the availability of drinking water at or near sports facilities.

Governance

The second major theme concerns governance : the rules, schedules, and management practices that determine access to sport spaces. Several contributions to the inaccessibility of spaces at critical times. Participants frequently noted that indoor sports halls, such as those near Mail and the Écoquartier, were closed during summer, despite providing the thermal condition for safe and comfortable physical activity. This concern emerged in Activity 2 and during Activtiy 1, indicating that it is both persistent and widely shared. This was not framed as an infrastructure shortage, these spaces exist, but as an accessibility problem. Decisions made by school administrators, municipal authorities, or facility managers ultimately shape who gets to use these spaces and when. As a result, what appears on paper as available infrastructure becomes, in practice, inaccessible. Moreover, follow-up discussion with the participants revealed that

these decision-makers remain largely invisible to youth participants, making it difficult for them to question these decisions.

Activity 3 : Cool Hackaton

DATA COLLECTION

Activity 3 built directly on the challenges identified in Activity 2. In a session titled *Cool Hackathon*, participants were invited to propose solutions, either directly addressing the problems they had mapped earlier or offering new ideas for improving the neighborhood.. As in Activity 2, participants wrote their ideas on post-it notes and placed them on a shared whiteboard. When a solution addressed a previously stated problem, it was placed directly above it; otherwise, it was added to the side as a independent suggestion. Photographs of the original materials are included in Annex III for reference and transparency

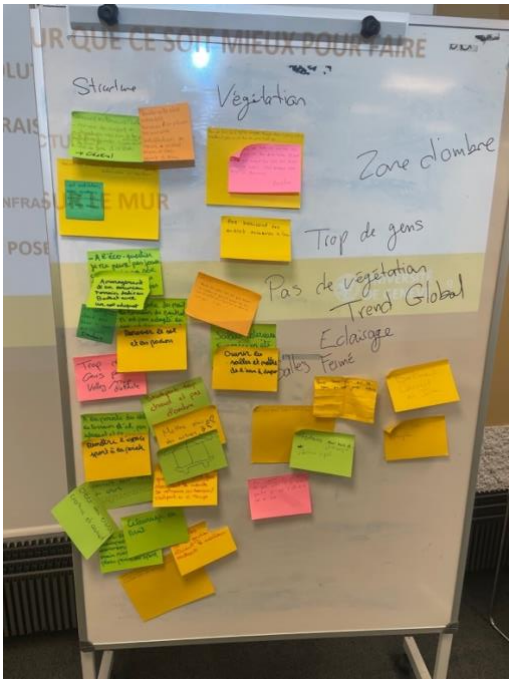


Figure 6: *Post-It Boards created during Activity 2 & 3.*

OVERVIEW OF THE DATA

A total of 26 ideas were collected during Activity 3. Of these, 18 addressed general issues related to heat and sport in the neighborhood, while 8 were linked to specific sports: 4 related to basketball, and 1 each to football, skateboarding, volleyball, and boxing.

Several notes focused specifically on basketball, particularly emphasizing the inadequacy of existing infrastructure. The two youth who represented the basketball group within the workshop arrived with notably well-developed proposals for improving local courts. Their suggestions included the installation of “shaded rest areas with trees” and the provision of “water access” at sports sites. They also called to “renovate or replace the baskets,” with their most emphasized recommendation being the creation of a new court “with a suitable surface.” The issue of inadequate flooring was a recurring concern, highlighted through multiple mentions of the need for “a safe flooring.”

In a follow-up discussion, these participants shared that they are actually active in an association called *Grande Assiette* to raise such concerns with local officials. Specifically, they proposed the installation of removable flooring, specific to basketball, that could be installed during the summer months and removed at other times of the year. According to them, this solution is largely used in other countries such as the United States and France, and would offer dual benefits: enabling safe play on appropriate surfaces and reducing heat buildup across the entire court area.

Solutions related to the skatepark and in general emphasized the need to “add more tree”, with the suggestion of choosing “plant above-ground trees to provide shade, and so we could move the planters with the trees” if needed. Participants also recommended improving the “night lighting,” noting that the current lighting is not suitable for sport use. More broadly, participants proposed the creation of “covered sports spaces,” applicable across various types of infrastructure. One particularly notable idea came from a Romanian participant, who proposed the use of “rubber shade covers open on the sides,” inspired by heat adaptation solutions used in her country of origin. According to her, this type of structure could be applied in multiple locations, such as the football field in Bois de la Bâtie or the skatepark. Importantly, the design would allow these covers to be removed after the summer months, offering a flexible solution.

In terms of practices adaptations, a suggestion to “do sport after 5 p.m.” reflects the habit of shifting activity times. Others recommended “wearing loose clothing”. Two notes emphasized improving access by stating that people should be allowed to “just go in and play.” Finally, multiple entries proposed water-based cooling options, such as “a drinking fountain where you can also dip your feet,” and the creation of “a pool, misting station, or splash zone in the skatepark.”

To better analyze this diverse range of responses, I coded each post-it into one or more of four thematic categories.

Table 3. Themes identified in Activity 3, by category.

Theme	Mentions	Suggestions / Description
Sports Infrastructure	17	Renovate surfaces, update equipment, build covered sport zones
Shadow	6	Plant trees, install movable planters, adapt shade systems for courts and skateparks
Usage	7	Shift sport schedules, wear appropriate clothing, improve access to indoor spaces
Water	2	Add fountains, misting areas, and cool-down zones

ANALYTICAL INTERPRETATION

Infrastructural over Practices

A notable pattern emerging from Activity 3 is the strong emphasis on infrastructural over practice-based solutions. Of the 26 ideas shared, 17 were categorized under sports infrastructure, compared to only 7 under usage. While a handful of suggestions involved adaptive practices, most contributions called for physical transformations of the urban environment. These ranged from targeted technical interventions, such as resurfacing basketball courts, to broader infrastructural upgrades like creating covered sports areas. Even when practical adaptations were proposed, they often appeared as pragmatic workarounds rather than ideal solutions. For example, the idea of playing sport “after 5 p.m.” was presented not as a preference, but as a necessity.

Interestingly, many infrastructural solutions emphasized temporary and reversible adaptations designed specifically for seasonal use. Examples include the removable rubber shade covers, the partial covering of the skatepark, and the use of movable tree planters to provide flexible shade. Participants consistently leaned toward forms of infrastructure that could be adapted without becoming permanent fixtures. In this context, participants appear to advocate for an infrastructure of responsiveness. Moreover, rather than proposing speculative or futuristic solutions, youth participants favored low-tech interventions. In follow-up discussions, some explicitly noted that the solutions they proposed would require lower capital investment and fewer administrative approvals.

