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What Can Visualization Research Do For Climate?: A Workshop Report

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Abstract—Earth, our home planet, is changing at an unprecedented rate, due to human industrial activity. Data visualization can uniquely illuminate these complex transformations through revealing hidden patterns, thereby translating abstract data into compelling narratives and increased understanding. How can we harness visualization’s full potential to inform and inspire our generation toward environmental awareness and stewardship? This paper reports on insights and key challenges from the 2024 IEEE VIS workshop on Climate Action and Sustainability whose submissions paint a rich picture of the current, yet still nascent, landscape of how the field of visualization can help empower people to take meaningful steps toward environmental stewardship. Drawing from the presented works and the collective workshop discussions, we propose future research directions and invite the visualization community, both researchers and practitioners, to join this vital effort in addressing one of our planet’s greatest challenges.

Visualization empowers people to understand complex data, make informed decisions, communicate effectively, and engage meaningfully with information. In light of our changing global environment, it is timely to ask *how can visualization advance environmental awareness and stewardship through innovation, capacity development, and improved research methodologies?* Answering this question will help catalyze participation and identify research questions worth exploring.

To advance this discourse and foster a global community, we organized the “*Visualization for Climate Action and Sustainability*” workshop [1] at the IEEE VIS 2024 conference. The workshop¹ brought

together visualization, HCI researchers and practitioners, and artists, to establish actionable connections between these fields, climate science, and stakeholders. The workshop addressed diverse environmental contexts—from sustainability and energy systems to biodiversity—across scenarios ranging from public awareness to expert decision-making. Building on the IEEE VIS 2022 Viz4Climate² workshop’s focus on “*High-Impact Techniques for Visual Climate Science Communication*”, the 2024 workshop showcased diverse visualization projects including interactive web experiments, data stories, physicalizations, immersive experiences, and public exhibits.

These workshops align with the workshop organizers’ broader initiatives in visualization, human-computer interaction, and climate science. Notably,

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¹<https://svs.gsfc.nasa.gov/events/2024/Viz4ClimateAndSustainability/>

²<https://svs.gsfc.nasa.gov/events/2022/Viz4Climate/>



FIGURE 1. Data dashboards at Earth Information Center's Hyperwall exhibit, NASA HQ, Washington, DC, Credit: H.-N. Kostis

this includes NASA's Scientific Visualization Studio's (SVS)³ mission to develop innovative data visualizations that make complex phenomena understandable to public audiences. Supporting all NASA science themes (Earth, Heliophysics, Planetary, Astrophysics), SVS creates visualizations for the Earth Information Center (EIC)⁴, launched in June 2023. The EIC features public exhibits that include hyperwalls (Figure 1) with data dashboards and narratives, interactive installations, and immersive experiences at NASA Headquarters and the Smithsonian National Museum of Natural History in Washington, DC, with content distributed openly online and to museums.

In this viewpoint article, we report on the 2024 workshop, highlighting key challenges and identifying emerging trends and themes. We propose future research directions and call upon visualization researchers and practitioners to advance this critical work in climate visualization and communication.

Publications to the IEEE 2024 Workshop on Climate Action and Sustainability

Theme 1: Storytelling and Communication

- w1. *Local Climate Data Stories: Data-driven Storytelling to Communicate Effects and Mitigation of Climate Change in a Local Context*, by F. Beck, L. Panzer, M. Redepinning.
- w2. *Data Comics for Climate Change, Workshop submission, 2024*, by Z. Wang, S. Gruber, C. Herbert, Z. Sarrazin, M. Levy, S. Carpendale.
- w3. *Designing Visualisations for Enhancing Carbon Numeracy*, by K. Batziakoudi, F. Cabric, S. Rey, J.-D. Fekete.

Theme 2: Immersive and Tangible

- w4. *Eco-Garden: A Data Sculpture to Encourage Sustainable Practices in Everyday Life in Households*, by D.

Perera, N. Verdezoto Dias, S. Lannon, J. Gwilliam, P. Eslambolchilar.

