

# COMMUNICATING 'STORIES THAT MATTER': ACTIVIST MUSEOGRAPHY AND IMMERSIVE PRACTICE IN THE CLIMATE EMERGENCY

Jenny Kidd and Salsabilla Sakinah

Museums operate in ever more complex analytical and political relation to our world-in-crisis. This chapter explores how they document and communicate climate (in)justice, working to inspire the civil and humanitarian will that is needed in response. Specifically, it explores museums' use of immersive approaches to 'tell stories that matter' (Newell, 2020).

Critics have been clear that – despite what are understood to be museums' unique potentials to communicate about planetary issues<sup>1</sup> – they have to date failed to make climate action a priority. Over the last decade however several climate museums and exhibitions have opened, reflecting global initiatives to arrest crises in our current world ecology, and to resuscitate our (more-than-) human relationships (Cameron, 2021). It is a marked phenomenon of this shift how many institutions have turned to immersive approaches for interpretation and storytelling, and this chapter explores that development. It proposes that immersive approaches are particularly interesting in light of Robert Janes' (2020) call for individuals and organisations, including museums, to move beyond *thinking* about the climate crisis and to start *feeling* it instead.

The chapter begins with an overview of current thinking within the museum sector about planetary issues, connecting with ongoing (and often still conflicted) debates about institutions' activist roles and responsibilities (Janes and Sandell, 2019). We then situate these developments and discussions in relation to the recent 'immersive turn' within museums and heritage sites, exploring how a series of practical examples are attempting to promote changed perspectives on the climate emergency.

## Context

Since their earliest manifestations, museums have demonstrated great interest in exhibiting nature and the environment, as can be seen from the emergence of natural history museums across the globe in the nineteenth century. These museums were founded on positivist science, understanding nature and the environment to be separate from human culture, and considering specimens as passive objects for documentation, conservation and display. It is only in recent decades, along with the growing paradigm of the new museology,<sup>2</sup> that museums have acknowledged the complex interrelationship between humans and nature (Decker, 2020, p. 646).

One of the first exhibitions specifically focused on climate change was opened at the American Museum of Natural History (AMNH) in 1992, and several more opened globally in the 2000s. Those exhibitions often sought to explain the scientific realities of climate change but, in a bid to provide (flawed) equivalence or to assert museums' own neutrality, tended to acknowledge contestation and scepticism in debates about environmental change, and steadfastly avoided questioning the political consensus in relation to it. Examples include the first exhibition specifically about climate at the Deutsches Museum in 2002 *Climate: The Experiment with Planet Earth* (Keogh and Möllers, 2015), and the *Mission: Climate Earth* exhibition at the Swedish Museum of Natural History in 2004 (Bergdahl and Houltz, 2017). According to Bergdahl and Houltz (2017, p. 218) such approaches, which 'hamper museums in their ambitions to articulate and address the issue of climate change' have had 'deep historical roots' in museums' practices of categorisation and display, often leading to ambiguous interpretation and an excess of caution as a result (see also Keogh and Mollers, 2015, p. 84; Newell, Robin and Wehner, 2017, p. 7; Decker, 2020, p. 646). It is only more recently that exhibitions have broadened in scope to include investigation of current and future consequences of the climate crisis for human cultures. This is in part because museums have increasingly been

able to assume visitors have an awareness of some of the fundamentals of climate science (Newell, Robin and Wehner, 2017, p. 7), but also because there have been escalating calls for museums to join the climate activist movement.

The idea of ‘activist museums’ emerged in the late twentieth and early twenty-first century as a vision challenging what were understood to be institutions’ inherently colonial policies, principles, and practices (Brown and Mairresse, 2018; Chipangura and Marufu, 2019; Anderson, 2020; Bekenova, 2023). Janes and Sandell (2019, p. 1) have described museum activism as a ‘divergent expression’ of a museum’s inherent power as a ‘force for good’, one ‘that is intended to bring about political, social and environmental change’ in what Janes (2009, p. 55) calls a ‘troubled world’. Museum activism is predicated on the presumption that museums have enough cultural authority – the ‘signifying power of culture’ (Sandell, 2002, p. 3) – to communicate narratives and to present values and frameworks for enacting them, which might ultimately impact human outlooks and behaviours (Janes and Sandell, 2019, p. 7). Museums then can actively promote societal change by addressing and advocating urgent contemporary global issues such as social injustice and environmental crises (Ünsal, 2019, pp. 595–596; Anderson, 2020, pp. 490–491).

In order to achieve museums’ transformative social power and potential, activists argue that institutions need to puncture ‘the myth of neutrality’ that continues to be pervasive in their orbit<sup>3</sup> (Janes and Sandell, 2019, p. 8; Lyons and Bosworth, 2019, p. 174; Janes and Grattan, 2019, p. 100; Sutton, 2020, p. 625). In this view approaching climate narratives solely from the standpoint of ‘neutral’ science (as in the examples referenced above) is critically flawed given that it fails to recognise connections with environmental justice for example, where minorities, low-income, and vulnerable communities are disproportionately affected (Decker, 2020, p. 646), and at risk of becoming climate refugees (Dawson, 2015). For critics however, such approaches are not straightforward, and circle back to questions concerning public trust: will the public continue to trust museums if they are no longer viewed as neutral?<sup>4</sup> If it is currently the case that museums offer ‘non-confrontational’ and even ‘safe’ spaces for the exploration of issues (Newell, Robin and Wehner, 2017, p. 4), what might such a shift mean for them in the longer term?