Activity 4 : Try the Cooling Material

In Activity 4, *Try the Cooling Material*, participants were invited to test and evaluate a range of low- and mid-tech cooling tools designed to help mitigate heat stress during outdoor activity. Each item was rated individually using an appreciation table, with the 10 participants selecting whether they found it always useful, sometimes useful, or useless. Several of them also provided free-text comments, offering insight into the perceived practicality, comfort, or appeal of each item. This table is included in Annex IV.

Figure. 7: *Examples of cooling tools tested.*
From left to right and top to bottom: wet towel, personal mist sprayer, hand fan, and water spray bottle.

OVERVIEW OF THE DATA

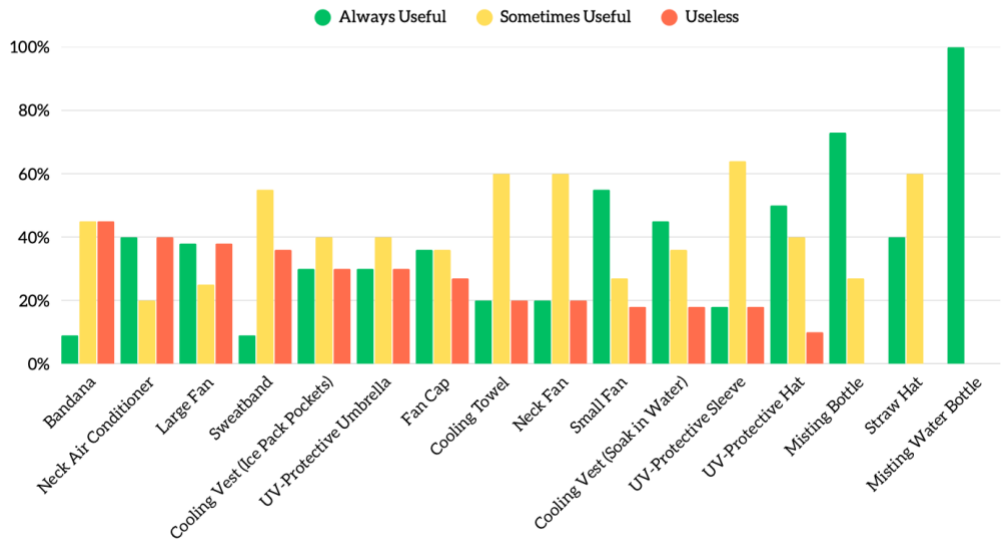
Among all the objects tested, the most favorably rated item was the spray water bottle (gourde-brumisateur), which received a unanimous “Always Useful” ratings. Participants described it

as “excellent,” “very useful,” and praised its combination of “hydration and refreshment.” The personal misting spray also scored highly, with 8 participants rating it as always useful and none as useless. Comments highlighted its small size, ease of use, and suitability even for indoor sports in winter. The third most appreciated item was the UV-protective hat, with 5 participants choosing “Always Useful” and only one calling it “Useless.”

Other items produced more ambivalent results. The cooling vest (to be soaked in water) scored relatively well, with 5 “Always Useful” ratings, although some youth noted that it left clothes “wet afterwards” or might be “better suited for seniors.” The fan cap (a cap with a built-in fan) received 4 “Always Useful” and 3 “Useless,” with comments noting that it “dried the eyes” and had “not much effect.” Similarly, the neck fan and UV-protective sleeves were mostly rated as “Sometimes Useful,” and often described as uncomfortable or ineffective over time. The folding hand fan, by contrast, was appreciated for being “easily transportable” and “simple to distribute,” earning 6 “Always Useful” responses despite being low-tech.

At the other end of the spectrum, three items received the most critical responses. The bandana, although a familiar accessory, was rated “Always Useful” by only 1 participant and considered “Useless” by 5. Youth noted that the fabric was “too thin,” “didn’t protect,” and was generally ineffective. Similarly, the sweatband received mixed responses, with just 1 “Always Useful,” 6 “Sometimes Useful,” and 4 “Useless.” A participant mentioned it was “too thin, but black,” suggesting limited value in terms of cooling. The neck air conditioner also divided opinions: while 4 participants rated it as always useful, another 4 marked it as useless. Several comments described it as “not practical” or simply a “gadget.”

Table 4. Results of the evaluation of cooling tools.



ANALYSIS OF THE DATA

LowTech over HighTech

One notable pattern emerging from Activity 4 is the consistent preference for low-tech solutions high-tech items. Despite the inclusion of innovative devices, such as the neck air conditioner, fan cap, and cooling vest, the most highly rated tools were the highest-rated tools were simple, easy to operate, and immediately effective. The spray water bottle, for example, received unanimous approval, consistently described as “excellent” and “very useful,” earning a perfect score across all participants. Its popularity seems to come from the fact that it provides a direct, tangible benefit that combined hydration and cooling in a single object. Similarly, the personal misting spray and folding hand fan were evaluated favourably due to their portability and applicability to sport settings. In contrast, more complex or unfamiliar gadgets such as the fan cap and the neck air conditioner were met with caution,.

Portability vs. Fashion

Another strong theme that came out of Activity 4 was the balance between portability and fashion. Tools like the spray water bottle, hand fan, and personal misting spray were rated not only as very useful, but also described as “easy to carry,” “usable anywhere,” and even “good indoors.” For many youths, the ability to bring these devices into everyday seem to be important. At the same time, participants also paid attention to how these objects looked. While their main focus was on how well an item worked to reduce heat, some of their comments and ratings showed that design and social acceptability also mattered. For example, participants talked informally about the colors of items like the bandana, cooling sleeves, and cooling vest, and how these might affect whether they would wear them. Even the sweatband, which used to be a popular sport item, didn’t get much interest. Their concern wasn’t only about whether the item worked, it was also about how it looked in public, and whether it would feel embarrassing or “uncool” to wear. In contrast, more neutral and familiar items like the spray bottle, UV-protective hat, and folding hand fan were rated highly. They didn’t stand out too much and looked like everyday objects.

RESULTS

This section brings together the analytical themes emerging from the different workshop activities to arrive at a final interpretation. The analysis identifies two broad thematic

categories: infrastructure and practices. The first, infrastructure, refers to the physical and material conditions that enable or constrain youth physical activity, including the design and location of sport facilities and public spaces. The second category, practices, refer to the everyday behaviours, routines, and strategies adopted by individuals and institutions. Finally, the discussion sheds light on the tension between these two aspects.

