

COOL down: The role of social capital in enhancing adaptation to extreme heat events in the city of Vienna (COOLCITY) : Final Report to the City of Vienna Anniversary Fund for the University of Natural Resources and Life Sciences, Vienna

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Final Report to the City of Vienna Anniversary Fund for the University of Natural Resources and Life Sciences, Vienna

Title

COOL down: The role of social capital in enhancing adaptation to extreme heat events in the city of Vienna (COOLCITY) // COOL down: Die Rolle von Sozialkapital in der Verbesserung der Anpassung an extreme Hitzeereignisse in Wien

Scientific abstract (English)

The increasing number of extreme heat events in Vienna due to climate change causes negative impacts on the residents, such as heat-related mortality and morbidity. Most adaptation strategies in cities rely so far on technical solutions and on changes in individual lifestyle. However, next to financial, infrastructure and human capital, climate change adaptation also requires social capital. COOLCITY thus focused on strengthening social capital in Vienna through social innovations, particularly during extreme heat events. Two highly vulnerable areas in Vienna – ‘Innerfavoriten’ and ‘Gründerzeitviertel/Westgürtel’ – were selected based on pre-existing heat hot spots overlapped with socio-demographic data. 22 interviews with particularly vulnerable residents of the case study areas as well as eight expert interviews were conducted to investigate the relation between social capital and heat stress. Social innovations for adapting to extreme heat events were developed in two participatory citizen workshops and discussed with representatives of the City of Vienna and relevant organizations in a concluding stakeholder workshop. The COOLCITY findings show that social capital can mitigate heat stress in multiple ways: through organizing mutual help in social networks, facilitating communication between residents and administration, and sharing local knowledge. Social innovations can play a crucial role in these processes. Thus, the enhancement of social capital should be seen as a central component of a resilient city – particularly, but not exclusively during extreme heat events. COOLCITY continuously evolved in close collaboration with different administrative bodies of the City of Vienna. Such a transdisciplinary approach was followed to ensure the applicability of results and to facilitate the implementation of new policy measures increasing social capital in the City of Vienna.

Populärwissenschaftliche Zusammenfassung (Deutsch)

Die zunehmende Zahl extremer Hitzeereignisse in Wien aufgrund des Klimawandels hat negative Auswirkungen auf die Bevölkerung wie hitzebedingte Mortalität und Morbidität. Die meisten Anpassungsstrategien in Städten beruhen bislang auf technischen Lösungen und auf Änderungen im individuellen Lebensstil. Neben Finanz-, Infrastruktur- und Humankapital erfordert die Anpassung an den Klimawandel jedoch auch Sozialkapital. COOLCITY konzentrierte sich daher auf die Stärkung des Sozialkapitals in Wien durch soziale Innovationen, insbesondere bei extremen Hitzeereignissen. Zwei besonders gefährdete Gebiete in Wien – Innerfavoriten und Gründerzeitviertel/Westgürtel – wurden auf Grundlage bereits bestehender Hitze-Hotspots verschnitten mit soziodemografischen Daten ausgewählt. 22 Interviews mit besonders gefährdeten Personen in diesen Fallstudien sowie acht Expert:inneninterviews wurden durchgeführt, um den Zusammenhang zwischen Sozialkapital und Hitzestress zu untersuchen. Das Projekt entwickelte soziale Innovationen zur Anpassung an extreme Hitzeereignisse in zwei partizipativen Bürger:innenworkshops. Diese wurden zudem in einem abschließenden Stakeholder-Workshop mit der Stadt Wien und relevanten Organisationen diskutiert.

Die Ergebnisse von COOLCITY zeigen, dass Sozialkapital Hitzestress auf vielfältige Weise abschwächen kann: durch die Organisation gegenseitiger Hilfe in sozialen Netzwerken, die Erleichterung der Kommunikation zwischen Bevölkerung und Verwaltung und den Austausch von lokalem Wissen. Soziale Innovationen können bei diesen Prozessen eine entscheidende Rolle spielen. Daher sollte die Stärkung des Sozialkapitals als zentraler Bestandteil einer resilienten Stadt angesehen werden - insbesondere, aber nicht ausschließlich bei extremen Hitzeereignissen. COOLCITY wurde in enger Zusammenarbeit mit verschiedenen Verwaltungsbehörden der Stadt Wien laufend weiterentwickelt. Ein derartiger transdisziplinärer Ansatz wurde verfolgt, um die Anwendbarkeit der Ergebnisse zu gewährleisten und die Umsetzung neuer politischer Maßnahmen zur Steigerung des Sozialkapitals in der Stadt Wien zu fördern.