- w5. *Designing Earth Mission Control: An Immersive Data Visualization Tool for Climate Communication and Decision-Making*, by M. Rathnasabapathy, R. Connolly, P. Cherner, J. Palmer, D. Newman, M. SubaRao.
- w6. *AwARe: Using handheld augmented reality for researching the potential of food resource information visualization*, by N. Rosa.

Theme 3: Analytics and Transparency

- w7. *Interactive Visualization of Ensemble Data Assimilation Forecasts for Freshwater Floods*, by A. Patil, M. Smith, H. Kershaw, M. El Gharamti.
- w8. *Urban Computing for Climate And Environmental Justice: Early Perspectives From Two Research Initiatives*, by C. Veiga, A. Sharma, D. de Oliveira, M. Lage, F. Miranda.
- w9. *Exploring the Reproducibility for Visualization Figures in Climate Change Report*, by L. Ying, Y. Wu, J.-D. Fekete.

Theme 4: People, Art, and Engagement

- w10. *Cultivating Climate Action Through Multi-Institutional Collaboration: Innovative Data Visualization Educational Programs and Exhibits for Public Engagement*, by B. Altringer Eagle, E. Sylvan.
- w11. *Harnessing Visualization for Climate Action and Sustainable Future*, by N. Mahyar.
- w12. *Artists, Data and Climate Change: Distilled messages, multiple entry points, layered metaphor*, by F. Samsel, B. Campbell.
- w13. *EcoViz: co-designed environmental data visualizations to communicate ecosystem impacts, inform management, and envision solutions*, by J. Kendall-Bar, I. Nealey, I. Costello, C. Lowrie, K. Huynh Nguyen, P. J. Ponganis, M. W. Beck, I. Altintas.

THEMES

The workshop accepted three formats: pictorials, short papers (4 pages), and long papers (8 pages). Through peer-review, 13 out of 20 submissions were accepted: 7 short papers, 5 long papers, and 1 pictorial. All accepted works, listed in the gray box on the previ-

³<https://svs.gsfc.nasa.gov>

⁴<https://earth.gov>

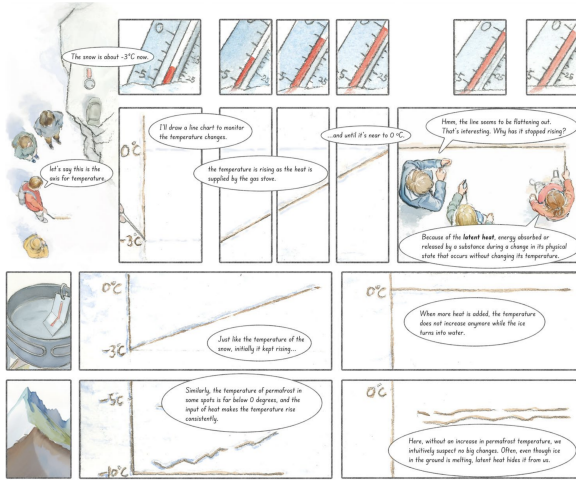


FIGURE 2. Data comic explaining the effect of rising temperatures on natural phenomena. Credit: Z. Wang et al. [w2].

ous page and referenced as [w1-w13] in this article, are available on the workshop website⁵. Across these accepted works, we identified four themes which we detail in the following pages: *storytelling and communication, immersive and tangible, analytics and transparency, and people, art, and engagement.*

Theme 1: Storytelling and Communication

Effective communication is essential to make complex data and information understandable to experts and lay audiences alike. Through a growing set of techniques and studies on storytelling and presentation, the visualization community holds wide means and knowledge ready to be *applied* to challenges around climate change: storytelling formats such as comics, dashboards, and immersive experiences; narrative patterns and structures; guidelines and best practices, as well as a rapidly growing set of visualization authoring tools. Still, in their application to that specific topic, we find novel challenges. Studying storytelling in the context of climate action will lead to a better, and expanded understanding of storytelling and communication.