Such concerns were apparent in controversy surrounding a new international museum definition proposed by the International Council of Museums in 2019, and in particular, the rejection of phrasing such as: ‘democratizing’, ‘inclusive’, ‘polyphonic spaces’, ‘critical dialogue’, ‘equal rights’, ‘human dignity’, ‘social justice’, ‘global equality’ and ‘planetary wellbeing’. As highlighted by

Fraser (2019, pp. 502–503) and Lorenc (2020, p. 168), the main issue that arose from the addition of activist phraseology to the international definition of a/any ‘museum’ was fear that it would exclude a large number of existing institutions, particularly those operating within funding or political constraints which meant they could not act freely within these changed parameters. These constraints are of course concerning to proponents of museum activism where they have a cooling effect on discourse and practice, where they lead to a lack of challenge when ‘dirty’ money is concerned, or where sponsorship is allowed to wield undue influence over museum activities such as collection, display or interpretation.<sup>5</sup>

Within this context, and given a professional praxis (museography) that can mean change is achingly slow, many museums have turned to (often itinerant) immersive approaches to tell ‘stories that matter’ about the climate emergency. This chapter explores this phenomenon. It demonstrates how museums are using such approaches to layer and diversify the narratives they contain, often integrating participatory mechanisms and calls to action. To close, we then make the case for further exploration of what immersive storytelling can do, more robust interrogation of how feeling, cognition and action are intertwined in the orbit of museums, and creativity in considering where a museum even ‘is’ as all of our climate futures are negotiated.

## The potentials of immersion

In this section, we explore a range of immersive museum practices designed to promote changed perspectives on the climate emergency. Although they often involve digital technologies and platforms (virtual and augmented reality for example), it is worth noting from the off that our approach here is not defined by hardware. Instead, it follows previous scholarship on immersive heritage in that it centres practices that are ‘story-led, audience and participation centred, multimodal, multisensory and attuned to [their] environment’ (Kidd, 2018). The examples that follow all nod to a set of experiential and affective qualities that it is hoped will characterise participation and prove consequential in terms of visitors’ planetary understanding and interactions.

Immersive installations and approaches are now regular features within museum and gallery contexts where it is felt the use of dynamic narrative techniques and new audience propositions can subvert the conventions of a more traditional heritage encounter (Kidd and Nieto McAvoy, 2019; Gao and Braud, 2023). They follow what Economou and Pujol Tost (2007) have called

'a different communication paradigm' for museums, one where visitors are encouraged to play more active and perhaps challenging roles,<sup>6</sup> and to experience a more diverse – or layered – range of viewpoints as a result (Amakawa and Westin, 2018). In what follows we discuss the potential of such approaches to craft an impactful feeling of presence and engage visitors' senses, with a view to offering changed (human and nonhuman) perspectives and encouraging agency.

Although in the past museums might have privileged visual and textual resources, in immersive practices spatial, haptic, aural, and even olfactory cues become important stimuli. Where the combination of these stimuli is experienced coherently it is hoped meaning-making will become more visceral and be experienced powerfully in the body (Kidd, 2019; Huws et al., 2019). This can be done in a number of ways, some of which we introduce in this section.

Rio de Janeiro's Museu do Amanhã (Museum of Tomorrow), for example, is narratively led throughout and contains very few artefacts. It is committed to harnessing the expressive arts and technology to communicate climate science, and to provoke responses to the question 'How do we want to live?' for the future. All visitors enter the exhibitions via *Cosmos*, a 360° movie space featuring a full-scale multi-sensory introduction where they 'witness' the formation of Earth and the beginnings of life. This 360° introduction's intensity is marked, as visitors watch in the dark, acutely aware of the bodies of others, and unable to disregard a penetrating voiceover (in Portuguese):

'We are the unfolding Universe.'  
'We are the thought that envisions Tomorrow'<sup>12</sup>

The use of 'we' here is codified as a narrative device which collectively implicates visitors – spatially and narratively – as actors in an interplay between humans and nature, but with agency to imagine and enact change. As an approach this is in marked contrast to the more traditional curatorial voice often found in museums.<sup>7</sup> Further into a visit at the Museu do Amanhã a slightly different 360° concept is utilised in the Anthropocene gallery (Figure 15.1) where visitors are surrounded by six giant totems, each ten metres tall and three metres wide, purposefully arranged as if in a stone circle. A series of thought-provoking filmic installations on topics such as oil extraction, water pollution, and the production of waste are then projected onto those totems. By dint of the spatial dynamics in the gallery visitors are again implicated as more than mere witnesses to climate destruction, their agency recognised, for good or for ill. These spatial, sensory and narrative cues support the Museu



Figure 15.1. Museum do Amanhã's Anthropocene Gallery. Photo Credit: Raul Aragão

do Amanhã's express intention that visitors should leave 'feeling disturbed or inspired but not indifferent' to their responsibility in collectively constructing a future that is both sustainable and convivial (Oliveira in Watts, 2015).