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Project Output

Introduction

The number of extreme heat events in Vienna has increased significantly during the past few decades due to climate change and this trend is rising (APCC, 2018). In 2022, the average temperature during the months of June, July and August has again been considerably higher than the reference period 1981-2010, by 3,0°C, 1,9°C and 2,5°C respectively (ZAMG, 2022a; ZAMG, 2022b; ZAMG, 2022c). To react to the negative impacts of heat exposure and vulnerability like heat-related mortality and morbidity, many adaptation strategies in cities rely on technical solutions, such as green roofs, facade greening or fog showers, and on changes in lifestyle, such as cold baths or a cooling diet (Icaza, 2017; Brandenburg et al., 2018; Oswald et al., 2020). However, technical innovations and individual adaptation measures are not sufficient in facing the consequences of extreme heat events. Next to financial, infrastructure and human capital, social capital is also an indispensable cornerstone of climate change adaptation. The COOLCITY project thus focused on strengthening social capital in Vienna through social innovations, particularly during extreme heat events. Two highly vulnerable areas in Vienna – ‘Innerfavoriten’ (part of the 10th municipal district of Vienna) and ‘Gründerzeitviertel/Westgürtel’ (the parts of eleven municipal districts of Vienna in proximity of the main traffic route ‘Wiener Gürtel’ with a focus on 7th and 16th municipal district) – were selected based on pre-existing heat hot spots overlapped with data about the socio-demographic structure of Vienna.

Methodology

Following a transdisciplinary approach, regular communication with and consultation of the LOI-issuing stakeholders Gebietsbetreuung Stadterneuerung, MA18, MA25, Magistratsdirektion Klimaschutzkoordination and Wiener Gesundheitsförderung took place. In bilateral consultations and two group meetings with these stakeholders and other one-time collaborators with specific knowledge

and interests, the COOLCITY project developed and improved research (e.g., identify potential interviewees, adapt case studies). In addition, such an approach ensures the applicability of results for the City of Vienna (e.g., discuss synergies with ongoing projects in the City of Vienna, tailor presentations to specific administration department needs).

COOLCITY focused on two target groups that are particularly vulnerable to heat stress: elderly residents aged 60+ due to lower resistance to high temperatures and increasing social isolation (Wanka et al., 2014; APCC, 2018), and residents with a migrant background due to socio-economic disadvantages and heat-susceptible living and working conditions (Wiesböck et al., 2016; Arnberger et al., 2021). In sum, 22 residents of the target groups were interviewed in the case study areas (for an overview of the interviewees, see Table 1 in Appendix 2). The interviews were semi-structured, followed strict COVID-19 rules and guidelines and partly conducted as walking interviews to tap into the interviewees' perceptions and feelings as experts for their local living environment (Carpiano, 2009; Harris, 2016). Based on the interview results, two participatory citizen workshops with residents of the case study areas were held to develop social innovations for adapting to extreme heat events. After the perspectives of the target groups were sufficiently scrutinized through the interviews and workshops, the initially conceived online survey was not conducted. Instead, eight expert interviews with representatives of the following organizations were conducted to learn more about the target groups, their vulnerability and how they are supported: GB*, MA17, Verband gemeinnütziger Bauvereinigungen (GBV), Wien-Süd, WiG, Wiener Hilfswerk, Wiener Rotes Kreuz, Wiener Wohnen. Finally, the COOLCITY results were discussed with these experts and other administrative and political bodies of the City of Vienna (including the district-level) as well as residents of the case study areas in a concluding stakeholder workshop that was co-developed with the LOI-issuing stakeholders.

