THE CLIMATE STORIES MAP
FROM ANECDOTES TO ACTION: A PROJECT-BASED EXPLORATION OF PARTICIPATORY CARTOGRAPHIC ARCHIVES FOR CLIMATE ADVOCACY

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ABSTRACT

This article centres around the creation of the 'Climate Stories Map' (CSM), a participatory cartographic archive strategically designed to convey the urgent reality of climate change through the lens of local narratives. Developed in collaboration with Google Berlin and built on the company's 'Google Maps Platform', the project explores the potential of participatory and qualitative approaches for climate advocacy. The CSM successfully aggregates 200+ individual accounts of environmental destruction in Berlin-Brandenburg. Through its intuitive design and minimal barriers to contribution, the CSM democratises climate discourse, empowering diverse individuals to share first-hand experiences with climate change. Trialling the use of anecdotal evidence to increase engagement with the climate crisis, the CSM aims to inspire pro-environmental behaviour by emotionally connecting users with the topic and linking to local sustainability initiatives. This project fills a vital research gap and contemplates new ways to understand, communicate, and act on climate change.

INTRODUCTION

The climate crisis is no longer a distant future concern. Recent decades have witnessed a surge in extreme weather events leading to water and food insecurity, the loss of over two million lives, and economic damages totalling $391 million per day (Newman and Noy, 2023; United Nations Türkiye, 2023). Scientists agree that immediate behavioural adjustments are imperative to limit global warming to 2°C and avoid immeasurable environmental disasters (Hickel, 2020). However, many people still struggle to grasp the urgency of the crisis. In Germany, 22% of people do not believe in anthropogenic climate change, and only 36% of people adopt sustainable behaviours to mitigate climate impacts (Hirndorf, 2023; YouGov, 2023). Individuals' lack of action stems from the perception that climate change remains a distant threat which does not have an immediate impact on their current lives (Hinnant et al., 2016). This research aims to address this problem by trialling the use of a participatory archive of anecdotal climate evidence to showcase present environmental destruction through the eyes of local communities.

The foundation of this project is the 'Climate Stories Map' (CSM), an online map that allows users to share their personal experiences with climate change by geo-tagging written accounts and uploading images, as well as browsing through and commenting on other people's entries (Figure 1). The map also features a second layer linking to local sustainability initiatives (Figure 2). The project was executed in collaboration with Google Berlin under the supervision of Inger Paus (Head of Public Affairs Google Europe) and Joce Heuzé (Technical Solutions Engineer).

The CSM pursues two objectives: To engage individuals by *aggregating* personal observations of local climate impacts, thereby increasing awareness that climate change is already affecting their immediate surroundings. Secondly, to *empower* ordinary citizens by providing them with a platform to contribute to the climate discourse, centring diverse perspectives and local knowledge. This research investigates to what extent this technological solution has managed to achieve these goals.

