

Facing the storm: the increasing effect of severe weather on mass gathering events

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Severe weather events increasingly threaten the safety of mass gatherings, particularly music concerts. Enhanced risk assessment methods, along with greater awareness from both artists and attendees, are essential. This awareness forms a significant part of a broader crowd and event safety culture. Additionally, the music industry has an important role to play in reducing the carbon footprint of large-scale events, which can contribute to environmental sustainability efforts.

The year 2023 was the warmest year on record¹, a distinction that underscores the escalating effects of climate change on the environment and society. Particularly affected were mass gathering events, including music concerts and festivals, which experience a heightened risk from severe weather events. From intense heatwaves and storms causing attendee discomfort and health risks and even deaths to the cancellation and postponement of events, the challenge is multi-faceted. Last year's record-setting temperatures serve as a reminder of the urgent need to change the organisation of mass gatherings. Table 1 is a non-exhaustive list of events and mass gathering events affected by weather condition during 2023. The list provides examples of incidents that made headlines in English-speaking media and does not reflect all occasions of events derailed by extreme weather. This shows the increasing scale of this problem.

The role of organisers and venue operators

Event organisers and venue operators manage the safety risks of events. Their responsibilities extend beyond operational management to include in-depth risk assessments, contingency planning and proactive safety measures tailored to the specific requirements of the event, the location, and potential consequences posed by different weather scenarios.

One of these responsibilities is the implementation of rigorous safety protocols to prevent incidents like structural collapses. This involves regular safety audits and ensuring that temporary structures, such as stages and barriers, are designed to withstand extreme weather conditions.

In addition to structural safety, organisers must prioritise risk assessments that consider weather forecasts as a major component. This involves monitoring weather patterns and being ready to adapt plans accordingly. Contingency planning is crucial for different scenarios, including the possibility of pausing, delaying or cancelling events based on weather conditions. These plans should be communicated clearly to all stakeholders, including attendees, to ensure everyone is aware of potential risks.

A critical aspect of these preparations is making adequate provisions to respond to weather expectations. For example, in regions prone to extreme heat (e.g. Taylor Swift concert in November 2023 in Brazil where attendees suffered burns from heated metal bars), organisers should consider the choice of materials and design elements in venues to mitigate such a risk. This may include using materials that do not conduct heat or providing shading and cooling areas for attendees.

Organisers should employ other approaches like using infrared cameras to monitor temperature variations within crowds, setting up ample water

stations for hydration in hot conditions and having trained front-of-stage barrier personnel and crowd managers for swift safety responses. If a situation arises, there should be pre-hospital care for medical emergencies and clear procedures for pausing or stopping shows. Organisers can also change event timings to cooler periods of the day and use misting showers around stages in cases of extreme heat. These measures, alongside crowd planning and monitoring practices such as crowd-sensing technology, are essential to maintain a safe event environment.

The role of artists

Artists, with their influential platform and connection to the audience, play a critical role in ensuring the safety and wellbeing of attendees at mass gatherings. Their position means they can actively contribute to safety and environmental awareness in many ways. During live performances, artists are often the first to notice changes in crowd behaviour or potential safety hazards. Their ability to assess the situation and respond quickly can help mitigate risks. For example, during the Taylor Swift concert, the artist's decision to pause the show to distribute water and provide safety instructions was a decisive action that helped manage the risk. This incident highlights how timely interventions by artists can significantly enhance safety.

Artists can influence crowd behaviour positively. Their announcements or actions can calm an agitated crowd, encourage orderly behaviour or facilitate a speedy response to an emergency situation. Artists can also draw attention to unfolding threats and guide the audience in taking appropriate safety measures.

Given their role, it is essential for artists to equip themselves with crowd safety knowledge and be familiar with potential sources of risks at their concerts and any effective interventions. Understanding the dynamics of large crowds, recognising signs of distress or danger among attendees and knowing how to effectively communicate with the event staff and the audience are skills that can help artists contribute to the safety and success of an event.