For example, one fundamental challenge with climate change communication is to **make climate science and the relevant complex physical, socio-economic, and physiological concepts accessible and understandable**. While data is crucial as general evidence, interpretation and action require relevant

⁵<https://svs.gsfc.nasa.gov/events/2024/Viz4ClimateAndSustainability>

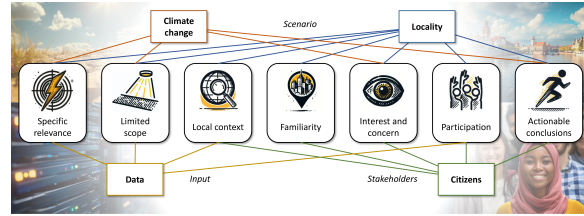


FIGURE 3. Characteristics of the local climate data stories (center) and their main relationships to key concepts (top/bottom). Credit: Icons and Images generated through AI, F. Beck [w1].

background knowledge, which is rarely a given. To bridge this gap, Wang et al. [w2] explore combining abstract charts with illustrations of natural phenomena such as permafrost (Figure 2) through data comics [2]. Creating compelling data comics required iterative and interdisciplinary design workshops as well as exploring generative AI for characters and a consistent appealing style. In a general sense, generative AI holds promising opportunities for science communication.

A related challenge is to **make information relevant to their intended audiences**. By analyzing local (German) newspapers, Beck et al. [w1] identified strategies for localizing global change through region-specific explanations and locally relevant scenarios (Figure 3), i.e., creating hyper-local explanations and referring to events and possible futures relevant to that local audience. Although personalization is a well-known strategy in data-driven storytelling [3], its application at the hyper-local level can be challenged by factors such as the absence of data and the creation of personal stories: for example, missing data can lead to mistrust, if a prediction forecasts warmer summers overall, while in reality summers are getting cooler and wetter in that specific geographic area.

A last challenge discussed under this workshop theme was to **translate abstract measurements and scales into relatable quantities** such as *parts-per-million* to thousands of tons, in ways that support understanding and analytical reasoning. Based on ideas from the concrete scales framework [4], Batziakoudi et al. [w3] proposed two novel approaches to communicate information at different magnitudes (Figure 4): *i)* categorical encoding that emphasizes familiar concepts (units, thousands, millions) and *ii)* the integration of meaningful thresholds (such as daily or annual personal CO₂ budgets). While empirical evidence for these approaches is still sparse, they raise intriguing questions about developing personalized scaling systems to enhance communication and decision-making.

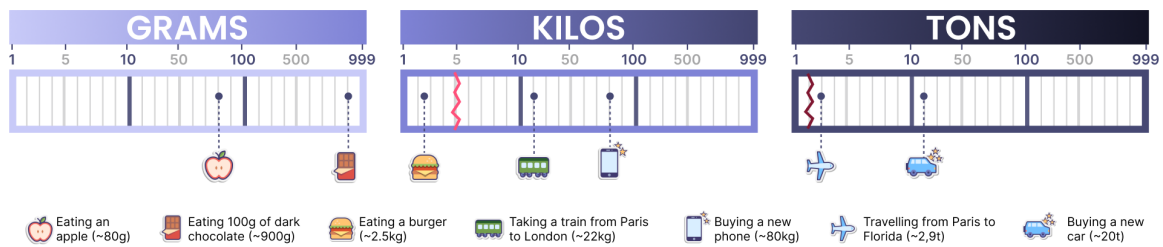


FIGURE 4. Visualization illustrating the range of carbon dioxide (CO₂) emissions from individual actions, grouped by emission weight units and displayed in ordered facets. Within each facet, a piecewise linear scale is used to facilitate comparisons across different magnitudes. Personal carbon targets based on the Paris Agreement are included (red wiggly vertical lines), helping individuals assess the relative impact of each action, Credit: K. Batziakoudi, Inria & Berger-Levrault [w3]

