**[Haj and climate attributions](https://www.dawn.com/news/1843736/haj-and-climate-attributions)**

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CLIMATE change has begun to infringe on the freedom of believers to perform Haj freely and fearlessly. The world was shocked to learn that almost [1,500 individuals died of the heat](https://www.dawn.com/news/1840835) during the pilgrimage. [Heatwaves](https://www.dawn.com/news/1835326) everywhere in the world, as in Pakistan, have become mercilessly hotter, frequent, and longer. The developments in attributive sciences are able to clearly assign the share of climatic changes to increased temperatures and precipitation. This emerging field of inquiry has begun to guide climate adaptation, risk management, commodity price hedging, insurance, and the landscape of international climate finance.

Detection and attribution of climate change has emerged as an active area of research that uses various methods to link observed changes in climate caused by human activities. This helps determine whether human influence can be distinguished from natural weather cycles, processes and variabilities. Causation, also known as detection and attribution studies, is used to attribute trends, extreme events, impacts, and sensitivity to human-caused climate change. Several attribution techniques are applied for increasingly reliable, timely, and actionable information for climate adaptation and risk management efforts.

Almost 50 studies over the last 10 years or so by the World Weather Attribution (WWA), ClimaMeter and several others have conducted studies to ascertain whether or not climate change is altering the frequency and intensity of extreme weather events (EWEs), helping to determine how climatic changes affect specific trends. These studies can now be undertaken on an almost real-time basis.

Attributional science is now able to provide quantitative assessments of how climate change has affected the odds of similarly extreme weather occurring in the future. Quantifying can now provide scientific evidence on how the likelihood and intensity of specific EWEs has increased. WWA has, for example, found that heatwaves have become 1.2 degrees Celsius hotter than in pre-industrial times. Likewise, a study found that the 2022 heatwave in India and Pakistan was 30 times more likely due to climate change. A recent rapid assessment by ClimaMeter on the heatwave during Haj found that, without the influence of human-caused climate change, temperatures would have been 2.5°C cooler. ClimaMeter and WWAs regularly conduct rapid assessments of the role of climate change in particular EWEs.

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There are, however, also significant challenges and limitations. An integrated, nuanced approach is required to effectively leverage this emerging field of climate science. A careful consideration of the limitations is needed when applying attribution findings to predict and manage future climate-related risks and damage. The goal of such studies is to provide the best available science-based information to support risk management and climate adaptation. Researchers acknowledge the limitations and uncertainties in their analyses, recognising that ‘we don’t know’ or ‘no significant trend’ are valid findings, as many of the 50 studies by WWA concluded.

Some studies have used ‘source attribution’ to link climate damage to specific emitters, such as fossil fuel companies. This could potentially support liability claims and policies to hold emitters accountable. A Dutch court, for example, has recently ordered Shell to reduce emissions based on this type of attribution. As the world’s second largest oil producer, Saudi Arabia owns Aramco, which is one of the largest corporate emitters of greenhouse gas emissions. According to a report, it is reportedly responsible for more than four per cent of the world’s historical carbon emissions.

Meanwhile, the heat during this year’s Haj is directly linked to global fossil fuel burning and has affected the most vulnerable pilgrims, posing an ethical dilemma for the kingdom that is considered the home and custodian of Islam and its universal values.

Extreme event attribution can potentially be used to inform discussions around loss and damage. Attribution science can inform international policy discussions on L&D mechanisms. While researchers use rigorous methods, some uncertainty remains in precisely quantifying specific EWEs. This could limit the direct application for compensation. There are also concerns that attribution findings could be misrepresented or used for political purposes of assigning blame or liability, rather than informing constructive solutions. L&D encompasses a wide range of slow-onset changes and non-economic losses that are not always fully captured by extreme event attribution. It is argued that the slow-onset needs criteria-based approach using averages and trends, rather than relying solely on detailed singular event studies for L&D policy and finance mechanisms.

Further, uneven data quality and research infrastructure in developing countries poses challenges for applying attribution science to the L&D agenda. Attribution has played a central role in global climate negotiations since the early 1990s, but attribution science has begun to play an important role only in recent years. It is used in financing adaptation and litigation, and will underpin L&D funds. These efforts can influence the global conversation around climate justice and help integrate findings in new approaches to L&D policies and financial mechanisms. For L&D-related financing mechanisms, the methodological refinement will probably provide rapid attribution assessments, and enable a more immediate response and support in the aftermath of extreme events.

Extreme weather events are already having significant economic consequences. They damage property, critical infrastructure, impact human health and productivity, and negatively affect key economic sectors like agriculture, trade, industry, and urban planning. Indirect costs from supply chain disruptions and uncertainty are also substantial. Businesses face growing risks from damage to their facilities, supply chain disruptions and resource scarcity.

These economic impacts do not even account for non-economic losses such as biodiversity loss, or loss of cultural or religious heritage and practices. The floods in Pakistan have caused significant damage to mosques and other religious sites. The Post-Disaster Needs Assessment reported that religious sites in active use, including mosques, shrines, and dargahs were “extensively damaged” by the 2022 floods and that the “deterioration and damage to the sites will negatively affect visitor numbers”. In a similar vein, Haj is a central pillar of Islam and the pilgrimage should not become risky for our elderly parents, women and young children. ClimaMeter study should be a wake-up call, and not a harbinger of what’s to come.

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