The *Blue Paradox* installation in the Museum of Science and Industry Chicago takes a similar approach. Here the museum features a tunnelled experience with 360° digital videos of the ocean projected onto the floor, walls, and ceiling. Visitors enter the exhibition as if from a beach, and then roam 'beneath' the sea's surface. Rich visuals first attempt to connect visitors emotionally with blue spaces – communicating something of their scale and majesty, as well as their significance to human life – before introducing the problems we face, and how we might begin to tackle those, both through individual and collective actions. Visitors explore the impact of the ocean plastic crisis on the marine ecosystem through multiple data points and visuals and are encouraged throughout to centre the question: 'Are you ready to make a difference?' In promotional materials the museum makes much of what it calls *Blue Paradox's* 'emotional storytelling' as a way to encourage behavioural changes in visitors and other key stakeholders.

There is a great deal of research (see, e.g.: Bergevin, 2018; Sweeney et al., 2018; Huws et al., 2019; Kidd, 2019) that explores how immersive heritage

approaches which combine storytelling and first-person perspectives can elicit emotional impact and empathetic engagements, to the extent that a visitor might perceive their visit as a 'transformative journey' (Bergevin, 2018). However, despite any museum's intention to evoke particular emotions, it is important to remember that visitors are active participants, who may respond with a diverse and unpredictable – even contrary – range of emotions (Oren, Shani and Poria, 2021; Bareither, 2021; Buchheim, 2022; May et al., 2022; Salazar et al., 2022). Using emotional storytelling to encourage behavioural change is challenging then: it may motivate visitors to act, but it might equally be perceived as an overwhelming or uncomfortable input which eventually leads to avoidance. For museums interested in encouraging visitors to move from thinking to feeling however, providing opportunities for embodiment – or embodied cognition – is clearly important.<sup>8</sup> As Salazar notes (2015, p. 97) 'designing richer experiences of climate change ought to transcend scientific data to enable a sensory-enhanced mode for anticipating futures'. As is demonstrated in the above examples, immersive approaches often pay particular attention to the way media and environments are experienced through our bodies and our senses, and museums have become attuned to those logics and their potentials (Gröppel-Wegener and Kidd, 2019; Liu and Lan, 2021; Mandelli, 2021; Sumar-tojo and Graves, 2021). Such approaches can – although never inevitably – give visitors a sense of personally, tangibly, being connected with an experience or subject matter, and even to feel perceptual cues associated with it (Shin and Biocca, 2017). The notion of 'presence' is a particularly powerful concept here as a way of articulating the extent to which a person feels transported, however temporarily or consequentially, into another environment or outlook. Experiencing such presence can mean users respond automatically to spatial cues, including audio cues, and to prompts from other persons within the environment (whether those persons are physically or virtually co-present with them). Presence is associated with and affected by the vividness of an encounter, as well as the user's range of possibilities within it; being able to interact with an environment for example, instead of just passively watching it, tends to lead to heightened feelings of presence and engagement.

The Klimahaus Bremerhaven takes this idea of presencing as an organising principle for its entire exhibitions:

You will cross five continents and nine locations. You will sweat, freeze, marvel and laugh, and above all, meet people from around the world who will talk about their everyday lives and describe how the climate affects them.<sup>9</sup>

Within this climate museum, visitors ‘journey’ following longitude 8° 34’ E (notionally ‘from’ the city of Bremerhaven), entering nine rich multi-sensory scenes (called ‘stations’) as they go. At the Niger station, visitors find themselves experiencing life in the 35° heat of a rocky desert, whilst in the Antarctica station, they feel the -6° average summer temperature and can even hear people shaking and shivering in a tent. Whilst journeying across and between the different scenes, visitors encounter the impacts of climate change; drought and forest fires in Sardinia, damage caused by the tropical cyclones in Samoa, and disappearing sea ice from the coasts of Alaska. This museum, which describes itself as a mix between a science museum and a theme park, and has a stated emphasis on ‘creative, imaginative, collaborative and hopeful – rather than fearful – experiences’ is focused on memorability and reorientation through multiplicity of perspectives, such that visitors will make more informed decisions in relation to sustainability in their everyday lives. The ‘spatial-emotional dimensions’ of a site like this – it is hoped – generate narratives, and in turn, imaginative and empathetic investment in visitors (to borrow from Arnold-de Simone, 2018).