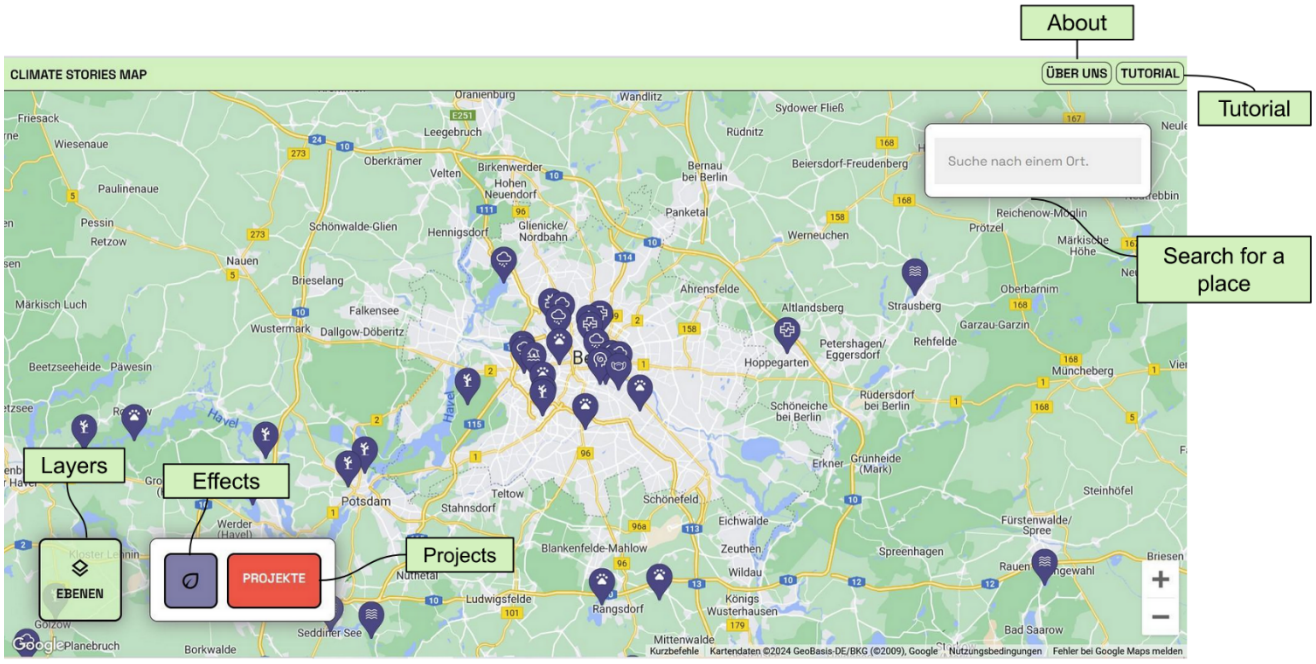

Figure 1: screenshot of the first layer of the CSM

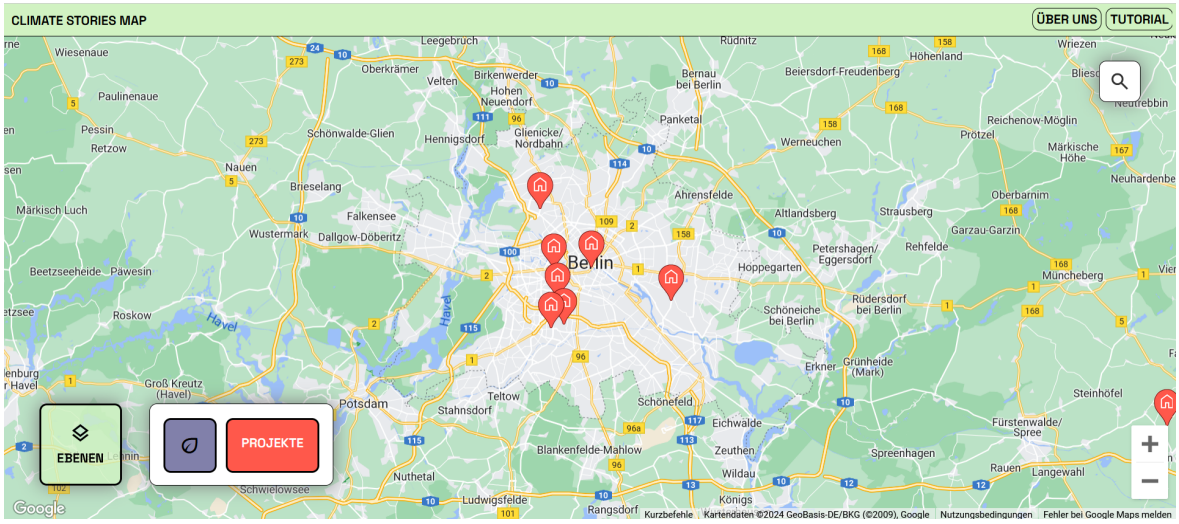

Figure 2: screenshot of the second layer of the CSM

LITERATURE REVIEW

The participatory turn: maps as participatory archives and their role in climate advocacy

In the age of Web 2.0, users have evolved beyond passive consumers. Rather than merely viewing the content of others, they actively shape the digital landscape by contributing content to blogs and social media platforms or engaging with Web APIs, including digital maps (Kirby et al., 2021; Dodge and Kitchin, 2013). This democratisation of authorship has had vast implications for the age-old practice of archiving. Archiving, the controlled and systematic long-term storage of information, has been used since the third millennium BC to preserve traces of time for future generations and embed historical events in public memory (Yeo, 2021). As archiving has increasingly moved to the digital realm, Web 2.0 has popularised participatory archives where users can actively partake in the archiving process (Alaoui, 2020). Instead of letting designated employees gather new content and artefacts, participatory archives outsource this process to the public through crowdsourcing (Howe, 2006).

