

Climate Attribution Science for Environmental Justice: Holding Polluters Accountable through Effective Legal and Policy Frameworks

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Abstract

This paper discusses the role of climate attribution science in fostering environmental justice. It critically examines the concept of climate attribution science. The paper observes that climate attribution science is a vital field in promoting environmental justice by linking global climate change to greenhouse gas emissions. It notes that through climate attribution science, it is possible to identify the specific sources and causes of climate change. Consequently, the paper argues that climate attribution science is an effective approach towards holding polluters accountable for the climate crisis. The paper examines the need to build effective legal and policy frameworks on climate attribution science in order to hold polluters accountable at all levels for environmental justice.

1.0 Introduction

Climate change is an environmental justice issue. The concept of environmental justice recognises the disproportionate impacts of environmental hazards including the triple planetary crisis of climate change, pollution, and biodiversity loss¹. It has been observed that environmental justice acknowledges that the impacts of environmental hazards such as climate change are felt unequally². In particular, environmental justice highlights the plight of vulnerable people and communities, including people of colour, indigenous and local communities, women, the youth and developing countries, who bear the most burden when it comes to environmental damage and seeks to give them a voice through access to environmental information, participation in environmental decision-making processes and access to justice in order to ensure sustainable and equitable development³. The ideal of environmental justice envisages the just treatment and meaningful involvement of all people in environmental decision-making processes in order to ensure full protection from disproportionate environmental and health impacts, and equitable access to a clean, healthy, sustainable, and resilient environment⁴.

Climate change fuels environmental injustices. For example, the impacts of climate change including intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and

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¹ United Nations Development Programme., 'Five steps to environmental justice' Available at <https://www.undp.org/blog/five-steps-environmental-justice> (Accessed on 26/03/2026)

² Ibid

³ Muigua. K., Wamukoya. D., & Kariuki. F., 'Natural Resources and Environmental Justice in Kenya.' Glenwood Publishers Limited, 2015

⁴ Environmental Justice Factsheet., Available at <https://css.umich.edu/publications/factsheets/sustainability-indicators/environmental-justice-factsheet> (Accessed on 26/03/2026)

declining biodiversity are felt unevenly and unequally⁵. It has been observed that the poor, marginalized and disadvantaged populations including indigenous peoples, local communities, women and girls and the youth are more vulnerable to the impacts of climate change⁶. In addition, it has been pointed out that due to geographic and economic vulnerability, people and communities in the Global South are extremely vulnerable to climate change and its impacts⁷. Climate change is therefore an environmental justice issue since it disproportionately affects vulnerable individuals, communities and regions who have contributed negligibly to the accumulation of greenhouse gases in the atmosphere⁸. It has been observed that people and communities who have contributed the least to climate change are being affected by it the most, and are likely to be less able to protect themselves from its impacts⁹. Fostering environmental justice is therefore crucial towards acknowledging and addressing the disproportionate impacts of climate change across individuals, communities and regions.

This paper discusses the role of climate attribution science in fostering environmental justice. It critically examines the concept of climate attribution science. The paper observes that climate attribution science is a vital field in promoting environmental justice by linking global climate change to greenhouse gas emissions. It notes that through climate attribution science, it is possible to identify the specific sources and causes of climate change. Consequently, the paper argues that climate attribution science is an effective approach towards holding polluters accountable for the climate crisis. The paper examines the need to build effective legal and policy frameworks on climate attribution science in order to hold polluters accountable at all levels for environmental justice.

2.0 Role of Climate Attribution Science in Fostering Environmental Justice

Climate change attribution has been defined as the science that links global climate change to specific weather events¹⁰. Climate change attribution has also been defined as the quantitative analysis of the extent to which human-induced climate change is affecting local weather patterns and events¹¹. In addition, climate change attribution has been described as the scientific process for establishing the principal causes

⁵ United Nations., 'What is Climate Change?' Available at <https://www.un.org/en/climatechange/what-is-climate-change> (Accessed on 26/03/2026)

⁶ Center for Climate Justice., 'What is Climate Justice?' Available at <https://centerclimatejustice.universityofcalifornia.edu/what-is-climate-justice/> (Accessed on 26/03/2026)