Results

In COOLCITY social capital is defined as a measure of cohesion, e.g., within a district. It is composed of the density of networks and associations, the willingness of people to help each other, and the degree of mutual trust and cooperation (Jäger et al., 2012). Social capital comprises structures, institutions, networks, and relationships, which enable individuals to consolidate and develop their human capital in partnership with others. Unlike other forms of capital, social capital is embedded in relationships and not a matter of individual ownership. The literature discusses three different types of social capital: bonding, bridging, and linking (Bhandari and Yasunobu, 2009; Rostila, 2011; Moore and Kawachi, 2017). Bonding social capital refers to trusting and cooperative relations between members of a group that are homogeneous in demographic characteristics and attitudes, e.g., family members and close friends (Poortinga, 2006). Bridging social capital comprises relations across groups with heterogeneous social identities, e.g., work colleagues or the wider neighborhood, and indicates the perceived levels of mutual respect and solidarity in a society (Kawachi et al., 2004). Linking social capital denotes relations across formal or institutionalized power or authority gradients of a group with political authorities, administration, and other agencies (Szreter and Woolcock, 2004; Bhandari and Yasunobu, 2009).

Next to social capital, social innovations are a second essential parameter to foster adaptation strategies for extreme heat events. Social innovations are defined as new services, rules, procedures, and practices, aiming to improve the problem-solving capacity in any given social context (Howaldt and Hochgerner, 2018; Howaldt and Kopp, 2012; ZSI, s.a.). Whereas new products become innovations

through their market success (ZSI, s.a.), social innovations can be termed as such when they “simultaneously meet social needs [...] and create new social relationships or collaborations” (European Commission, 2010, p. 9). Furthermore, social innovations can be collectively co-shaped and co-created by various groups of actors with different social relationships (Howaldt and Kopp, 2012).

Results from the interviews illustrate that there is manifold bonding, bridging, and linking social capital available in the case studies. Regarding bonding networks, family members may act as support against heat stress in single cases, but interviewees agree that this is insufficient due to conflicting obligations and physical distance. Furthermore, particularly elderly citizens often lack family and friends and thus “*should not be dependent on private relationships [and] own social skills*” (personal quotation from interviewee P19). While this challenge was acknowledged, most of the interviewees described themselves as being part of intact social networks. Many of them reported on some type of (local) social engagement, either informally, formally, or as part of their paid work, suggesting that they contribute to social capital in the case studies and likely also benefit from it in reciprocal ways. For more isolated citizens, interviewees suggested social innovations such as the establishment of shared accommodations for seniors and (more) social housing projects. Residents of one housing project in Innerfavoriten emphasized how their community diminishes social isolation and serves as a support network both during extreme heat events and at other circumstances. Generally, such house communities seem to become bonding networks of trust and cooperation most likely when members share a common concept of living together, facilitated by comparable characteristics, such as levels of education and etiquettes.

House communities as well as the wider neighborhood can also constitute bridging networks. While most interviewees agreed that neighborly relations in Vienna are generally rather superficial, some of them described their neighborhood as extremely well connected, exemplified by regular communication and neighborly help within and between residencies. In one case, this extends to advising vulnerable residents to stay inside during extreme heat events and growing concern when they remain unseen for a few days. Therefore, this kind of neighborhood as bridging networks may replace formal support offers, such as mobile nursing services. To be able to create such bridging networks, interviewees formulated the wish for (more) adequate public spaces, e.g., parks or larger squares, and semi-public spaces, e.g., cafés or cultural centers, in their vicinity, especially in new neighborhoods such as the Sonnwendviertel in Innerfavoriten. The accessibility of existing public and semi-public spaces – ideally cool spots, to counteract social isolation particularly during extreme heat events – was also discussed, both in terms of reachability and suitability. Social innovations suggested to facilitate easier access to such cool spots included a price-reduction of museums and the opening of school workrooms, churches, and other suitable public or private owned buildings. Some interviewees also proposed the opening of inner yards and roof terraces in single residencies to the wider neighborhood, under certain conditions and for certain time periods. Others argued in contrast that these spaces should remain exclusively accessible by the respective house communities, arguing that they are the ones paying for it and that sharing such spaces with a relatively small group of people is already challenging enough. Being concerned about preserving a “*certain intimate character*” (personal quotation from interviewee P13) of such spaces when opening them up to more and unknown people illustrates the difference and overlap between networks of bonding social capital and bridging social capital.