Popularised through viral internet archives like 'QueeringTheMap', which allows users to map LGBTQIA+ histories, participatory archives have begun to utilise maps to link artefacts and experiences to spatial dimensions (LaRochelle, 2024; Watson et al., 2024). Historically, maps have been a top-down tool to exert territorial rights and prescribe a colonial view of the world (Rose-Redwood et al., 2020). However, theories of counter-mapping highlight that maps can also be harnessed to frame alternate realities. Indigenous communities have used participatory maps since the 1970s to document the traditional boundaries of their territories and successfully challenge claims to their land in court (Guldi, 2016). Rekacewicz (2021) argues that by mapping geographies and experiences previously rendered invisible, grassroots initiatives have a unique ability to challenge power structures and amplify perspectives outside dominant narratives. They shift the map's purpose from a depiction of physical geography towards a relational representation of the interdependencies between peoples, nature, and built environment.

Simultaneously functioning as archives and communal spaces for involvement, Dodge and Kitchin (2013) argue that participatory maps are particularly useful in climate investigation as they preserve marginalised perspectives on climate change, highlight the unique spatial dimensions of environmental destruction, and elicit deep public engagement with the issue. Engagement with climate change necessitates the public to gain a deep understanding of the issue, experience an emotional response, and participate in political action as a result (Rajanen, 2021). Literature indicates that participatory maps address all three pillars of this engagement paradigm effectively. Firstly, they aid comprehension of the nature and extent of ongoing crises as they collect, aggregate, and centralise information from disparate and often localised sources. Secondly, participatory mapping elicits emotional involvement by encouraging individuals to critically engage with their social and physical surroundings (Salovaara, 2019). Watson et al.'s (2024) study indicates heightened affective engagement with issues when individuals observe connections to familiar places. Lastly, as Spindler (2014) highlights, if people feel like an issue is irrelevant to their lives, actively soliciting their input on the topic can motivate them to become personally invested and take action. By providing those affected with a space for communication and amplifying their voices, participatory mapping approaches are powerful catalysts for enhancing involvement in climate activism (Rajanen, 2021).

From metrics to stories: the value of anecdotal evidence to inspire climate action

The type of information communicated can significantly impact public engagement with climate change. Anecdotal evidence, or colloquial story, refers to evidence based on personal observations and individual experiences rather than systematic scientific analysis (Haven, 2007; Moezzi et al., 2017). Under the Western rationality paradigm, which posits that humans base their decisions primarily on objective truths or facts, stories have been dismissed as an inferior and baseless form of knowledge (Dahlstrom, 2014; Morris et al., 2019). Public disengagement with environmental issues is often framed as an information deficit problem that can simply be addressed by communicating quantitative evidence to citizens (Suldovsky, 2017). However, despite clear and widely accessible scientific information, a significant number of individuals remain inactive or even sceptical about climate change (Kahan et al., 2011).

Scholars have increasingly examined the significance of anecdotal evidence in enhancing engagement with climate change (Morris et al., 2019). Historically utilised by indigenous societies to convey cultural knowledge and foster communal stability, stories possess the unique capacity to make sense of complex human experiences (Sakakibara, 2008). They excel precisely where rationality falters, allowing for the inclusion of 'emotional, psychological, symbolic, and cultural' dimensions omitted in quantitative data (Moezzi et al., 2017). Building upon Zillmann's exemplification theory, scholars have asserted that local and anecdotal knowledge plays an essential role in capturing the climate crisis' social realities and helping us understand the personal relevance of the issue (Temper et al., 2015; Zillmann, 1999). This is underpinned by neurological studies highlighting that anecdotal evidence improves memory retention and generates stronger emotional responses than statistical information (Dahlstrom, 2014; Haven, 2007). Research into risk perception shows that emotions play a particularly critical role in spurring political action when threats are perceived as abstract, distant future concerns, as in the case of climate change (Kahan et al., 2011; Weber, 2006).

Mapping qualitative climate data

Participation and personal experience thus have unique advantages in promoting public engagement with climate change. Combined approaches remain relatively rare in environmental contexts. Most participatory climate research focuses on quantitative data. For example, CrowdCurio used crowdsourcing to collect data about the impact of changing climates on herbarium species (Willis et al., 2017). The EJAtlas (2024), WWF Climate Crowd, and ClimateOfChange Diaries are among the few participatory projects incorporating qualitative data, with the EJAtlas and Climate Crowd structuring their archives in a map format. Climate Crowd gathers weather and climate information through informant interviews and data entries from climate NGOs, while ClimateOfChange Diaries involves 30 selected participants who share photos and personal perceptions of the climate crisis in a WhatsApp group (Giacomelli and Walker, 2021; WWF, 2024). Both approaches still pose notable barriers to contribution. The WWF map only accepts entries from registered environmental organisations. Similarly, participation in the ClimateOfChange Diaries demands long-term engagement in a study, which individuals not initially

interested in the topic might be hesitant to undertake. While the EJAtlas welcomes contributions from everyone, it focuses on documenting environmental conflicts and activist causes rather than capturing how people personally experience and make sense of the climate crisis (Temper et al., 2015). A participatory map documenting local experiences and anecdotes of the climate crisis has yet to exist. Considering the benefits of this approach outlined in the literature, this constitutes a significant research gap that this project aims to address.