⁷ Giles. M., 'The Principles of Climate Justice at CoP27.' Available at <https://earth.org/principles-ofclimatejustice/#:~:text=That%20response%20should%20be%20based,the%20consequences%20of%20climate%20change> (Accessed on 26/02/2026)

⁸ United Nations Environment Programme., 'Responding to Climate Change' Available at <https://www.unep.org/regions/africa/regional-initiatives/responding-climate-change> (Accessed on 26/03/2026)

⁹ Oxfam., 'Climate Justice.' Available at <https://www.oxfam.org.au/what-we-do/climate-justice/> (Accessed on 26/03/2026)

¹⁰ Climate Change Attribution., Available at <https://climate.mit.edu/explainers/climate-change-attribution> (Accessed on 27/03/2026)

¹¹ Otto. F., James. R., & Allen. M., 'The science of attributing extreme weather events and its potential contribution to assessing loss and damage associated with climate change impacts' Available at https://unfccc.int/files/adaptation/workstreams/loss_and_damage/application/pdf/attributingextremeevents.pdf (Accessed on 27/03/2026)

and effects of climate change¹². It has been observed that for climate change attribution to be established, the relationship between the observed climatic events and the proposed causal mechanism needs to be demonstrated¹³.

Climate attribution science has emerged as vital process in the pursuit of environmental and climate justice. This field quantifies how climate change influences the likelihood and intensity of a particular extreme-weather event¹⁴. Through this, it is possible to attribute the impacts of climate change to specific causes¹⁵. It has been argued that by comparing the climate conditions the world is experiencing today to what the Earth's climate would be like without human influence, climate change attribution science plays a key role in highlighting the human-induced causes of climate change¹⁶. Climate change attribution science is therefore a critical tool for understanding the drivers and impacts of climate change. Through this, it is possible to hold the primary drivers of human-induced climate change accountable towards environmental and climate justice¹⁷.

Strengthening climate attribution science is therefore vital in holding polluters accountable for their role in causing and worsening human-induced climate change. It has been observed that through climate attribution science, it is possible to identify weather conditions that are becoming more common due to human-induced climate change and link them to specific causes¹⁸. For instance, climate attribution science has led to a better understanding of how climate change is causing and worsening extreme weather events such as heatwaves, wildfires, floods and droughts¹⁹. It has been observed that attribution studies have been done on droughts, wildfires and hurricanes making the impacts of change easier to discern²⁰. In addition, climate change attribution science is enabling a better understanding of how climate change impacts human health²¹. Climate change attribution science quantifies how events such as extreme heat, pollution from wildfires and flooding directly impact human health and mortality²².

Climate change attribution science can therefore spearhead progress towards environmental and climate justice by holding polluters accountable. In particular, it has been argued that the growth of climate attribution science is vital in strengthening efforts to hold the fossil fuel industry accountable for its role

¹² What is Attribution?., Available at <https://psl.noaa.gov/csi/whatis/> (Accessed on 27/03/2026)

¹³ Ibid

¹⁴ Attribution., Available at <https://www.climatecentre.org/attribution/> (Accessed on 27/03/2026)

¹⁵ Ibid

¹⁶ Union of Concerned Scientists., 'What is Attribution Science?' Available at <https://www.ucs.org/resources/attribution-science> (Accessed on 27/03/2026)

¹⁷ Ibid

¹⁸ Climate Central., 'Attribution Science and Climate Fingerprints' Available at <https://www.climatecentral.org/attribution-science> (Accessed on 27/03/2026)

¹⁹ Extreme Event Attribution., Available at <https://climateattribution.org/attribution/extreme-event/> (Accessed on 27/03/2026)

²⁰ Climate Change Attribution., Op Cit

²¹ Advances in Attribution., Available at <https://www.nature.com/articles/s41558-024-02189-7> (Accessed on 27/03/2026)

²² Ibid

as the primary driver of climate change²³. It has been observed that burning of fossil fuels such as coal, oil and gas is the primary cause of climate change²⁴. It is estimated that fossil fuels are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions²⁵. Through climate attribution science, it is possible to directly link extreme climatic and weather events to greenhouse gas emissions from the fossil fuel industry thus ensuring accountability towards environmental and climate justice²⁶. For instance, it has been observed that attribution studies have become a central component of climate litigation with courts relying on the testimony of scientific experts to hold polluters accountable²⁷. Courts are increasingly relying on scientific studies to attribute greenhouse gas emissions to fossil fuel companies, link extreme weather events to human-induced climate change, examine the impacts of climate change on ecosystems and assess how climate change influences human health²⁸.