*Symbiosis* (2022)<sup>10</sup> at Portland Art Museum’s Center for an Untold Tomorrow took multi-sensory engagement and the notion of presence to a rather different experiential end-point. In this project, six people at a time were zipped into haptic suits (powered by soft robotics) and wore head-mounted virtual reality displays wherein they visited a series of imaginary futures. Taking on the persona of one of a range of nonhuman or part-human characters, they then had to find ways of adapting to a collapsing ecosystem, encountering a series of haptic, olfactory and even edible cues as they did so. The goal was to de-prioritise human experience, and even the human bodily architecture, such that visitors to the experience might imagine more distributed forms of agency or ‘symbiosis’ between humans and nonhumans.

In this section, we have referred a number of times to this term ‘agency’ as a way to articulate the propositions inherent in some immersive experiences, and this is not unproblematic. Immersive approaches – whether in museums, or more broadly within media and communications contexts – are often celebrated for their capacity to centre users and give them increased agency, but the extent to which (designers of) immersive experiences can encourage meaningful decision-making and feelings of ownership or control, and how those translate beyond the immediate environment of an immersive encounter, is difficult to anticipate. Many of these systems are responsive and implicate those who participate such that we can end up struggling to articulate the interactants

positionality (audience, viewer, user, participant, visitor), but increased agency is by no means an inevitable outcome. It is easy to see however why these approaches might be considered compelling for institutions seeking means to explore more diverse (human and nonhuman) perspective-taking, and to work with more provocative narratives which suggest urgent dialogue and calls to action. Whether they can compellingly and consistently do that work is however still to be proven.

There are however a number of projects we can point to that seek to layer perspectives in this way through immersive approaches. The Design Museum's *Adapt* (2021) project is an interesting case in point, offering differing perspectives on our material futures. In partnership with Snap Inc. (of Snapchat) Architect Mariam Issoufou Kamara created an augmented reality project envisioning differing possible material realities for the museum building as it responds to extreme weather conditions. Creating filters which can be easily layered onto the museum in situ (see Figure 15.2) is a simple and provocative way of suggesting possible futures, and making the case for more robust discussions about 'climate-conscious architecture' through the re-imagining of a much-loved building (McGuirk in Silver, 2022).



Figure 15.2. *Adapt*, Design Museum. Image Courtesy of the Design Museum

Another prototype project using augmented reality technology at the Ethnological Museum of Berlin (2021) set out to provide additional perspectives on objects from the *Oceana: People and the Sea – A Sea of Islands* exhibition. *SwellAR*<sup>11</sup> invited users to scan an interactive map in order to access real-time climate data visualisations paired with content created by Pacific Islanders living the realities of the climate crisis. The AR experience enabled an extension of the static exhibition narrative to add layers of complexity, critically including the reflections of local stakeholders on issues such as drinking water shortages and coral reef devastation (Navarro in Lu, 2021). That layering, it is hoped, takes something that can otherwise seem quite abstract (to those in Northern Europe), giving the climate emergency immediate relevancy and proximity. Different narrative structures are thus possible in immersive formats, and can potentially be more agile than those in permanent exhibitions.

Another case in point is the *Museum of Water* (2013–), a roving live artwork of publicly donated water, as well as peoples' stories about it archived as audio recordings or handwritten notes. The museum is framed as a way of re-examining how we are connected by water, including how we utilise, share and look after our resources. The collection is open to donations wherever it is installed and now contains more than 1,000 contributions, featuring a wide variety of samples including (but not limited to) dam water, melting glacial ice, birth water, sweat and tears. According to founder Amy Sharrocks, it tells stories about cultural differences and our impact on the world, but also constitutes a performance of everyday life.<sup>12</sup> In this example, the potential for meaningful participation comes to the fore, alongside the hybridity of approaches which work across digital and physical materialities.

In contrast to these examples, where museums create immersion using digital technologies and/or the affordances of a physical museum space or building, the Climate Museum has taken a rather different approach. This is perhaps best exemplified in its 2022 collaboration – as part of a rich network of partners – to support the ninth, and final, performance of Sarah Cameron Sunde's *36.5 / A Durational Performance with the Sea*.<sup>13</sup> This immersive experience was one step removed from a digital or physical estate, taking place instead in the New York Estuary (Figure 15.3).

*36.5 / A Durational Performance with the Sea* was a series of nine site-specific participatory performances where the artist went to places at risk of rising sea levels and stood in the water. Following extensive community engagement activities led by the artist, members of the public were invited to participate, joining the artist in the water or on the shore, as day passed into



Figure 15.3. *36.5 / New York Estuary*, 9th and Final Work in the Series, *36.5 / A Durational Performance with the Sea*, Courtesy of Sarah Cameron Sunde Studio

night, and the water came in and then retreated in a full tidal cycle. As they were engulfed in water – a fully embodied and sensory experience of immersion – connections between our individual and collective physicality and the natural environment could be felt viscerally, and many participants (and viewers) reported feeling moved by the experience. As the artist noted:

This act of slowing down stays with participants and grants deeper understanding of our place in the world, which is the first step of many toward adaptation and collective intersectional resiliency.