Regarding linking social capital, the interviewees mentioned mainly the City of Vienna, as several of them had actively approached its administrative bodies in the past for various reasons. Most of them described these encounters as rather discouraging, when pointing out local issues or suggesting changes in the neighborhood – also related to heat stress, e.g., suffering from sub-standard housing conditions, or proposing greening initiatives for urban heat islands. This notion was strongly reinforced in the citizen workshop in Gründerzeitviertel/Westgürtel, in which the participants shared frustrating experiences with the city administration in participatory processes and discussed suggestions for improvements (see below). Both interviewees and workshop participants suggested social innovations particularly directed to the administration, namely more easily accessible contact points with clear responsibilities (e.g., ‘heat service centers’) as well as an enhanced ‘Stadt-service’ (citizens’ service) in the sense of a mouthpiece (‘Sprachrohr’) that translates and allocates all citizens’ concerns. This was also discussed in the context of greening measures such as urban gardening, greening facades and other community-oriented ideas, for which funding procedures should be simplified. Furthermore, interviewees emphasized the importance of addressing and appealing to all citizens by consistently offering multilingual information and communication on all channels, also in cooperation with different local and cultural associations. Such investments in strengthening linking social capital could increase trust in authorities and a sense of belonging, thus facilitating citizens’ care for their living environment and willingness to participate in its development. This is an important lever, as it bears the potential for building up more (particularly bridging) social capital.

Upon closer examination of the social innovations suggested by the interviewees, the following three levels were identified:

- I. Activities and offerings: implementing additional support measures during extreme heat events
- II. Information and communication: orchestrating the public discourse about heat
- III. Spaces: providing cool spots and ensuring their accessibility

These three levels are closely related, meaning that almost all the suggested social innovations touch upon more than one level. For example, free shared transportation to cool areas is an additional offering, but this service must be communicated adequately to the target groups, and for both pick-up spots and cool spots adequate spaces must be selected. Table 2 in Appendix 2 shows a list of all suggestions for social innovations from both interviews and citizen workshops, each assigned to one of the three levels. In the two citizen workshops, participants further discussed and specified some of these suggestions. The residents of Innerfavoriten discussed ‘Der G’Spritzte hat wieder Saison’, a public get-together organized by the district with free beverages for the local neighborhood. They envisioned a setup of large tables with stimulating question on display to induce dialogue with strangers, potentially in cooperation with GB* or small local businesses, but without any additional program for entertainment. Furthermore, they stressed the importance of clear parameters, i.e., date, time, space, and an alternative option in the case of bad weather. The residents of Gründerzeitviertel/Westgürtel discussed how citizen participation in greening measures could be improved. They stressed how crucial it is to provide possibilities for participation throughout the whole process, from finding common visions and reifying ideas to haptic steps, such as planting, watering, and harvesting plants. Implementing small-scale solutions while following a consistent overarching strategy for climate change adaptation was formulated as an appeal towards the City of Vienna. Both groups emphasized multilingual information

and advertisement through various channels, such as leaflets, local newspapers, posters, notice boards in residencies, and most importantly, word of mouth recommendations. Figure 1 in Appendix 2 serves as a visual impression of the citizen workshops.

Overall, the findings from the COOLCITY project support the notion that climate change adaptation must be understood as an inherently social process (Wolf, 2011). Strengthening social capital can mitigate heat stress in multiple ways: mutual help between residents is increased through intact social networks, communication between residents and administration is facilitated, and local knowledge is shared more effectively. Furthermore, similar to financial capital, a certain stock of social capital might be conducive or even necessary to better mobilize or enhance it. Both citizens and experts agree that social innovations can play a crucial role in these processes, especially when supported by physical measures, i.e., architectural, technical, and planning-related measures. Some interviewees reported that the surge of neighborly help during the COVID-19 pandemic (Felici, 2020) has increased their trust in people's willingness to help. Therefore, a window of opportunity for such integrated measures is opening. The enhancement of social capital should thus be seen as a central component of a resilient city – particularly, but not exclusively during extreme heat events.