Cultivating a 'crowd and event safety culture'

The development of a robust 'crowd-safety culture' is a critical aspect of safety at mass gathering events. This concept goes beyond adherence to rules. It is about fostering a collective sense of responsibility and awareness among attendees regarding their own safety and that of others. Educating attendees about potential risks is the foundation of a crowd-safety culture. This education includes information on how to recognise and respond to health emergencies, such as heatstroke or dehydration, which are common in large, densely packed crowds, especially in hot weather. Organisers can disseminate this information through channels like social media, event websites and informational booths at the event. Promoting a safety culture extends beyond providing information. It involves engaging attendees in safety practices. Another aspect of fostering a crowd-safety culture is promoting a community mindset, where attendees look out for

each other. Encouraging attendees to stay vigilant, offer help to those in need and be respectful of each other's space and wellbeing can create a secure and enjoyable environment.

In a crowd-safety culture, individuals are adept at recognising potential risks, including those related to weather, both prior to and during an event. They can make informed assessments about the level of hazard a situation poses and respond appropriately, while also influencing others to do the same. This culture encourages proactive behaviours, such as choosing not to attend an event if it seems too risky or preparing adequately by bringing sunscreen, water or rain jackets based on expected weather conditions. This means that risk assessment is a shared responsibility; not only do organisers and venue operators assess risks, but attendees also acknowledge their own personal risk and take actions that align with improved safety. Actions like checking weather conditions, heeding alerts, carrying appropriate gear and being willing to adhere to evacuation orders or accept event cancellations for safety reasons are integral components of this culture.

While the concept of safety culture describes a quality rather than a quantity, its state can be quantitatively measured using standardised self-reporting instruments. This approach enables authorities and organisers to conduct cross-cultural comparisons and monitor the status of safety culture. Monitoring helps identify potential declining trends in safety attitudes and practices. When these trends are identified, targeted interventions, behavioural campaigns and awareness-raising initiatives become essential tools to improve and maintain a strong safety culture.

Shifting the event industry towards sustainable practices

As severe weather events increasingly challenge the event industry, it is imperative to recognise that adopting environmentally sustainable practices is more vital than ever. Mass gatherings, particularly music concerts and festivals, significantly contribute to increasing the global carbon footprint. These events involve vast energy consumption for lighting, sound systems and other operations, often powered by non-renewable energy sources. Additionally, the transport of artists, staff and attendees contributes substantially to greenhouse gas emissions. Fortunately, the industry has started to recognise its environmental effects and is taking steps to rectify it.

Artists play a vital role in promoting environmental sustainability too by advocating for eco-friendly practices and raising awareness about the environmental effects of events. Artists can inspire fans and attendees to adopt sustainable behaviours.

There are currently non-profit organisations that collaborate with musicians and festival organisers to adopt initiatives that 'green' the concert industry. These initiatives include eliminating single-use water bottles at events and sourcing local food and sustainable biodiesel. The adoption of such initiatives can ultimately eliminate the use of millions of single-use bottles at concerts.

There is a need for proactive campaigns to address greenhouse gas emissions related to the music industry. Such programs can encourage the music community to reduce the carbon footprint and neutralise what they cannot reduce by funding projects that reduce greenhouse gases. Some artists are proactively addressing their environmental impact. For example, some have linked concert ticket sales to tree planting², or have had their carbon footprint of touring audited by a climate change research centre. These efforts show there is a shift towards environmental sustainability actions in the event industry. The widespread adoption of these practices will significantly reduce the industry's carbon footprint and benefit the industry itself.

Summary

The challenge of severe weather during mass gathering events, intertwined with the event industry's impact on climate change, calls for a unified commitment to safety and sustainability. Organisers, artists and attendees must embrace responsible practices and cultivate a safety and environmental stewardship ethos. Such action will help mass gatherings remain dynamic platforms for human connection and celebration, harmonised with the imperative of environmental sustainability. The resilience and future viability of these events hinge on the collective adaptability and responsiveness of every stakeholder involved.

Table 1: A selected list of events and mass gatherings affected by severe weather events during 2023.