METHODS

The Google Maps Platform was chosen as the project's cartographic foundation due to its widespread familiarity and user-friendly interface (Chen et al., 2011). As the web interface on its own would not retain user entries after closing the browser, a database infrastructure was developed simultaneously. For seamless integration with the Google Maps API, Google Firebase was utilised as a static web hosting service and database provider. With studies estimating that spam and harmful comments account for 90% of user-generated content online, entries needed to be filtered before publication (Shin et al., 2011). To ensure open access while maintaining content quality and security, the CSM allows for anonymous contributions that are manually moderated by the author. In addition, the database is protected from automated attacks through the implementation of Google ReCAPTCHA (Google, 2024). A comment feature was implemented, enabling users to flag misinformation, enhancing platform interactivity, and better capturing the dynamic nature of the climate crisis by making entries updateable (Oomen and Aroyo, 2011).

To promote participation and collect data, multiple strategies were employed. The author attended industry conferences to introduce the project to key stakeholders. A link to the map and project summary was emailed to regional climate NGOs, activist groups, agricultural associations, and a local climate justice newsletter. This contributed to 50+ new entries, with the CSM featured on federal and local government websites (Engagement Global, 2024; neuland21, 2023). In May 2024, a comprehensive communication campaign targeting the public was conducted, combining social media outreach with traditional media coverage to reach a diverse audience (Galan and Osserman, 2021; Lie, 2018). The press campaign was especially effective, with hundreds of major newspapers across Germany featuring the CSM (Süddeutsche Zeitung, 2024).

EVALUATION AND DISCUSSION

The following section will evaluate the extent to which the CSM has achieved its objectives.

Enhancing climate awareness by aggregating anecdotal evidence

A primary goal of the CSM was to aggregate personal experiences relating to climate change in a singular space. With more than 200 entries collected between March 2024 and October 2024 and 300 -2000 daily active users, the CSM already provides an emerging depiction of the current environmental realities of Berlin-Brandenburg. Certain issues, such as the dryness of marshland, lakes, and people's gardens, are reported more frequently, allowing inferences about regional patterns (Kirby et al., 2021). This aggregation of evidence aids the identification of clusters and functions as an advocacy tool, rendering the reality of climate change visible (Watson et al., 2024). By visualising individual crisis points for localised areas and obtaining a high-level overview on the map, users get a sense of the magnitude of change (Sheppard, 2005; Watson et al., 2024).

Showcasing climate impacts in people's immediate surroundings, the CSM allows users to understand climate change as a concept that affects them personally (Temper et al., 2015). The resulting humanisation and personalisation of climate change makes it easier for people to connect with the issue on an emotional level (Haven, 2007). For example, looking at the following CSM entry, it is arguably more emotionally impactful to hear that someone was 'standing in water up to [their] waist' as opposed to the frequency of extreme rain events in Berlin having increased by 30% in the past five years (Dahlstrom, 2014; Mandalka, 2023).

"The Kudamm was so flooded for several days that buses could no longer open their doors, and I was standing in water up to my waist. I have the feeling that extreme rain and storms have become more and more frequent in the last 2-3 years. In Berlin, small floods have repeatedly disrupted important infrastructure."

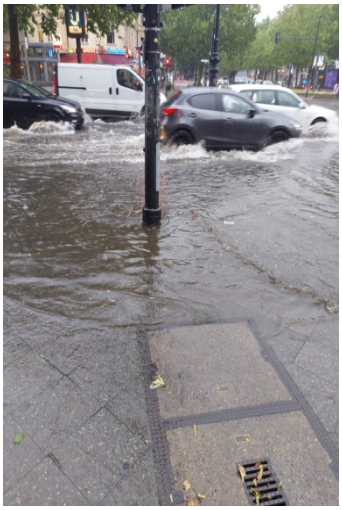

Figure 3 & 4: User contribution to the CSM, translated by the author alongside an image submitted by an anonymous user to the Climate Stories Map

Users are more likely to reflect on the direct impact of climate change on their own lives through personal narratives and ultimately become aware of the acute consequences of global warming for the regions they call home or value otherwise (Weber, 2006). Although anecdotal evidence holds significant potential for fostering climate awareness, the CSM's exclusive emphasis on qualitative narratives presents a notable limitation. Scholars like Dahlstrom (2014) advocate for a synthesis of qualitative and quantitative data, as each provides an incomplete picture on its own. While anecdotal accounts capture rich human experiences, they lack the generalizability and statistical rigour necessary to investigate local climate impacts. To partially mitigate this limitation, the map was integrated into an online climate knowledge hub run by the city of Bad Belzig (neuland21, 2023). By presenting the map alongside a collection of quantitative evidence, such as soil moisture measurements, a synergetic approach was achieved. It underscores the potential for implementing a combined solution on a larger scale.