Working in partnership in this way was in keeping with the ambitions of the Climate Museum to transform public arts and cultural programming such that it accelerates climate dialogue and action; ‘connecting people and advancing just solutions’.<sup>14</sup> This immersive encounter de-centres the museum as institution or host (and the baggage that perhaps comes with that), opening up a space for different kinds of thinking, and feeling, about the climate emergency. It is gently – but profoundly – cooperative, stubbornly persistent, and works with a very different understanding of temporality than museums, and their visitors, have become accustomed to.

In this section, we have reviewed immersive activities from a variety of museums, designed to communicate ‘stories that matter’ about the climate emergency. Through a variety of mechanisms, they demonstrate museums making more ‘assertive’ attempts to communicate the physical, social, cultural and emotional dimensions of climate change (Salazar, 2015), exploring – albeit tentatively – alternative futures (Friday, Mansfield and Ramos, 2015).

## Conclusion

In this chapter, through a range of examples, we have demonstrated clear enthusiasm from museums (variously defined) for the possibilities immersive approaches present to facilitate rich storytelling and even transformative encounters as they communicate about the climate emergency. There is no doubt a pervasive set of assumptions about immersive experiences that underpin this uptake; that they can facilitate the communication of a broader range of perspectives than traditional exhibitions, that they can enable embodied and even visceral meaning-making, and that they might increase emotional investment and even empathy in visitors as a result. With charged subject matters, or those that suggest a strong call to action, these are no doubt seductive propositions.<sup>15</sup> They suggest ways museums can communicate about the climate crisis by ‘encompassing joy, wonder, and delight, rather than just pressing the buttons of fear and guilt’ (Cameron et al., 2013, p. 19).

Most powerfully perhaps, at their best, these immersive approaches demonstrate museums practising more relationality; attempting to develop (and share) their authority ‘through supporting and curating networks of related things and their significance, rather than delivering knowledge from a single vantage point’ (Newell, Robin and Wehner, 2017, p. 4). In these encounters an object, collection, building, even the very concept of a museum (those definitional difficulties aside), can become a ‘pathway’ through which stories can flow, and around which dialogue can happen (Newell, Robin and Wehner, 2017). Bergdahl and Houltz propose that creating exhibitions today about the climate crisis ‘requires embracing discontinuity’ (2017, p. 229). Immersive approaches can embrace fragmentary and non-linear storytelling to present, and allow people to (notionally at least) experiment with, more radical visions of the future. These visions of the future can de-prioritise or de-stabilise the status quo, whether that be the prevailing political consensus, or the deeply ingrained museological consensus. As such, these approaches can be fitting to museums’ activist ambitions.

But they present challenges too. As we have noted, there is much work to do to understand how meaning-making works within these contexts, as well as how that then translates into thoughts and actions in the longer term.<sup>16</sup> Much of the work we have reviewed here is itinerant or otherwise somewhat fleeting. This might be perfectly justifiable, but may also raise concerns about sustainability, structural obstacles and levels of managerial support. Visitors should be able to discern – and interrogate – how these approaches reflect an institution's 'socially responsible' vision and governance more generally (Janes, 2022). We also need to better understand what ethical issues these approaches present or bring into focus. For example, where they utilise digital technologies, there is a need to confront the kinds of cultural and socio-technical assumptions that are embedded in these systems and discussions about them, as well as to reckon with their own environmental impacts.

Salazar (2015, p. 93) argues that 'what are urgently needed are not so much awareness campaigns but deep civic-driven processes of social change' facilitated by museums. The examples we have highlighted in this chapter as yet largely fall short in meeting those ambitions, but they are bringing museums ever closer to them.

## Notes

- 1 Janes (2020) notes that museums often [1] have a strong footing in communities and a keen sense of place, [2] 'bear witness' and document 'sustainable living practices', [3] bridge science, culture and creativity, [4] assemble and assess evidence, and [5] make learning accessible and engaging. See also Janes (2022).
- 2 Originally established to take care of objects deemed valuable, the 'old' duties of museums were focused on items and connected to collections, conservation, analysis and exhibitions (Weil, 1999, p. 229). However, concerns have been raised in recent decades that object-oriented museums are struggling to remain relevant in our rapidly evolving cultures (Cameron, 1971; Lehmannova, 2020). The 'new museology' refers to the more explicit recognition of social and political role of museums which emerged in the 1980s (see e.g. Vergo, 1989, as well as Anderson, 2004, p. 5, Hooper-Greenhill, 2006, p. 2, Vlachou, 2019, p. 47, Lyons and Bosworth, 2019, p. 17).
- 3 Museums have typically been regarded as 'neutral' institutions. However, some scholars and practitioners have recently questioned this viewpoint (Jones, Hussain, and Spiewak, 2020, p. 64). The process of collecting and selecting some artefacts and narratives over others, which museums have done since their inception, demonstrates of course that 'museums have never been neutral' (Fraser, Coleman, and Bennet, 2020, p. 298). Furthermore, as Cameron and Neilson (2015, p. 2) argue, seeing museums as neutral institutions ignores their often complicated position in relation to wider socio-political factors.