Infrastructure

A striking element that emerges from the analysis is the central role of infrastructure in shaping young people's ability to engage in physical activity during heatwaves. In Activity 2, which focused on challenges and obstacles, sport infrastructure was mentioned 8 times, making it the most frequently cited theme. This pattern continued in Activity 3, which centered on solutions, where infrastructure was mentioned 17 times, again emerging as the most recurrent theme. These consistent patterns make it clear that, for youth, infrastructure is not simply a neutral backdrop for activity. Rather, it is an active determinant of whether, when, and how sport can be practiced under extreme heat conditions. This finding reflects wider scholarship on the role of built environments in enabling or constraining climate adaptation, where infrastructure is increasingly recognised as a frontline factor in public health resilience (An & Dedekorkut-Howes, 2025).

The analysis shows that youth view certain types of sport infrastructure positively, particularly those that integrated natural cooling features such as shade and access to water. In the heat-mapping exercise, places considered "cool" were almost always linked to these elements. For example, Pointe de la Jonction has been repeatedly recognized for its shade and easy access to water. Similar feedbacks have been attributed to the banks of the Rhône or Piscine des Vernets. Participants emphasized their preference for spending time in green parks and along riversides, where shade, airflow, and water access provided comfort and allow for physical activity, even during heatwaves. These spaces illustrate how green and blue infrastructure can work in tandem to create microclimates favorable to physical activity. The benefits of urban greenery for thermal regulation, mental well-being, and physical health are well-documented (Aram et al., 2020; Gao et al., 2022), and the role of water bodies in cooling urban areas is increasingly emphasised in adaptation planning (Ahmed et al., 2024).

However, the data revealed a clear mismatch between the location of cooling elements and the placement of formal sport facilities. In Activity 2, the absence of shade was mentioned 6 times, being the second most mentioned theme after infrastructure. Across these sites, excessive sun exposure and the absence of shaded areas were consistently identified as major barriers to participation in physical activity. In addition to shade, Activity 2 also emphasized material choices in shaping young people's experiences of heat. Participants often described how certain materials used in public sports facilities, such as asphalt, concrete, or synthetic compounds, absorb and reflect heat excessively. This cause to discourage or even completely stop them from using the space for physical activity.

Several facilities were named repeatedly as problematic: the basketball courts at École du Mail, the Écoquartier, Baud-Bovy, and the Plainpalais skatepark. In some cases, even when sport facilities were located near green spaces, they were still not adequately equipped. The Bois de la Bâtie football field is a good example of this situation. While the surrounding park was appreciated for its greenery and natural space, the field itself was described as inaccessible during summer afternoons due to its exposure to the sun and heat. This challenges a common planning assumption that proximity to greenery automatically ensures thermal comfort (An & Dedekorkut-Howes, 2025). Without intentional climate-adaptive design, such as tree planting for direct shading of sport surfaces or the use of heat-reflective materials, these spaces may remain inaccessible during the hottest periods, reducing the functional availability of public sports facilities.

It is important to underline that these facilities are not peripheral or lightly used. Parc de la Bâtie, the Plainpalais skatepark, and other facilities mentioned are central, well-known, and highly visible public spaces. They are a key part of the local sport infrastructure network in Geneva. Yet, during periods of high heat, they become inaccessible to many young people. Their seasonal inaccessibility represents not just an inconvenience but a loss of public resource at precisely the time when safe outdoor spaces are most needed. In the light of this analysis, I argue that many sport spaces in the Jonction neighborhood appear to be considered by the youth as poorly adapted for safe and comfortable use during periods of high temperature.

In contrast, the most appreciated spaces identified by youth were not meant to be for sports. Pointe de la Jonction, the banks of the Rhône, or shaded areas under trees throughout the city, are not formal sports facilities at all. They are flexible, informal public spaces where activities, sports or not, can be self-organised. These environments allowed for autonomy, comfort, and a degree of spontaneity that was not possible in heavily scheduled or rigidly designed sport

facilities. This contrast highlights a broader issue: conventional sport infrastructure often lacks the adaptability required to meet youth needs in the context of rising temperatures. I argue that, during heatwaves, young people may seek out environments that offer more autonomy and comfort, and opportunity for spontaneous activity, qualities that many traditional sport facilities fail to provide. It also suggests that sport participation during heatwaves may be supported as much by accessible "everyday" public spaces as by specialised infrastructure.

If infrastructure is considered as a key challenge by the participants, it is also the path to improvement. The solutions proposed by participants reflect a pragmatic and adaptive mindset. Rather than calling for entirely new builds, which they recognised as financially and bureaucratically difficult, youth focused on modifying existing infrastructure. Moreover, many of the proposed solutions favored modular and reversible interventions that can be adjusted according to seasonal and climatic conditions. Examples included removable basketball court flooring to reduce heat absorption, movable planters for creating temporary shaded areas, and rubber covers for football pitches that could be installed during summer and removed in cooler months. More broadly, participants advocated for the creation of covered sports spaces using both natural elements, such as trees, and built materials. Such proposals reveal a sophisticated understanding of public space as a dynamic system that can evolve with environmental conditions. I argue that, in the context of improving sport facilities during heatwaves, youth do not view infrastructure as a static or finished product. Instead, they conceptualized it as something that could be adjusted and refined over time to better meet changing needs.

Ultimately, the infrastructural findings point to three parallel messages. First, climate-adaptive design is not simply about providing more facilities. It is about ensuring that those facilities remain usable across a range of environmental conditions. To do so, flexible, seasonal-adapted measures are recommended. Second, formal sport infrastructure should not be seen in isolation from the wider network of public spaces that young people use for activity. Parks, riverbanks, and shaded areas, even if not designed as sport spaces, can function as critical assets in maintaining youth physical activity during extreme heat. Third, future developments in sport facilities should aim to innovate by integrating elements of both formal and informal spaces. By doing so, it may better meet the needs of youth by providing greater flexibility and inclusion.

Practices

The second major barrier to physical activity during the summer, as identified by participants, was not infrastructural but practice-based and institutional in nature. In several cases, these non-material constraints were perceived as even more limiting than the physical environment itself. This dimension of the findings points to the critical role that time, governance, and social norms play in shaping sport participation during extreme heat.

A recurring theme that emerged was the issue of time, specifically how daily routines and institutional schedules influence young people's access to sport facilities. Many participants reported that outdoor sport spaces were only tolerable during the evening, when temperatures dropped. As a result, youth developed an informal strategy of shifting their sport activities to cooler hours. Such behaviour aligns with public health guidance that recommends scheduling activity during less hot parts of the day (République et canton de Genève, n.d.). However, this adaptive practice came with its own set of challenges: evening hours were often overcrowded, making it difficult to access popular facilities. Some youth eventually stopped playing sports altogether during the hottest weeks.