Date	Location	Event	Incident and impact
Jan 2023	Mt Smart Stadium, Auckland, New Zealand	Sir Elton John's concert	Concert cancelled half an hour before start and fans evacuated ¹
Jan 2023	Auckland, New Zealand	Laneway Festival	Event cancelled ²
Mar 2023	Apollo Theatre, Belvidere, Illinois, United States	Heavy metal concert	Sudden storm caused a roof collapse, killing one person and injuring dozens ³
Apr 2023	Virginia Beach, United States	The Water Festival	Third day of festival cancelled due to bad weather conditions ⁴
May 2023	Rose Bowl stadium, California, United States	The Cruel World Festival	Severe thunderstorm alert, forcing festival goers to evacuate the venue ⁵
Jun 2023	Bridgeport's Hartford HealthCare Amphitheatre, Connecticut, United States	Young the Giant concert	Event rescheduled due to air quality concerns affected by the smoke from Canadian wildfires ⁶
Jun 2023	Madrid, Spain	Primavera Sound Festival	Event cancelled due to adverse weather conditions ⁷
Jun 2023	The Far in Manchester, Tennessee, United States	Bonnaroo Festival	Event paused and evacuation order given due to a thunderstorm alert ⁸
Jun 2023	Red Rocks Amphitheatre, Colorado, United States	Louis Tomlinson concert	Seven concert goers hospitalised and nearly 100 injured due to a severe hailstorm before the start of the concert. Event was cancelled ⁹
Jun 2023	West Michigan, United States	Electric Forest Festival	Concertgoers temporarily evacuated the venue due to severe thunderstorm alert ¹⁰
Jul 2023	United Kingdom	Tiree Music Festival	Event cancelled due to bad weather conditions, with campers stranded in ferry terminal ¹¹
Jul 2023	Acrisure Stadium, Pittsburgh, Pennsylvania	Ed Sheeran concert	Heatwave caused 17 transports to hospital including one seizure and two cardiac arrests ¹²
Jul 2023	Amsterdam, The Netherlands	Awakening Festival	Third day of the music festival cancelled due to severe weather conditions and storm ¹³
Jul 2023	Xfinity Theatre in Hartford, Connecticut, United States	Jason Aldean concert	The artist ran off stage mid-concert after having heat exhaustion ¹⁴
Jul 2023	Chicago, United States	Pitchfork Music Festival	The festival temporarily evacuated due to dangerous weather conditions ¹⁵
Jul 2023	Phoenix, Arizona, United States	The Disturbed concert	Event cancelled and rescheduled due to extreme heat ¹⁶
Aug 2023	Bend, Oregon, United States	My Morning Jacket and Noah Kahan concerts	Worsening air quality from wildfire smoke led to cancellations ¹⁷
Aug 2023	California, United States	Insomniac's Debut Interstellar Event	Event cancelled due to Hurricane Hillary ¹⁸
Aug 2023	British Columbia, Canada	ThumpTown music festival	Event cancelled and postponed due to wildfire risk ¹⁹

Aug 2023	Talking Stick Resort Amphitheatre, Phoenix, Arizona, United States	50 Cent concert	Event cancelled and postponed due to severe heatwave ²⁰
Aug 2023	FedEx, Washington DC. United States	Beyonce concert	Shelter in place order was issued in anticipation of heavy rain and lightning, resulting in overcrowding and heat exhaustion in the concourse area. Event was delayed ²¹
Aug 2023	Seoul's World Cup stadium, South Korea	World Scout Jamboree ceremony	Reported health issues and evacuation order resulting from heatwaves as well as a typhoon threat ²²
Sept 2023	Huston, Texas, United States	Danzig concert	Event cancelled due to extreme heat ²³
Sept 2023	Allegiant Stadium, Las Vegas, United States	Ed Sheeran concert	Some fans waiting outside the stadium required medical attention due to the scorching heat. Event cancelled ²⁴
Sept 2023	Brooklyn Mirage, New York, United States	Pretty Lights show	Event postponed due to heavy rain and flood conditions ²⁵
Sept 2023	Black Rock desert, Nevada, United States	Burning Man Festival	Attendees got stranded in heavy rain and mud ²⁶
Oct 2023	São Paulo, Brazil	Tomorrowland Brazil Festival	Extreme rain led to the cancellation of the second day ²⁷
Nov 2023	Rio de Janeiro, Brazil	Taylor Swift concert	A young fan died due to extreme heatwave ²⁸
Nov 2023	Canberra, Australia	Spilt Milk Festival	Event postponed due to unsafe weather conditions and an approaching storm ²⁹
Dec 2023	Sydney, Australia	Good Things Festival	Festival ended abruptly due to wild storm and evacuation order issued ³⁰

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Endnotes

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2. For example, Pianist and composer, Martin Kohlstedt, is planting a tree for every concert ticket he sells. See www.classicfm.com/discover-music/instruments/piano/pianist-planting-one-tree-for-every-concert-ticket-sold/.