- 4 Museums have not been alone in facing questions about how to communicate the climate emergency and maintain public trust in the process. Broadcasters such as the BBC have been negotiating similar issues (Parratt, 2014; Brüggemann and Engesser, 2017).
- 5 This was evidently the case with the Science Museum London exhibition *Atmosphere: Exploring Climate Science Gallery* as widely reported, for example, by Macalister (2015) in *The Guardian*.
- 6 These possibilities have been demonstrated in other contexts, for example, in immersive theatre, and virtual reality (Dinesh, 2016; Warren, 2017; Machon, 2013; Bucher, 2017).
- 7 Bergdahl and Houltz (2017) also reflect on the power of 'we' as a narrative device within exhibitions about the climate emergency.
- 8 There is some evidence that embodied and spatialised interactions can lead to more searching and 'dialogical' encounters (Poole, 2018, p. 306, see also Kenderdine et al. 2014, Kenderdine, 2016).
- 9 <https://www.klimahaus-bremerhaven.de/en/>.
- 10 Symbiosis is produced by Polymorf <https://www.polymorf.nl/interaction/symbiosis/>.
- 11 <https://refrakt.org/swellar/>.
- 12 <https://museumofwater.co.uk/>.
- 13 For more about 36.5 / A Durational Performance with the Sea (2013–2022) visit <https://www.36pt5.org/>
- 14 <https://climatemuseum.org/mission>.
- 15 See Benardou and Droumpouki (2022) for more on immersive experiences and 'difficult' subject matters in particular.
- 16 Although Damala et al. (2008), Yoon et al. (2012), Ghouaiel et al. (2017), and Bernardou and Droumpouki (2022) have made in-roads into that understanding.

## References

- Amakawa, J. and Westin, J. (2018) 'New Philadelphia: Using augmented reality to interpret slavery and reconstruction era historical sites', *International Journal of Heritage Studies*, 24, pp. 315–331.
- Anderson, G. (ed.) (2004) *Reinventing the museum: Historical and contemporary perspectives on the paradigm shift*. Walnut Creek, CA: AltaMira Press.
- Anderson, S. (2020) 'Unsettling national narratives and multiplying voices: The art museum as renewed space for social advocacy and decolonization – a Canadian case study', *Museum Management and Curatorship*, 35(5), pp. 488–531.
- Arnold-de Simine, S. (2018) 'The stories we tell: Uncanny encounters in Mr Straw's House', *International Journal of Heritage Studies*, 25(1), pp. 80–95.
- Bareither, C. (2021) 'Difficult heritage and digital media: "selfie culture" and emotional practices at the Memorial to the Murdered Jews of Europe', *International Journal of Heritage Studies*, 27(1), pp. 57–72.
- Bekenova, K. (2023) 'African museums and their participation in the debates on the ICOM new museum definition', *Museum History Journal*, pp. 1–21.

- Benardou, A. and Droumpouki, A.M. (eds.) (2022) *Difficult heritage and immersive experiences*. New York: Routledge.
- Bergdahl, E. and Houltz, A. (2017) 'Museum Awakenings: Responses to environmental change at the Swedish Museum of Natural History, 1965–2005' in Newell, J., Robin, L. and Wehner, K. (eds.) *Curating the future: Museums, communities and climate change*. London; New York: Routledge.
- Bergevin, J.L. (2018) 'Narratives of Transformation: Reframing and naming the impact of activist museum practice on visitors', PhD Thesis, University of Leicester.
- Brown, K. and Mairesse, F. (2018) 'The definition of the museum through its social role', *Curator: The Museum Journal*, 61(4), pp. 525–539.
- Brüggemann, M. and Engesser, S. (2017) 'Beyond false balance: How interpretive journalism shapes media coverage of climate change', *Global Environmental Change*, 42, pp. 58–67.
- Bucher, J. (2017) *Storytelling for virtual reality: Methods and principles for crafting immersive narratives*. New York; Oxon: Routledge.
- Buchheim, E. (2022) 'The motif of tears: Representations of activism and suffering in the Liji Alley Museum in Nanjing', *Women's History Review*, pp. 1–19.
- Cameron, D.F. (1971) 'The museum, a temple or the forum', *Curator: The Museum Journal*, 14(1), pp. 11–24.
- Cameron, F. (2021) *The future of digital data, heritage and curation: In a more-than-human world*. London; New York: Routledge.
- Cameron, F. and Neilson, B. (eds.) (2015) *Climate change and museum futures*. New York: Routledge.
- Cameron, F. Hodge, B. and Salazar, J.F. (2013) 'Representing climate change in museum spaces and places.' *Wiley Interdisciplinary Reviews: Climate Change*, 4(1), pp. 9–21.
- Chipangura, N. and Marufu, H. (2019) 'Museums as public forums for 21st century societies: A perspective from the National Museums and Monuments of Zimbabwe' in Janes, R.R. and Sandell, R. (eds.) *Museum activism*. Oxon; New York: Routledge.
- Damala, A., Cubaud, P., Bationo, A., Houlier, P. and Marchal, I. (2008) 'Bridging the gap between the digital and the physical: Design and evaluation of a mobile augmented reality guide for the museum visit' in *Proceedings of the 3rd International Conference on Digital Interactive Media in Entertainment and Arts, DIMEA '08*. New York: ACM, pp. 120–127. <https://doi.org/10.1145/1413634.1413660>
- Dawson, A. (2015) 'Putting a human face on climate change' in Cameron, F. and Neilson, B. (eds.) *Climate change and museum futures*. New York: Routledge.
- Decker, J. (2020) 'Climate of change', *Museum Management and Curatorship*, 35(6), pp. 636–652. Available at: <https://doi.org/10.1080/09647775.2020.1836999>
- Dinesh, N. (2016) *Memos from a theatre lab: Exploring what immersive theatre 'does'*. New York; Oxon: Routledge.
- Fraser, J. (2019) 'A discomfoting definition of museum', *Curator: The Museum Journal*, 62(4), pp. 501–504. Available at: <https://doi.org/10.1111/cura.12345>
- Fraser, J., Coleman, L.S. and Bennett, B. (2020) 'Neutrality is not an option, museums don't need left-over statues', *Curator: The Museum Journal*, 63(3), pp. 295–298.