Brief statement on the consideration of the fund's objectives in the project implementation

COOLCITY was conducted in close cooperation between the Institute of Forest, Environmental and Natural Resource Policy (InFER) at BOKU and the City of Vienna. The transdisciplinary approach described above was followed to best integrate knowledge from both experts and citizens, and to facilitate the implementation of new policy measures increasing social capital in the City of Vienna. The high relevance of COOLCITY for sustainable development in Vienna is reflected in the concurrent publication of the Wiener Hitzeaktionsplan in May 2022 (Stadt Wien, 2022a). Furthermore, the project's emphasis on social innovations makes it a valuable supplementary contribution to the Smart Climate City Strategy Vienna (Stadt Wien, 2022b). At BOKU, COOLCITY has promoted exclusively young scientists (one person <7 years after dissertation, two current doctoral students and one master student).

Exploitation of results and knowledge transfer

The COOLCITY results have been presented to and discussed with administrative bodies of the City of Vienna and other organizations in a stakeholder workshop on 25 April 2022 and in a presentation hosted by MA18 on 12 September 2022. This led to an invitation as climate change adaptation experts in a GB* workshop on the organization's strategic orientation on 20 September 2022. Exchange on the project has taken place at the Smart City Summit Vienna on 5 May 2021 (hosted by Vienna Business Agency), at the event "Schritte auf dem Weg zur klimasozialen Musterstadt" (11/2022, hosted by ÖKOBÜRO), with the research project Tröpferlbad 2.0 (led by Green4Cities GmbH), the project teams of WieNeu+ and Wiener Klimateam as well as urban sociologist Cornelia Dlabaja from the University of Vienna. Future exchange and dissemination are planned at the 23rd Austrian Climate Day (04/2023, hosted by Climate Change Centre Austria). One to two scientific papers are in preparation for publication in the following target journals: Ecology and Society, Environment and Planning.

Assessment of leverage

COOLCITY has led to novel discussions about heat stress between experts and practitioners from different disciplines and fields, e.g., urban planning, public health, political science, and social work. This has opened up a space for inter-department collaboration in the City of Vienna and resulted in potential new research questions and project ideas for academia. Furthermore, the transdisciplinary collaboration between BOKU, the City of Vienna, and the other involved organizations as well as the respective personal contacts have paved the way for future cooperation. In the follow-up project UrbanHeatEquality (funded by the Austrian Climate Research Program), which focuses on green gentrification effects in Vienna, the principal investigator and one project researcher of COOLCITY will again cooperate closely with MA18 and other administrative bodies of the City of Vienna. The COOLCITY results will serve as a starting point in this and other thematically related projects at BOKU.

Teaching

The project researcher Maximilian Muhr aims to integrate at least one COOLCITY publication into his cumulative dissertation, co-supervised by the principal investigator. COOLCITY results will only be incorporated in courses at BOKU after the project report is approved. The transdisciplinary approach of the project will definitely serve as a (best practice) example not only in future research, but also in teaching about the science-policy-practice interface.

Appendixes

Appendix 1: Bibliography

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Appendix 2: Tables and figures

Table 1: Overview of COOLCITY interviewees

ID	Gender	Age	Migrant background	Case study	Walking interview
P3	Male	60	Turkey	Innerfavoriten	Yes
P4	Male	63	No	Innerfavoriten	Yes
P5	Female	71	No	Innerfavoriten	No
P14	Female	33	No	Innerfavoriten	No
P15	Female	57	No	Innerfavoriten	No
P16	Female	30	Syria	Innerfavoriten	No
P20	Female	78	No	Innerfavoriten	No
P21	Female	49	Serbia	Innerfavoriten	No
P22	Female	44	Poland	Innerfavoriten	No
P1	Female	65	No	Gründerzeitviertel/Westgürtel	Yes
P2	Male	64	USA	Gründerzeitviertel/Westgürtel	Yes
P6	Female	68	No	Gründerzeitviertel/Westgürtel	Yes
P7	Female	58	Croatia	Gründerzeitviertel/Westgürtel	Yes
P8	Female	76	No	Gründerzeitviertel/Westgürtel	No
P9	Male	72	No	Gründerzeitviertel/Westgürtel	No
P10	Female	57	No	Gründerzeitviertel/Westgürtel	No
P11	Female	74	No	Gründerzeitviertel/Westgürtel	Yes
P12	Female	74	No	Gründerzeitviertel/Westgürtel	Yes
P13	Female	65	No	Gründerzeitviertel/Westgürtel	No
P17	Male	51	Serbia/Germany	Gründerzeitviertel/Westgürtel	Yes
P18	Female	70	No	Gründerzeitviertel/Westgürtel	No
P19	Female	57	No	Gründerzeitviertel/Westgürtel	Yes