At the same time, youth noted that indoor sport facilities, such as school sport halls that could provide cooler alternatives, were closed during the summer holiday. These places are integral to the sporting lives of many participants during the academic year, particularly for sports like volleyball. Participants suggested that opening these indoor infrastructures to the public during summer could relieve pressure on outdoor areas and increase overall access to sport spaces. While this idea reflects a relatively low-cost, feasible solution compared to large-scale infrastructural investment, it requires shifts in institutional priorities and management practices.

Interestingly, while participants were quick to identify evening activity as a coping strategy, none mentioned making use of early-morning hours, when temperatures are also relatively cool. While it is understandable that early-morning activity may be unappealing to many teenagers, encouraging sport sessions during cooler morning hours could represent an overlooked opportunity especially as research recommending that outdoor activities be rescheduled to the coolest parts of the day to minimize heat exposure (Armstrong et al., 2007; Hossain et al., 2024).

Beyond individual routines, these observations underscore the extent to which institutional norms and administrative decisions shape when, how, and by whom sport spaces are used. In this sense, youth offered a thoughtful and pragmatic perspective. Improving access during

heatwaves may not always require new facilities. Instead, it means changes in how existing ones are governed, scheduled, and opened. This serves as a practical and low-cost solution. Yet participants acknowledged the barriers to initiating such changes. They have uncertainty about who holds decision-making power and how to effectively demand for more inclusive access. This confusion reflects a broader issue in the governance of public resources: Institutions do not have, or do not communicate effectively, on their tools of communication for young people and their proposals.

Interestingly, findings also point to a less explored form of exclusion : skill-based barriers. Although the riverside is physically accessible, not all youth feel equally able to use it, especially when it comes to swimming. The data on this subject comes from this participant's post-it note indicating that he cannot swim. While the Quartier de la Jonction benefit from high-quality and publicly accessible blue infrastructure, such as the Rhône, access is not simply a matter of physical proximity. It is also shaped by knowledge, skill, and safety. This is especially relevant given that 80% of the participants in this study are refugees and migrant. Newcomers may be less familiar with local swimming practices or have had fewer opportunities for formal swim training. As Ozer (2016) emphasizes in his work. effective adaptation requires understanding and responding to the full range of capabilities and vulnerabilities present in a community. Without complementary support even the most inclusive spatial designs may inadvertently reproduce existing exclusions. Addressing these gaps could involve targeted initiatives such as free swimming lessons or culturally responsive water safety programs.

Temporal and practice-based dynamics were echoed clearly in participants' proposed solutions. As noted in the section on infrastructure, youth expressed a preference for flexible, seasonal interventions rather than static, one-size-fits-all infrastructure. Their suggestions reflected a desire for adaptive designs that could adapt to shifting environmental conditions, daily constraints, and personal routines. Rather than calling for permanent structural changes, many participants proposed temporary adjustments that could be implemented and removed as needed. In other words, practicality has taken over from permanence.

This same preference for adaptability and ease was evident in the evaluation of personal cooling materials. As mentioned, the literature lacks content on how youth use personal cooling materials, particularly in sports settings. This gap is evident across various tools: there is no known academic literature on hand fan use among youth at the time of writing, and only limited research exists on ice vests (Arngrímsson et al., 2004; Mokhtari et al, 2014) or misting systems

(Trbovich et al., 2019) in youth contexts. According to our data, participants consistently favored simple, low-tech tools over more sophisticated gadgets. Items such as misting bottles and hand fans were appreciated for their immediate effect, portability, and ease of use. These make them compatible with everyday youth routines. They allowed youth to self-regulate thermal comfort across contexts, from sports fields to public transport stops.

Yet functionality was not the only criterion for adoption. Comments from young people show that social and aesthetic factors also influenced participants' preferences. Some devices, although functional, were considered bulky, making them more difficult to carry. In addition, any item similar to clothing, such as hats, bandanas, or sleeves, was also evaluated in terms of design and "attitude." In this sense, fashion also plays a role in what young people consider usable as heat-resistant personal cooling material. If it is considered unsuitable, and therefore less attractive for public use, the object loses its potential as a cooling artifact. For instance, items like the neck air conditioner or fan-equipped cap were sometimes described as "uncool" or too noticeable. In contrast, familiar-looking objects, such as the brumisateur or simple hats, were more likely to be accepted. I argue that, for youth, the success of heat adaptation practices related to the use of object depends not only on functional efficiency, but also on social acceptability and the potential for integration into peer norms and daily life.

Taken together, these findings emphasise that enhancing youth resilience to heat during sport requires more than infrastructural fixes. It demands attention to the institutional and cultural systems that govern space and shape behaviour, as well as the social meanings attached to adaptation tools. By centring young people's lived experiences, this analysis reveals that climate adaptation strategies must be both materially effective and socially acceptable, operating across multiple scales, from the governance of public facilities to the personal aesthetics of a hand fan.

Tension between Infrastructure and Practices

A central insight from the workshop is the tension between two approaches to climate adaptation: modifying personal practices versus transforming the physical and institutional frameworks that shape those practices. In the context of increasing heatwaves, this raises a critical question: should adaptation focus on helping youth adjust their routines, or on reshaping the material and governance systems in which those routines unfold?

This tension is particularly evident when considering the nature of participants' proposed solutions. As shown in the data, of the 26 suggestions generated during the solution-mapping activity, 17 were related to sports infrastructure, compared to 7 that involved practices or usage adaptations. This strong emphasis on infrastructure indicates that, for most participants, the solutions to physical activity during heatwaves are not perceived as acts of individual adaptation, but as structural challenges that demand collective and material responses. This preference for infrastructure-first solutions reflects the limits of change in practices in the face of physical constraints. As participants pointed out, practices adaptation alone cannot compensate for surfaces that become too hot to use, for courts without shade, or for locked gymnasiums during the summer. Young people, in the data, made clear that meaningful adaptation must involve transforming the material environment, not just changing personal practices. These finding echoes existing literature, which emphasizes that the effectiveness of practice-based strategies is closely tied to their environmental and social context, stressing the importance of complementing individual efforts with broader community-level interventions (Rana, Haque, & Masud, 2024).