- Gao, Z. and Braud, T. (2023) 'VR-driven museum opportunities: Digitized archives in the age of the metaverse', *Artnodes Journal*, 32. UOC.
- Ghouaiel, N., Cieutat, J.-M., Jessel, J.-P. and Garbaya, S. (2017) *Mobile augmented reality in museums: Towards enhancing visitor's learning experience*.
- Gröppel-Wegener, A. and Kidd, J. (2019) *Critical encounters with immersive storytelling*. London; New York: Routledge.
- Hooper-Greenhill, E. (ed.) (2006) *Museum, media, message*. London: Routledge.
- Huws, S., John, A. and Kidd, J. (2019) 'Traces – Olion: Creating a bilingual "subtle mob" for National Museum, Wales' in Lewi, H., Smith, W., Lehn, D. vom and Cooke, S. (eds.) *The Routledge international handbook of new digital practices in galleries, libraries, archives, museums and heritage sites*. London; New York: Routledge.
- Janes, R.R. (2009) *Museums in a troubled world: renewal, irrelevance or collapse?* London ; New York: Routledge (Museum meanings).
- Janes, R.R. (2020) 'Museums in perilous times', *Museum Management and Curatorship*, 35(6), pp. 587–598.
- Janes, R.R. (2022) 'The value of museums in averting societal collapse', *Curator: The Museum Journal*, 65(4), pp. 729–745.
- Janes, R.R. and Grattan, N. (2019) 'Museums confront the climate challenge', *Curator: The Museum Journal*, 62(2), pp. 97–103.
- Janes, R.R. and Sandell, R. (2019) *Museum activism*. London; New York: Routledge.
- Jones, R., Hussain, N. and Spiewak, M. (2020) 'The critical role research and evaluation assume in the post-truth era of climate change', *Journal of Museum Education*, 45(1), pp. 64–73.
- Kenderdine, S. (2016) 'Embodiment, entanglement, and immersion in digital cultural heritage', in Schreibman, S., Unsworth, J. and Siemens, R. (eds.) *A new companion to digital humanities*. John Wiley & Sons, pp. 22–41.
- Kenderdine, S., Chan, L.K.Y. and Shaw, J. (2014) 'Pure land: Futures for embodied museography', *Journal on Computing and Cultural Heritage (JOCCH)*, 7, p. 8.
- Keogh, L. and Möllers, N. (2015) 'Pushing boundaries curating the Anthropocene at the Deutsches Museum, Munich' in Cameron, F. and Neilson, B. (eds.) *Climate change and museum futures*. New York: Routledge.
- Kidd, J. and Nieto McAvoy, E. (2019) *Immersive experiences in museums, galleries and heritage sites: A review of research findings and issues*. Project Report [Online]. Creative Industries' Policy and Evidence Centre (PEC).
- Kidd, J. (2019) 'With new eyes I see: Embodiment, empathy and silence in digital heritage interpretation', *International Journal of Heritage Studies*, 25, pp. 54–66.
- Kidd, J. (2018) "'Immersive" heritage encounters', *The Museum Review*, 3(1).
- Lehmannová, M. (2020) 224 Years of Defining the Museum. ICOM Czech Republic. Available at: [https://icom.museum/wp-content/uploads/2020/12/2020\\_ICOM-Czech-Republic\\_224-years-of-defining-the-museum.pdf](https://icom.museum/wp-content/uploads/2020/12/2020_ICOM-Czech-Republic_224-years-of-defining-the-museum.pdf)
- Liu, P. and Lan, L. (2021) 'Museum as multisensorial site: Story co-making and the affective interrelationship between museum visitors, heritage space, and digital storytelling', *Museum Management and Curatorship*, 36(4), pp. 403–426.