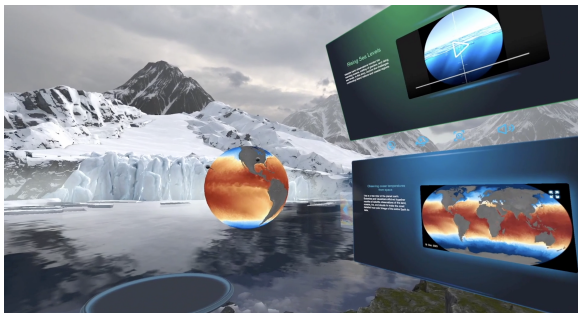


FIGURE 5. Sea Level Rise vignette from Earth Mission Control, an immersive AR/VR data visualization platform that utilizes satellite Earth Observation (EO) data to make complex data more accessible and comprehensible. Credit: Future Worlds, MIT Media Lab [w5].

Theme 2: Immersive and Tangible

Immersive environments such as virtual, mixed and augmented reality (VR/MR/AR) and tangible physical visualizations offer unique, embodied, situated experiences that can reduce the psychological distance between viewers and information and make concepts physically and temporally more immediate, bridging the gap between data and personal experience. In their comprehensive analysis, Fauville et al. [5] examine how virtual reality specifically can address key climate change communication challenges through experiential learning and embodied cognition.

One of the challenges for climate communication is to **translate abstract concepts into relatable human experiences**. The sense of presence, i.e. the feeling of ‘being there’ which VR/MR/AR uniquely afford is a powerful tool to this end. At the workshop, Connolly et al. [w5] demonstrated *Earth Mission Control* (Figure 5), a VR environment that immerses users in local climate scenarios by simulating events and phenomena, such



FIGURE 6. Handheld AR through the AwARe prototype: (left) entering ingredients list for a simple meat-centered meal; (center and right) crops, water and livestock required for that meal, visualized in one's home, Credit: N. Rosa [w4].

as wildfires, within their own neighborhoods. Allowing people to witness impacts of climate change first hand has the potential to enhance empathy, create connections to spaces, and improve preparedness to plausible futures.

Another difficulty is to **make visible the processes, phenomena, and quantities otherwise invisible to the naked eye**. Through augmented reality Rosa [w6] exposes resource consumption in food production by displaying virtual volumes of water and wheat as objects within kitchen spaces (Figure 6). Carbon dioxide (CO₂) can also be made visible in-situ using AR⁶. Revealing impalpable impacts of our actions can help audiences get a better grasp of important sustainability challenges as suggested by related work (e.g., [6]).

The challenge of understanding abstract units combined with the difficulty of presenting personalized data, was another key topic discussed at

⁶<https://www.hdilab.org/projects/crafting-futures/>

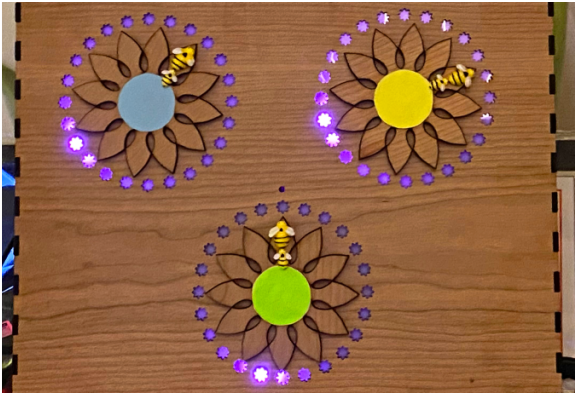


FIGURE 7. Eco-Garden: a data sculpture that visualises household consumption to encourage sustainable practices at home, Credit: D. Perera [w6].

the workshop. To explore this challenge, Perera et al. [w4] created a physical ambient visualization where household consumption data appear as bees moving across flowers (Figure 7). Through their role as both as an aesthetic piece and an information display, physical ambient visualizations are an interesting avenue for data engagement, as illustrated by related work (e.g. [7]). Data physicalization has also gained traction in urban settings through situated installations that display local data [8], [9]. Further, physical and tangible representations are particularly appreciated for participatory data visualizations in shared spaces where individuals can each contribute to a collective visualization by adding physical token representing their own data. Because they are inclusive and playful, such constructive visualizations [10] are an engaging tool to facilitate participative workshops.