Table 2: COOLCITY suggestions for social innovations for adapting to extreme heat events

Activities and offerings	Information and communication	Spaces
Neighborhood encounter programs (e.g., 'Coole Straßen')	Encouragement of communities to implement own measures (e.g., 'house buddies')	Provision of unused ground-floor premises as cool spots
Easier access to indoor cool spots (e.g., school workrooms)	More inclusion in redesigning public spaces	Green roofs as points of encounter
Heat trainings for nursing staff	More advertisement for public cool spots	More greening and tree planting events
More shared accommodations for seniors and housing projects	Wellbeing checks during heat events (door to door or via phone)	City-wide coverage with public outdoor pools
More summer Grätzl events and get-togethers (for seniors)	Grätzl groups on social media	More non-consumption points of encounter
Vouchers for communal trips and shared transportation to cool areas	Easily accessible contact points within the administration (e.g., 'heat service centers')	More community gardens for intercultural exchange
More summer activities for children (e.g., inner yard rallies, juice bars)	Awareness raising for heat-related health risks and urgency of climate change	Further opening of inner yards
'Heat assistants' for help with heat-decreasing behavior in residencies	Consistently multilingual information on heat stress and climate change	Culture-specific greening and design of tree pits
Increased mediation in parks during heat events	Simplification of funding for greening measures	Provision of more cool rooms in residencies
More activities in cool day-care centers and senior clubs	Better inclusion of migrant groups and associations	
Price reductions in museums during heat events	Implementation of climate change issues in German courses	
Providing support for everyday errands (e.g., shopping, dog walks)		

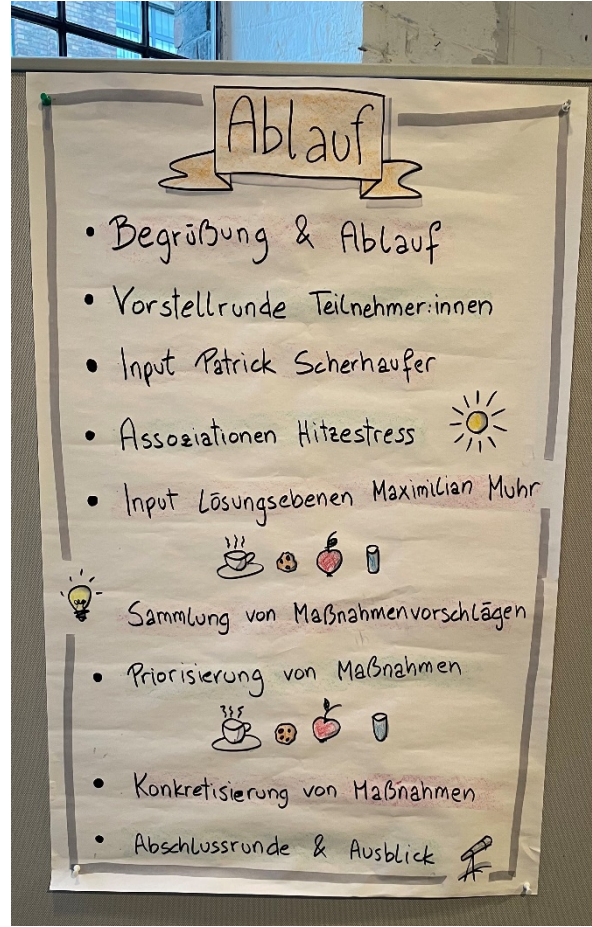


Figure 1: Impressions from the participatory citizen workshops