Alongside physical barriers, participants repeatedly highlighted governance as an equally significant constraint. While some youth emphasized the lack of cooling elements in outdoor facilities, others pointed to the inaccessibility of indoor or shaded spaces. Several participants highlighted those certain facilities, such as school gyms or sport halls, remain closed during critical periods, such as the summer holidays, when heatwaves are most intense. This is not because they do not exist, but because of how they are managed. In this sense, infrastructure without accessibility is functionally equivalent to no infrastructure at all.

Here, the issue is less about infrastructure provision and more about institutional practices: the everyday operational rules and decisions that determine who can use a space, when, and under what conditions. Thus, the frustration expressed by youth was not necessarily about the absence of infrastructure, but about its governance. As mentionned earlier, decisions about schedules, access, and closures are often made by school authorities or municipal administrators, whose processes were described by participants as opaque and disconnected from youth realities. This reinforces a structural limitation: without institutional pathways for young people to influence operational rules, climate adaptation risks remaining top-down and misaligned with lived experience.

Yet, the findings also reveal youth agency in navigating these constraints. The heat mapping exercise highlighted how youth frequently identified informal spaces where they could practice sport despite heatwaves. This is particularly true for skateboarding. In response to the excessive heat at formal facilities, participants described alternative shaded locations where they preferred to skate, such as trees or covered areas. In this sense, the habits of going to informal shaded skate spots can be seen as micro-responses to macro-level failures in urban heat resilience. To a certain extent, this resonates with findings from Spaaij et al. (2018), who observed that youth in sport-for-development contexts often depend on flexible, negotiated uses of urban space when formal infrastructure proves insufficient or exclusionary. Within the specific context of skateboarding, Borden (2019) argues that the practice fundamentally challenges conventional ideas about public space. Rather than passively consuming the city, skateboarders engage it actively in different form to reimagine the urban landscape. The shaded skate spots identified by participants in La Jonction embody this dynamic use of space, not only as a form of spatial resistance or cultural expression, as described by Borden, but also as a response to climate conditions. These findings suggest that informal adaptability, specific to the culture of skateboarding, can also serves a climatic function. In this case, the creative appropriation of space becomes a practical strategy to pursue physical activity during heatwaves.

Importantly, this adaptability did not emerge for all sports. According to the present data, football and basketball, for example, were tied more closely to fixed facilities and were less able to shift into informal shaded environments. This raises a further question about the differential climate resilience of various sports and whether some physical activities are inherently more adaptable to changing environmental conditions than others.

Participants also demonstrated broader mobility strategies. Faced with local limitations, many described leaving La Jonction during extreme heat to visit cooler parts of the city, such as Baby Plage, Jardin Anglais, or Parc des Evaux. While this mobility strategy shows resourcefulness and agency, it simultaneously exposes the limits of local climate adaptation. The need to leave the neighborhood to engage in physical activity underlines, again, the inadequacy of local sport infrastructure in La Jonction.

In conclusion, the workshop findings reveal an ongoing tension between structural changes and everyday practices. Taken together, the dynamics illustrate that the tension between infrastructures and practices is not a binary opposition but a mutually dependent relationship. Structural changes are not isolated fixes; they must be designed to adapt to seasonal and

climatic variations while supporting the practical realities of youth routines. Conversely, practice-based strategies are only viable when the physical and institutional environment provides enabling conditions. This interdependence aligns with the view that climate adaptation in urban sport is both a material and a governance challenge—requiring collaboration between users and those who control resources. The workshop findings also reveal that youth are not calling for rigid, permanent infrastructure, but for systems that can evolve. They suggest a framework in which infrastructure serves as a base for adaptive practices, supported by governance models that prioritise accessibility and responsiveness. The example of cooling materials reinforces this point: participants were willing to adopt personal cooling tools when they met needs for adaptability, functionality, and social acceptability. This suggests that informed system, whether in the form of shaded courts, open gym policies, or socially acceptable cooling gear, are the most promising route to sustaining youth physical activity under heat stress.

Ultimately, the youth of La Jonction articulated a nuanced understanding that brings pragmatic and contextually based solutions. At the same time, they demonstrated adaptive responses to inadequate infrastructure and practices, for example, by adjusting their schedules, changing locations, or turning to informal sports spaces. In that sense, their emphasis on infrastructure was not limited to critiques of current shortcomings. It also reflected a broader vision of climate adaptation that is collective and grounded in adaptability. These perspectives suggest that infrastructure is a framework within which adaptive practices can flourish. In this vision, individual physical activity of youth would naturally adjust in response to the flexibility and accessibility of available sport infrastructure.

CONCLUSION

This study examined how young people in the Quartier de la Jonction perceive and can contribute to the development of climate-resilient physical activity practices in the face of increasingly frequent heatwaves. To do so, the study was guided by three sub-questions First, it aimed to understand how heatwaves impact the physical activity of youth aged 12–20 in the neighbourhood. Then, it focused on the environmental, social, and infrastructural factors influencing youth ability to stay active during extreme heat. Ultimately, the research aimed to

provide young people with a space to propose adaptive strategies for maintaining safe and accessible physical activity during heat waves.

The findings indicate that youth hold a nuanced understanding of the relationship between infrastructure conditions and social practices. Their perspectives highlight both barriers and opportunities for adaptation, underscoring the importance of combining material, institutional, and practices strategies. The condition defining the access to physical activity for youth during heatwaves can be categorized into two key dimensions: Infrastructural design and social practices.

Concerning infrastructural design, the physical usability of sports spaces is strongly shaped by their material composition and the presence of natural cooling features. The analysis shows that youth respond positively to facilities incorporating elements such as shade and access to water. Conversely, many sites were criticised for excessive sun exposure and a lack of shaded areas. These are barriers repeatedly cited as major obstacles to physical activity during heatwaves. Participants also noted that materials commonly used in public sports facilities, including asphalt, concrete, and certain synthetic surfaces, tend to absorb and radiate heat, making them unsafe in high temperatures. Without intentional climate-adaptive design, such as strategic tree planting to shade sport surfaces or the use of heat-reflective materials, these spaces risk becoming inaccessible during the hottest periods. Overall, the data indicate that many sports spaces in the Jonction neighborhood are perceived by youth as poorly adapted for safe and comfortable use in extreme heat.

Rather than calling for entirely new facilities, participants preferred adaptable, modular solutions that could be deployed seasonally or temporarily. Suggestions included removable basketball court flooring to limit heat absorption, movable planters to create temporary shaded areas, and temporary rubber covers for football pitches. These proposals reflect a sophisticated view of public space as a flexible system that can respond to environmental conditions. In this context, youth did not see infrastructure as fixed or final, but as something that can be continually adjusted and improved to meet evolving needs. I recommend that public policymakers, especially in Geneva, and concerned researchers to take these youth perspectives into account.