Theme 3: Analytics and Transparency

The highly polarized attitudes regarding climate change mean the validity of climate data visualizations is likely to be challenged and the choices of the data visualization designer criticized. To hold up to this extra scrutiny it is critical that climate data visualizations follow solid data practices. Transparency is key. The source of the data used for the visualization should be clearly identified, and those datasets themselves should be publicly available. All visualizations should be reproducible, and in the ideal case their code should be made available as well.

This is especially important for visualizations that influence policy decisions. For example, the United Nation’s Intergovernmental Panel on Climate Change (IPCC) produces key reports designed to provide

polymakers with regular scientific assessments on climate change, its implications, and potential future risks. Alongside these reports the IPCC working groups provide a GitHub repository containing the code to generate the graphics in the report. At first glance this would seem like an ideal model, but in the workshop Ying et al. [w9] reported that **making visualizations reproducible still creates challenges**. Some of the difficulties are technical, e.g., making sure the programming environment matches that of the author. Still, further attempts at reproduction from the Github repositories suffered from stylistic differences which are likely attributed to slightly different versions of plotting libraries, but also post-processing steps that visualizations underwent before inclusion in the IPCC report. This effort highlights that there are many decisions alongside the visualization pipeline, making reproducibility a general challenge.

Visual Analytics **tools need to work in a variety of contexts** and across audiences with varied scientific and data literacy. For example, Patil et al. [w7] reported on a decision support system to understand freshwater flood forecasts for both weather scientists and policy makers. Both of these audiences need to interpret and act on the forecasts, incorporating model uncertainties. Viega et al. [w8] reported on two Urban Computing projects on visual analytics and visualization tools they co-developed with community members and climate scientists; one in Brazil and the other in the United States. To be able to support users across domains and visual literacy levels, they developed a framework that enabled quick iteration of various visualization designs. In projects where considerable effort goes into the creation of bespoke tools, the authors argue for the **need for reusable toolkits** so that research from one urban computing project can feed into the next.

Theme 4: People, Art, and Engagement

The final emerging theme emphasized the importance of carrying messages and impacts of science to broad audiences. In the *Scientific American* article [11], journalist Dan Rather emphasized that “*we need cross-pollination and engagement. We need experimentation on form, tone, content, and distribution. We need to try to find a way to take the message to where people are, through digital promotion, distribution and social engagement.*” By leveraging diverse media platforms and experiences—from news and social channels to museums and art installations—we can bring science and therefore climate science into spaces where audiences engage naturally.

Museums serve as **trusted platforms for public**



FIGURE 8. A student from the joint Brown+RISD Design Engineering masters program showcases her interactive data visualization at Boston's Museum of Science, Credit: E. Workman from TMP Images [w10].

education [w10]. The Hall of Planet Earth at the American Museum of Natural History in New York and the Earth Information Center at the National Museum of Natural History in Washington, DC are two prominent exhibits showcasing earth data and visualizations from NASA and other agencies. These institutions reach millions of visitors annually, advancing public understanding of our planet. Altringer et al. [w10] presented a framework for multi-institutional collaboration among academia, government, and museums implemented at Boston's Museum of Science in partnership with the City of Boston, Brown-RISD, and Harvard's Beckerman Center. The outcome of this framework was the development of five installations (Figure 8) centered on two key principles: i) iterative exhibit design incorporating visitor feedback and ii) local engagement through city-specific data and narratives. Success of this institutional framework depends on **sustained commitment at both leadership and implementation levels**.

The workshop revealed one more emerging collaborative paradigm resulting in a novel visualization medium. Through three case studies, Kendall et al. [w13] demonstrated the effectiveness of co-designed, multi-modal visualizations in communicating ecosystem impacts (Figure 9) and nature-based solutions. While achieving cinematic quality through integrated tools and applications, these visualizations face significant scaling and reproducibility challenges due to bespoke pipelines and massive project files, highlighting the **need for new production methods and workflows beyond traditional repository systems**.