- Lorenc, M. (2020) 'Political undertone of the new ICOM Museum definition, or Maneuvering transatlantic among icebergs', *Muzealnictwo*, 61, pp. 164–171.
- Lu, F. (2021) *At the Ethnological Museum of Berlin, the climate change discussion is getting an AR boost*. <https://jingculturecrypto.com/muze-x-cristina-navarro-swellar/>
- Lyons, S. and Bosworth, K. (2019) 'Museums in the Climate Emergency' in Janes, R.R. and Sandell, R. (eds.) *Museum activism*. Oxon; New York: Routledge.
- Macalister, T. (2015) 'Shell sought to influence direction of Science Museum climate programme', *The Guardian*, 31 May. Available at: <https://www.theguardian.com/business/2015/may/31/shell-sought-influence-direction-science-museum-climate-programme>, accessed 1 March 2023.
- Machon, J. (2013) *Immersive theatres: Intimacy and immediacy in contemporary performance*. Hampshire; New York: Palgrave Macmillan.
- Mandelli, E. (2021) *The museum as a cinematic space: The display of moving images in exhibitions* (Edinburgh studies in film and intermediality). Edinburgh: Edinburgh University Press.
- May, S., et al. (2022) 'Measurement of science museum visitors' emotional experiences at exhibits designed to encourage productive struggle', *Curator: The Museum Journal*, 65(1), pp. 161–185.
- Newell, J. (2020) 'Climate museums: Powering action', *Museum Management and Curatorship*, 35(6), pp. 599–617.
- Newell, J., Robin, L. and Wehner, K. (eds.) (2017) *Curating the future: Museums, communities and climate change*. London; New York: Routledge.
- Oren, G., Shani, A. and Poria, Y. (2021) 'Dialectical emotions in a dark heritage site: A study at the Auschwitz Death Camp', *Tourism Management*, 82, p. 104194.
- Parratt, S. (2014) 'Public media and climate change: Ethical standards and codes in the BBC treatment of environmental information', *Interactions*, 5(1), pp. 127–140.
- Poole, S. (2018) 'Ghosts in the Garden: Locative gameplay and historical interpretation from below', *International Journal of Heritage Studies*, 24, pp. 300–314.
- Friday, G., Mansfield, T. and Ramos, J. (2015) 'Tools for Alternative Temporalities' in Cameron, F. and Neilson, B. (eds.) *Climate change and museum futures*. New York: Routledge.
- Pujol Tost, L. and Economou, M. (2007) Exploring the suitability of virtual reality interactivity for exhibitions through an integrated evaluation: the case of the Ename Museum. *Museology*, 4, pp. 81-97.
- Salazar, J.F. (2015) 'Futuring global change in science museums and centers: A role for anticipatory practices and imaginative acts' in Cameron, F. and Neilson, B. (eds.) *Climate change and museum futures*. New York: Routledge.
- Salazar, G., et al. (2022) 'Testing the influence of visual framing on engagement and pro-environmental action', *Conservation Science and Practice*, 4(10).
- Sandell, R. (2002) *Museums, society, inequality*. London: Routledge.
- Silver, H. (2022) *The Design Museum and Snap bring extreme climate change to London*. <https://www.wallpaper.com/architecture/design-museum-snap-filter>
- Shin, D., & Biocca, F. (2018). Exploring immersive experience in journalism. *New Media & Society*, 20(8), 2800-2823. <https://doi.org/10.1177/14614444817733133>

- Sumartojo, S., and Graves, M. (2021) 'Feeling through the screen: Memory sites, affective entanglements, and digital materialities', *Social & Cultural Geography*, 22(2), pp. 231–249.
- Sutton, S. (2020) 'The evolving responsibility of museum work in the time of climate change', *Museum Management and Curatorship*, 35(6), pp. 618–635.
- Sweeney, S.K., Newbill, P., Ogle, T. and Terry, K. (2018) 'Using augmented reality and virtual environments in historic places to scaffold historical empathy', *TechTrends*, 62(1), pp. 114–118.
- Ünsal, D. (2019) 'Positioning museums politically for social justice', *Museum Management and Curatorship*, 34(6), pp. 595–607.
- Vergo, P. (ed.) (1989) *The new museology*. Reaktion.
- Vlachou, M. (2019) 'Dividing issues and mission-driven activism' in Janes, R.R. and Sandell, R. (eds.) *Museum activism*. Oxon; New York: Routledge.
- Warren, J. (2017) *Creating worlds: How to make immersive theatre*. London: Nick Hern Books.
- Watts, J. (2015) *Museum of tomorrow: A captivating invitation to imagine a sustainable world*. <https://www.theguardian.com/world/2015/dec/17/museum-of-tomorrow-rio-de-janeiro-brazil-sustainability>, accessed 14 September 2023.
- Weil, S.E. (1999) 'From being about something to being for somebody: The ongoing transformation of the American museum', *Daedalus*, 128(3), pp. 229–258.
- Yoon, S.A., Elinich, K., Wang, J. and Van Schooneveld, J.G. (2012) 'Augmented reality in the science museum: Lessons learned in scaffolding for conceptual and cognitive learning' in *Presented at the IADIS International Conference on Cognition and Exploratory Learning in Digital Age*. IADIS, pp. 205–212.