Interestingly, the analysis show that young people often turn to informal public spaces for physical activity. The spaces they valued most were not formal sport facilities but everyday urban environments. As many traditional facilities fail to provide adequate conditions during

heatwaves pushing youth to seek out alternative spaces that meet their needs. This suggests that, in hot periods, certain public spaces can support sport participation as much as, if not more, than specialised infrastructure. Also, skateboarding emerged as a particularly adaptable activity, with opportunities to practice in shaded skate spots across the city. However, this flexibility did not extend to all sports. In this study, certain activities such as football, volleyball, and basketball, were more reliant on fixed facilities, limiting their ability to shift into cooler, informal environments. This raises a question about the uneven climate resilience of different sports and whether some are inherently better suited to adapt to changing environmental conditions. Future research could build on these results by examining the most effective strategies to support youth physical activity during heatwaves, whether through the lens of sport and space selection or infrastructure and politic design.

On the practices side, time emerged as a central theme. Many participants reported that outdoor facilities were only tolerable in the evening, when temperatures dropped, leading them to play almost exclusively at that time. However, evening hours often became overcrowded, and some youth stopped participating in sports altogether during peak heat. At the same time, indoor facilities, such as school sport halls, remained closed during the summer. Opening these spaces in summer was seen as a low-cost, feasible way to relieve pressure on outdoor facilities. However, this would require shifts in institutional priorities and management practices and participants expressed uncertainty about how to advocate for such decisions. This points to a broader governance gap: institutions either lack or fail to communicate effectively with youth. The findings also reveal another form of exclusion based on skills. For example, while the riverside is physically accessible, it is not equally usable for those who cannot swim. Without complementary measures, even well-designed spaces may inadvertently reinforce existing inequalities. Addressing this requires targeted initiatives for water safety programs. I recommend that local authorities focus on these two area, governance, and education, to improve access to physical activity during heatwaves. On personal cooling tools, youth preferences reflected a preference for adaptability. participants consistently valued simple, low-tech, portable devices over more complex gadgets. Importantly, adoption depended not only on functional performance but also on social acceptability and style. For youth, effective heat adaptation is as much about cultural fit as technical efficiency.

In conclusion, the workshop findings highlight an ongoing interplay between structural change and everyday practice. This is not a binary opposition but a mutually dependent relationship:

infrastructure must be designed to adapt to seasonal and climatic variations while accommodating the practical realities of youth routines. Moreover, practice-based strategies can only succeed when supported by enabling physical and institutional conditions. Youth perspectives further indicate a preference for flexible systems over rigid, permanent infrastructure. They envision facilities as adaptable bases for evolving practices, supported by governance models that prioritise accessibility and responsiveness. This interdependence reinforces the view that climate adaptation in urban sport is both a material and governance challenge, requiring collaboration between users and those who manage resources.

In that sense, three parallel pathways for action emerge from the findings: First, retrofit existing sport facilities with climate-adaptive features, such as shade provision, water access, and heat-reducing materials, ensuring year-round usability. Second, integrate formal and informal spaces into a cohesive network of active environments, recognising the value of parks, riverbanks, and shaded public areas as legitimate sport spaces. Third, implement a coherent physical activity strategy for heatwave periods: expanding seasonal access to indoor facilities during high-heat events, addressing skill-based barriers through accessible swim training, and, at the individual level, working with youth-focused organisations to promote affordable, low-tech cooling tools that are both functional and socially acceptable.

This research makes several contributions to the literature. Empirically, it introduces youth-specific evidence into a field that has largely concentrated on adult populations, elite athletes, or static infrastructure assessments. By centring lived experience, it demonstrates how heatwaves reshape both the spatial and temporal dynamics of youth sport. It also underscores the often-overlooked role of informal spaces as valuable, yet under-recognised, assets for physical activity and climate resilience during heatwaves. The findings invite the literature to look beyond traditional infrastructure and formalised practices, recognising the potential of everyday urban environments to support active lifestyles in extreme heat. Conceptually, the study reframes youth engagement from mere consultation to co-design. It advocates for participatory methods with young people, showing that their proposals are pragmatic, context-sensitive, and attentive to local resources. In doing so, it positions youth not simply as beneficiaries of adaptation strategies but as co-creators of solutions tailored to their own contexts.

While the participatory workshop generated rich, place-specific insights, its one-day format limited opportunities for proper co-design and real-world testing of proposed strategies.

Furthermore, the absence of decision-makers in the process reduced the immediate political traction of participants' proposals. Future research should adopt multi-phase engagement to refine and trial solutions over time. It should also include institutional actors to ensure that youth-generated ideas can inform policy and facility management.

In sum, the research demonstrates that climate adaptation in urban sport is not solely a matter of infrastructure or of individual practice, but of the dynamic relationship between them. Youth in La Jonction envision sport spaces as adaptable frameworks that support evolving practices. Material design, governance structures, and everyday routines interact to sustain physical activity under heat stress. Overall, their proposals emphasise practicality, flexibility, and social inclusion. These principles can inform broader strategies for climate-resilient urban sports planning in Geneva and beyond.

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ANNEXES

ANNEX I

Blank Informed Consent Form (Signed form are available on request).

Autorisation parentale

Nom et prénom du représentant légal : _____
Adresse : _____
Téléphone : _____
Adresse e-mail : _____
Nom et prénom du/de la mineur.e: _____

J'accorde le droit à le/la mineur.e de participer à l'atelier organisé par Nytaï Aidlin, étudiant en Master à l'Université de Genève, dans le cadre de son mémoire de recherche le 14 mai, de 13h à 16h à l'atelier 3DD (Rue David-Dufour 3, 1205 Genève).

Informations sur l'atelier

Objectif : L'atelier vise à récolter des informations sur les activités physiques et sportives des habitant·es de La Jonction, et à discuter de leur adaptation face aux canicules.
Activités prévues : discussions, travail de groupe, réflexion collective, moment convivial.
Public concerné : habitant·es du quartier, adolescent·es et jeunes adultes.