Audience considerations are crucial when developing climate visualizations for public consumption,



FIGURE 9. Visualization showing the flood protection benefits of coral reefs in Miami Beach, Florida by the Center for Coastal Climate Resilience at UC Santa Cruz, Credit: 3D visualization by Ian Costello and Jessica Kendall-Bar. Hydrodynamic modeling by Camila Gaido-Lasserre and Borja Gonzalez Reguero [w13].

as youth, policymakers, and subject matter experts possess varying levels of data, visual, science, and visualization literacy. In order to **reach audiences at different levels**, Mahyar [w11] emphasizes that visualizations should be designed with inclusivity and accessibility at their core, ensuring that data representations are easily understood and navigated by diverse audiences. This approach is particularly important when considering how climate aspects affect diverse populations differently, necessitating respectful acknowledgment and incorporation of various worldviews, cultures, and traditions, including those of aboriginal and indigenous communities. By prioritizing inclusive design principles, climate visualizations can effectively bridge knowledge gaps and resonate with audiences across different literacy levels while honoring diverse cultural perspectives and be universally understood.

Throughout human history, art and storytelling have stood among the primary means by which societies process, interpret, and make meaning of life's most profound threats. This enduring relationship dates back to our earliest expressions—prehistoric cave paintings where our ancestors depicted dangerous predators and hunting scenes, alongside oral traditions that conveyed survival wisdom through narrative. From these Paleolithic beginnings through contemporary times, visual art and storytelling have remained humanity's complementary tools for making sense of existential challenges, allowing communities to externalize fears, preserve collective memory, and imagine pathways

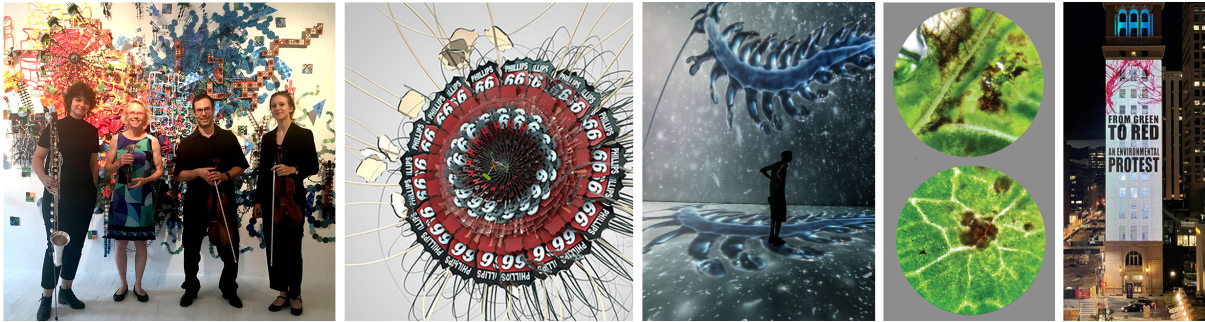


FIGURE 10. *Artists on Climate*, image courtesy of Francesca Samsel. Credit: Nathalie Mielbach, Ocean data and musical accompaniment; Jon McCormack, custom machine-learning generated flora; Victoria Vensa, Noise Aquarium, immersion in the sounds of the ocean; Deitmar Offerhuber, Dust Zone, auto-generated atmospheric data; Beatie Wolfe, Green to Red, multimedia installations using music, data and more, reflecting our rapidly changing planet [w12].