Amplifying local perspectives in climate discourse

The project's second objective aimed to bolster civic empowerment by focusing local perspectives on climate change and giving ordinary citizens a voice in climate discourse. By allowing anyone to share their environmental observations, the CSM effectively amplifies the voices of individuals with limited political influence, whose experiences often receive scant attention in conventional climate research (Kirby et al., 2021). The participatory archive empowers individuals to articulate their narratives and facilitates their agency in shaping social, economic, and political inclusion (Bratitsis and Moutafidou, 2018).

While affected communities successfully take charge of knowledge production on the CSM, individuals' participation and, consequently, the ability to benefit from its empowering effects vary depending on users' social location (e.g., race, gender, (dis-)ability, class) (Nordin et al., 2023). To reduce barriers to contribution, the design of the CSM prioritises ease of use and exclusively collects essential user data: the CSM avoids lengthy reporting protocols in consideration of individuals from lower socioeconomic backgrounds, whose participation in crowdsourcing initiatives is often constrained by a lack of spare time (Pateman et al., 2021). Using the widely familiar Google Maps interface is expected to make participation more accessible to people with limited digital skills. Since it is the most popular web mapping platform across all age groups, more users will be able to navigate it intuitively as opposed to other platforms like OpenStreetMap (Moreno et al., 2023; Yu and Chattopadhyay, 2020). The CSM's emphasis on anecdotal evidence enhances inclusivity by accommodating individuals without extensive scientific literacy (Paleco et al., 2021).

Wehn and Almomani (2019) underscore the importance of addressing privacy issues to enhance engagement with crowdsourcing projects. While the CSM endeavours to address this concern by making all submissions anonymous, the absence of personal data hinders the identification of individuals interacting with the platform, making it impossible to gauge whether a diverse range of individuals is represented. Simultaneously, the CSM's use of a map format introduces accessibility challenges for people with sight loss. The CSM relies heavily on visual media to present information, therefore not benefiting

those relying on screen readers equally. There is currently no feasible way to circumvent this barrier to contribution on a fully digital platform like the CSM (Buzzi et al., 2011).

For any project tracking an ongoing crisis, citizen empowerment is an inherently long-term process (Kieffer, 1984). Regarding climate change, it is imperative to assess how local environments change over time, for example, to explore how they regenerate due to pro-environmental behaviour. It is vital to encourage continuous participation with the CSM. As Spindler (2014) argues, creating incentives for users to provide sustained input, for example, by rewarding high-performing contributors with virtual badges, should be a key design objective of any crowdsourcing project. However, since the CSM opted for an authentication-free structure, it lacks the capability to identify users responsible for specific entries. While this may not foster sustained individual engagement, the map's goal, unlike other crowdsourcing projects, is not primarily to attract as many entries as possible but to encourage contributions from those initially uninterested in climate change. Minimising barriers to entry was consequently prioritised over long-term user retention strategies.

CONCLUSION

As a participatory cartographic archive of anecdotal climate evidence, the CSM fills a vital research gap by combining an effective type of information with a highly engaging presentation format. Guided by extensive research in participatory mapping and climate communication, the CSM makes significant progress towards attaining key project objectives. It enhances public awareness about climate change through the aggregation of local experiences and promotes civic empowerment by offering an avenue for ordinary citizens to contribute to climate discourse. The CSM constitutes the first qualitative climate crowdsourcing initiative open to contributions from the general public and manages to aggregate numerous moving accounts of local residents' personal experiences with climate change. As a publicly accessible platform, the project is both a research endeavour and a continuous and evolving space for climate education and advocacy. The intersection of participatory and qualitative approaches to climate advocacy is underexplored, offering many opportunities for further research. For instance, studying how applications like the CSM can promote pro-environmental behaviour through user interviews. Furthermore, enhancing the accessibility of participatory maps for visually impaired individuals and determining how to meaningfully synthesise anecdotal and quantitative climate evidence in a participatory archive are crucial areas for investigation.

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