Engagement et consentement

- La participation est bénévole.
- Aucune donnée ne sera utilisée à des fins commerciales, uniquement dans le cadre académique.
- Mon enfant pourra quitter l'atelier à tout moment, sans avoir à se justifier.
- Les échanges pourront être notés ou enregistrés (voix uniquement), dans le respect de la confidentialité.
- Les données personnels seront anonymisés

J'autorise donc mon enfant à participer à cet atelier, et je certifie avoir été informé·e de sa nature et de son déroulement.
J'accepte que mon enfant soit photographié et que les images soient utilisées sur les réseaux sociaux liés au projet de recherche.
Fait à : _____

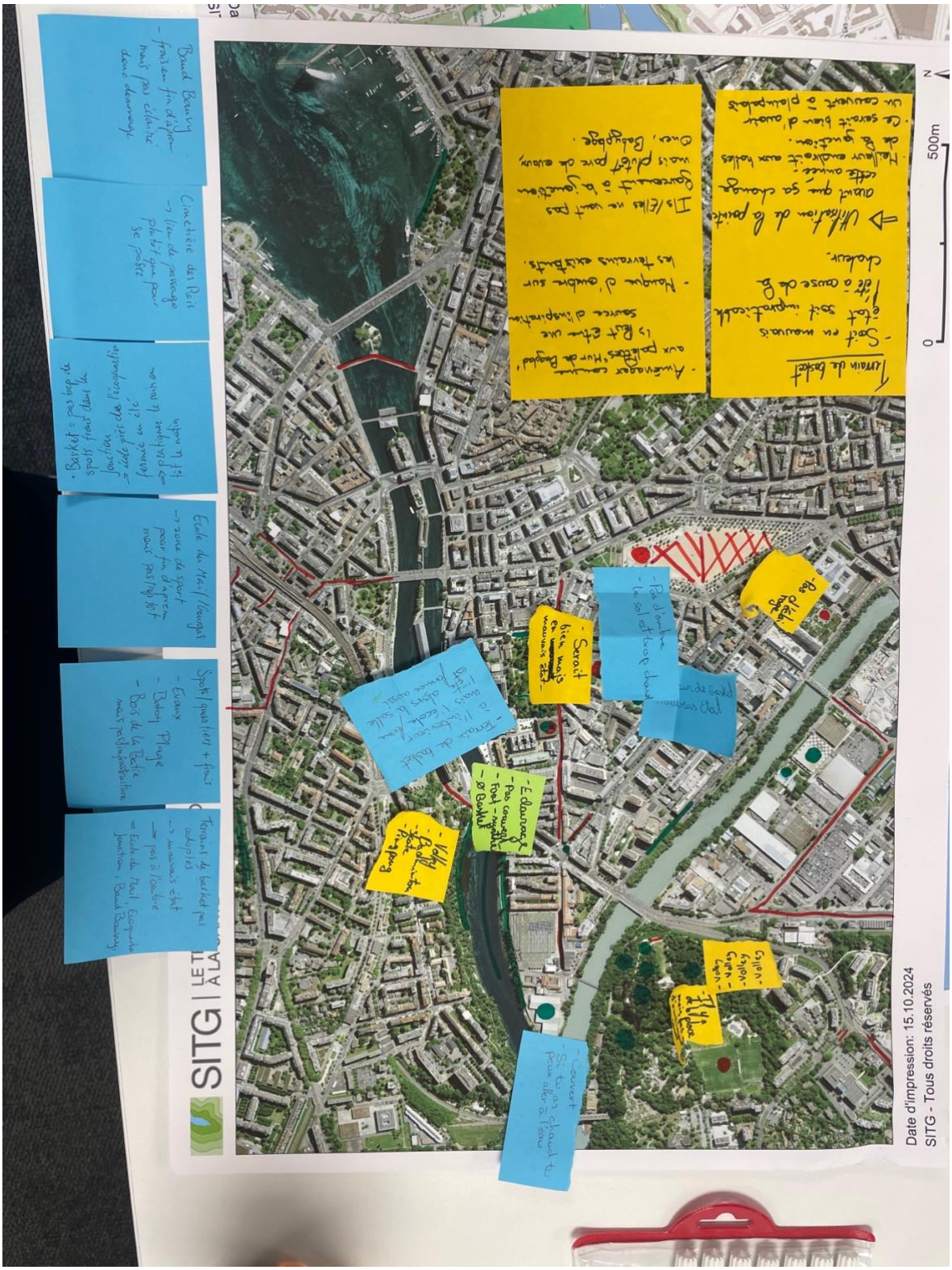
Le (date) : _____

Signature du représentant légal : _____

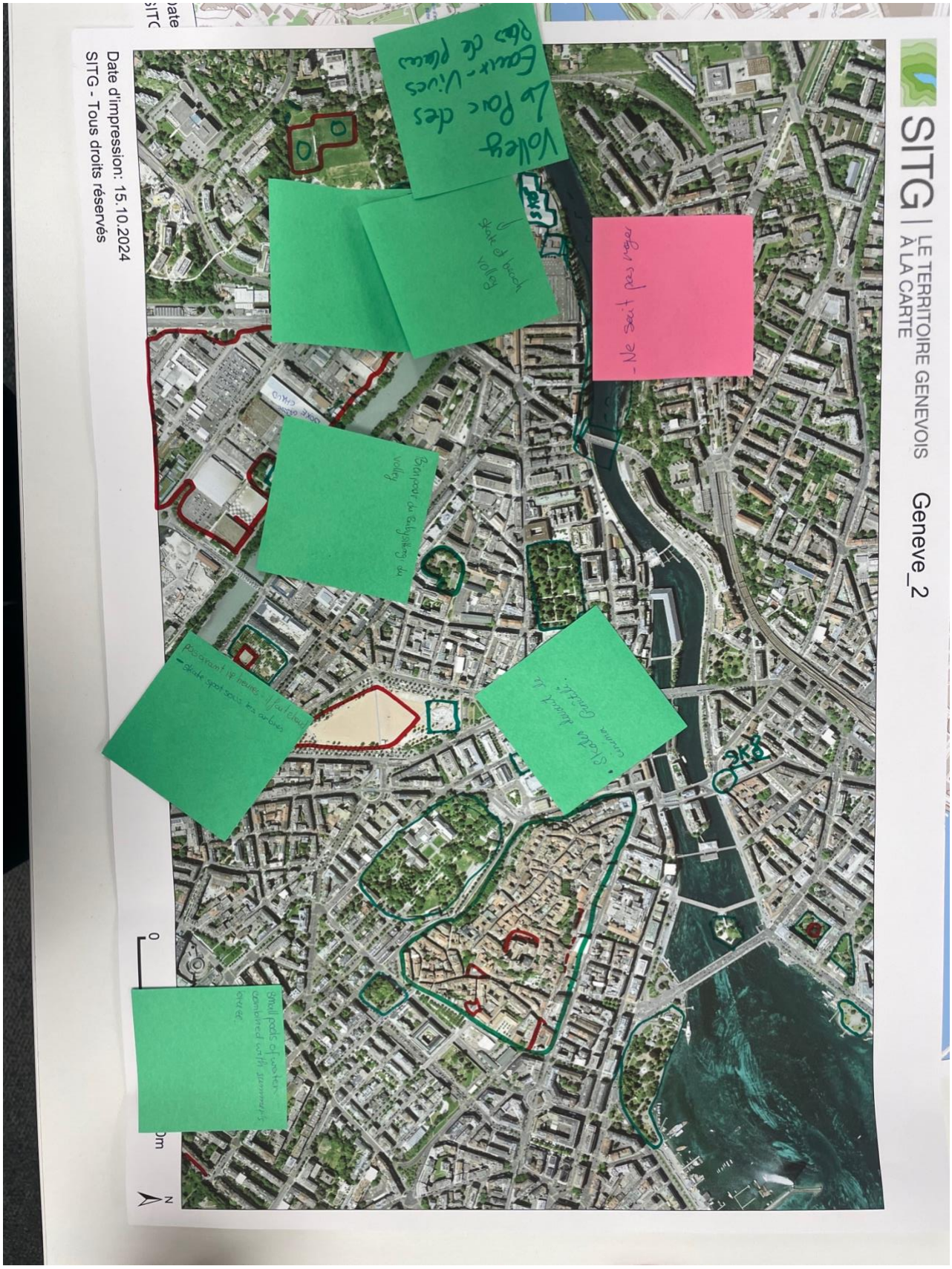
ANNEX II

Workshop. Heat Map Activity: Photographic Documentation