forward. During her workshop presentation, artist and researcher Francesca Samsel explained that artists harness the “*language of art to create multiple entry points into the reality of our changing planet, a topic where consequences overwhelm our human ability to absorb and contemplate.*” Through artistic expression, complex and daunting realities can become more accessible, allowing us to engage with critical issues that might otherwise remain too abstract or impossible to comprehend. Art appears everywhere in our daily environments, making it uniquely positioned to communicate climate issues at multiple scales. A neighborhood mural, a city-wide sculpture series, or an international installation can all convey climate messages, reaching people where they already are. Such artistic interventions transform ordinary spaces into climate conversation spaces, allowing a single concept to scale from engaging dozens in a community workshop to influencing hundreds of thousands of commuters passing a public installation. This scalability makes art an effective communication tool that meets diverse audiences in their everyday contexts. Samsel and Campbell’s [w12] research explores how artists employ distilled analogies and tap into emotions and senses to reach diverse audiences (Figure 10). Through their analysis of climate-related artworks, Samsel and Campbell identified five key principles that enable artists to speak to audiences: the ability to spark **curiosity**; incorporation of **real-time or interactives** connecting audiences to their environment, place and time; facilitation of **shared communal experiences**; **multi-sensory engagement**; and the presentation of **multiple interpretations** that transcend individual perspectives while addressing **timeless, universal themes**.

DISCUSSION & FUTURE DIRECTIONS

Through our workshops, we aim to understand *How can visualization research and practice empower people to comprehend climate and engage in related efforts? What are the challenges and how can we advance visualization research in support of climate?* Workshop submissions and the following discussions among participants paint a rich picture of the diverse approaches, contributions, and challenges. We seek to take advantage of this momentum to identify effective practices and research opportunities.

The workshop demonstrated some of visualization’s contributions to climate action communication: (a) means to make (abstract) data understandable through enhanced scales [w3], (b) immersive experiences through virtual reality [w5], situated physicalizations [w4] and augmented reality [w6]; (c) the ability to engage wide audiences through museums [w10,w13], art [w12] and community engagement [w11]; (d) making data, models and analyses explorable and transparent through interactive interfaces [w7] and rigorous open science [w8]. While these approaches offer significant potential, each also comes with distinct challenges (labeled C1-C6 and discussed below) that demand further investigation to leverage them most effectively, efficiently, and responsibly.

Acknowledging the fast-growing body of literature in visualization for climate and sustainability and its related interdisciplinary work, we emphasize that our synthesis is not intended as a comprehensive review of the field. Instead, it deliberately centers on approaches and directions that emerged from our IEEE 2024 workshop and our reflections upon them, highlighting their relevance and urgency for advancing climate visualization research and practice.

C1) RELEVANCE & RELATABILITY: hyper-local, hyper-personal, hyper-temporal—While climate impacts share common global patterns—including extreme weather events, biodiversity loss, and landscape degradation—effects vary significantly across populations and regions. Effective climate data communication, risk assessment, and mitigation strategies benefit from considering geographic, temporal, societal, and cultural contexts. Spence et al. [12] conceptualize this challenge through *psychological distance*—how far removed climate change feels from an individual’s immediate experience. Their research identifies four key dimensions: *geographical distance* (location of impacts), *temporal distance* (timing of impacts), *social distance* (who is affected), and *uncertainty* (confidence in predictions). Their findings demonstrate that reducing psychological distance increases both concern about climate change and willingness to take action. Building on this framework, approaches that incorporate *where* (hyper-local), *when* (hyper-temporal), and *who* (hyper-personal) are promising avenues to effectively bridge this psychological distance, increasing information relevance and motivating climate action.

C2) CREATION: inclusive, collaborative, iterative—Creating effective hyper-specific visualizations requires involving respective communities to understand local needs, cultural contexts, and communication preferences. This inclusive approach is especially critical for traditionally underserved communities, who often face both information barriers and heightened climate vulnerability. Beyond (co-)design, interventions can be long-lasting and become part of communities (museums, public installations) providing constant input and points of references for continuing engagement, discussion, and design.

C3) SCOPE DEFINITION: from micro to meso and macro—Because climate operates at varying scales, visualization should also adapt to these different scenarios. At a *micro*-scale, visualization could support individuals and their daily decisions and tasks related to family, shopping, or leisure. At a *meso*-scale, visualization could provide means to support community-level actions, businesses, organizations, and local actors often required to work toward specific climate targets and their monitoring. Eventually, at a *macro*-scale, visualization could support global and international actors, such as national governments and international organizations, in handling complex data sets and coordinating large-scale initiatives through policy and legislation. Each individual scale requires customized approaches in visualization techniques, technology infrastructure, analytics, communication strategies, and implementation methods,

aligned with specific stakeholder expertise, goals, and data characteristics.