Despite its role in fostering environmental justice, it has been observed that there are many uncertainties in attribution studies primarily due to unavailability of long-term meteorological observations²⁹. In addition, it has been pointed that the reliability of global climate models to simulate extreme weather events can affect the efficacy of attribution studies³⁰. Further, climate attribution science is a complex and technical field that relies on advanced computer and data models³¹. Consequently, without adequate investments and infrastructure, it may be difficult to conduct attribution studies³². In light of these challenges, it is imperative to embrace and strengthen climate attribution science towards holding polluters accountable for environmental justice.

3.0 Conclusion

The emergence of climate attribution science is a major step in the pursuit of environmental justice. Through climate attribution science, it is possible to hold polluters, especially the fossil fuel industry, accountable for their role in causing and worsening the climate crisis³³. In addition, climate attribution science has led to a better understanding of the causes and consequences of climate change thus enabling the world to adequately anticipate, prepare and respond to the impacts of climate change³⁴. Climate

²³ Union of Concerned Scientists., 'What is Attribution Science?' Op Cit

²⁴ United Nations., 'What is Climate Change?' Available at <https://www.un.org/en/climatechange/what-is-climate-change> (Accessed on 27/03/2026)

²⁵ United Nations., 'Renewable Energy - Powering a Safer Future' Available at <https://www.un.org/en/climatechange/raising-ambition/renewable-energy> (Accessed on 27/03/2026)

²⁶ Union of Concerned Scientists., 'What is Attribution Science?' Op Cit

²⁷ Climate Change Attribution in the Courts., Available at <https://climateattribution.org/attribution/courts/> (Accessed on 28/03/2026)

²⁸ Ibid

²⁹ Otto, F., James, R., & Allen, M., 'The science of attributing extreme weather events and its potential contribution to assessing loss and damage associated with climate change impacts'

³⁰ Ibid

³¹ The Impact of Climate Attribution., Available at <https://www.sciencespo.fr/chair-sustainable-development/news/the-impact-of-climate-attribution-science-on-global-climate-action/> (Accessed on 28/03/2026)

³² Ibid

³³ Union of Concerned Scientists., 'What is Attribution Science?' Op Cit

³⁴ Climate Change Attribution., Op Cit

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attribution science therefore strengthens environmental justice by linking extreme weather events to greenhouse gas emissions from specific industries. Consequently, climate attribution science enables individuals and communities to hold polluters accountable through scientific data that can support climate litigation at all levels³⁵. In addition, it has been observed that climate attribution science plays a key role in determining compensation for loss and damage associated by climate change by quantifying the role of climate change in causing and worsening disasters³⁶.

It is therefore necessary to design effective legal and policy frameworks on climate attribution science in order to hold polluters accountable towards environmental justice. In particular, there is need for policy frameworks that prioritise investments in climate attribution science in order to enable a better understanding of the causes and effects of climate change³⁷. In addition, there is need for legal and policy frameworks that integrate climate attribution science in climate mitigation and adaptation efforts in order to bolster climate action³⁸. Legal and policy frameworks that support the use of climate attribution studies in climate litigation at national and global levels are also necessary for evidenced-based and sound decision making-processes towards holding polluters accountable³⁹.

Strengthening climate attribution science is therefore vital in the pursuit of environmental justice. It is imperative to build effective legal and policy frameworks on climate attribution science in order to hold polluters accountable towards environmental and climate justice.

³⁵ Climate Attribution Database., Available at <https://climateattribution.org/> (Accessed on 27/03/2026)

³⁶ Ibid

³⁷ The Impact of Climate Attribution., Op Cit

³⁸ Ibid

³⁹ Climate Change Attribution in the Courts., Op Cit

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