Heat Map Activity – Group 1 Output

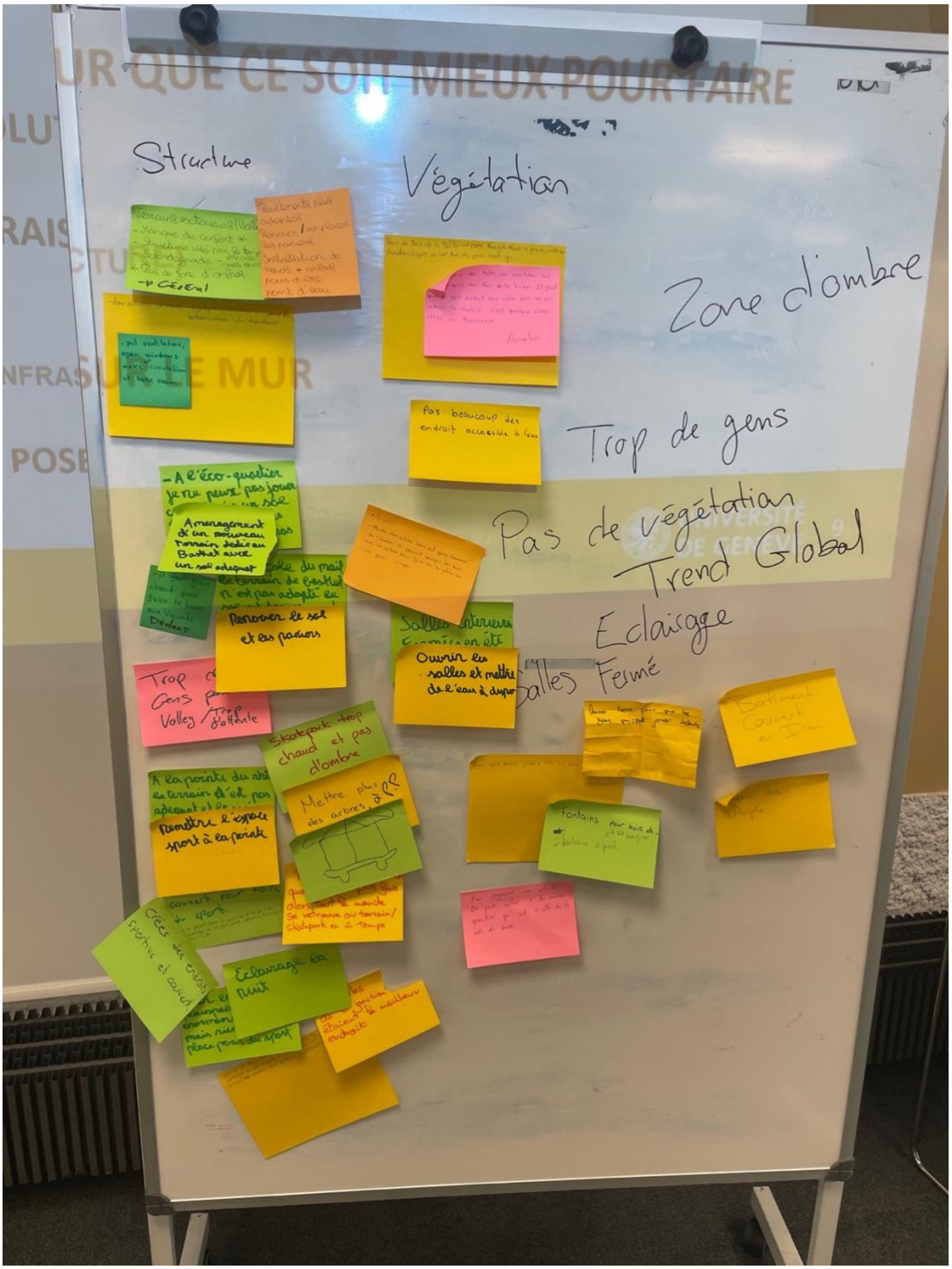


Heat Map Activity – Group 2 Output



ANNEX III

Workshop. Challenges & Obstacles & Cool Hackathon Activity: Photographic Documentation



ANNEX IV

Workshop. Try the Cooling Material Activity: Blank Checklist

#	Item	Prix unité (CHF)	Toujours utile	Parfois utile	Inutile	Remarque
1	Bandana	9				
2	Bandeau transpiration	6				
3	Brumisateur	8				
4	Casquette ventilateur	17				
5	Chapeau anti-UV	14				
6	Chapeau en paille	25				
7	Climatiseur nuque	59				
8	Petit éventail	9				
9	Grand éventail	18				
10	Gilet rafraîchissant (à tremper)	17				
11	Gilet rafraîchissant (poches glace)	130				
12	Gourde-brumisateur	9				
13	Manches anti-UV	15				
14	Parapluie anti-UV	14				
15	Serviette rafraîchissante	12				
16	Ventilateur nuque	25				