C4) EVOLVING LITERACY: for data, units, visualizations—Climate visualization encompasses an abundance of units, data sources, measures, and key performance indicators (KPIs), that operate across different scales and contexts. As Chevalier et al. [4] illustrate, integrating these units into personal, relatable reference frames helps establish meaningful understanding (how much is it, what is good, what is bad, what is normal). Visualization can help make magnitudes “graspable” through visual means (scales) or immersive analogies. Yet, many units and KPIs have a complex provenance, especially when aggregated and averaged (e.g., average CO₂ emissions per capita). Providing more transparency in these measures, explaining the data sources, frameworks, and parameters involved is an important prerequisite to enable understanding in targeted audiences.

C5) EVALUATION METHODS: reading, understanding, acting over short and long terms—Assessing visualizations’ impact requires looking beyond conventional metrics of effectiveness and efficiency. How can we include effects such as affection, internalization (of information and understanding) and behavior change over a period of years? The challenge lies in measuring long-term outcomes and sustained behavioral change. This evaluation becomes particularly complex given the open-ended nature of visualization use, diverse contextual applications, and varying levels of user literacy. Long-term impact assessment demands frameworks to capture both immediate understanding and enduring behavioral transformation.

C6) CONTEXT: complementary, collaborative, scenario-based—Visualization is only *one* tool among many in addressing climate challenge, functioning within broader systems and approaches. For example, immersive environments and data comics are eventually embedded into museums or educational programs; personal dashboards are part of smart home analytical systems; analytical visualizations are the user front-end to complex models and data sets; co-design links entire communities, their cultures, and agendas. We need to see the role of visualization, analytics, communication, and immersion as part of these systems, in order to leverage visualization’s power within these scenarios. Depending on the scenario, visualization can play a rather small role of informing a user of a data value in a time series; in other scenarios visualization takes the role of an interactive interface to explore data; in again other scenarios visualizations are facilitators for discussion and shared decision making. It is these scenarios that define if a visualization works.

C7) EMOTIONAL SHIFTS: from climate and data anxiety to confidence and action—Climate anxiety and grief manifest as a profound sense of helplessness when confronting current and anticipated environmental losses. This emotional response to species' extinction and ecosystem degradation can trigger paralyzing thoughts like *'Where do I start?'* or *'The problem is too vast for any meaningful action'*. Building on this understanding, in the context of visualization we can think of "data anxiety" to describe feelings in face of overwhelming volumes of data and visualizations that can similarly paralyze individuals, hindering their ability to process information and make decisions amid complex tradeoffs. The critical challenge here is to transform data access from a potential source of anxiety into a powerful catalyst for knowledge and action. The vast wealth of climate data represents not an overwhelming burden, but rather a foundation of scientific understanding that can inform and inspire. This transformation calls for reimagining climate data presentation through strategic approaches that build literacy and confidence, foster understanding through context, and empower audiences through thoughtful design that creates pathways to action.

C8) KNOWLEDGE SHARING: systemic, cross-disciplinary, strategic, open—Unless we are up to the challenge of turning data into meaningful content that begets knowledge and galvanizes the public to act on climate, we have not sufficiently leveraged the benefits of data visualization. While related works on data visualization are presented across multiple venues and conferences, our workshop series uniquely addresses a critical gap in the IEEE VIS program. Launched in 2022, the first workshop explored the potential for building a cross-disciplinary community, by bridging the gap between researchers and practitioners. The workshop also assessed the VIS community's interest to support climate. The enthusiastic response to our second workshop validated the existence of a vibrant, diverse community of practitioners, researchers, and artists eager to collaborate on this critical initiative. Though we may not have all the answers for the path forward, the participants' engagement has strengthened our resolve and mission. Our current focus is threefold: (i) disseminate workshop outcomes and (ii) identify research gaps through this report, and (iii) establish pathways for this growing community. We warmly invite you to join this vital initiative as we collectively advance the field of visualization research and practice.

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