GPH-International Journal of Applied Science
(Online ISSN 3050-9653)
Volume 09 | Issue 07 | July 2026
Published by: Global Publication House
DOI: https://doi.org/10.5281/zenodo.22055999
Available online at: www.gphjournal.org
Journal homepage: https://gphjournal.org/index.php/as/index

Artificial Intelligence, Climate Governance, and Environmental Justice: Comparative Perspectives from the United Kingdom and Africa

Akinwale Victor, ISHOLA [1]
Department of Peace, Security and Humanitarian Studies, University of Ibadan.
victorakinwale2@gmail.com

Anya Adebayo, ANYA [2]
SUMMA LOGIX LIMITED Lagos.
adeanya@summalogix.com

kelechi Adura, ANYA [3]
Computer science, Landmark University Omu-Aran Nigeria.
anyakelechiadura@gmail.com

Eke Kehinde ANYA [4]
Scottish Power Headquarters, Glasgow.
eanya@spenergynetworks.co.uk

Abstract

This paper examines the recent role of artificial intelligence (AI) in climate governance and its impacts on environmental justice with the United Kingdom and Africa as a comparative case study. As AI is increasingly incorporated into environmental monitoring and climate modelling, and into decision-making, it is often viewed as a means of making climate mitigation and adaptation more efficient. Nevertheless, it is implemented in uneven global conditions under the influence of variations in technological capacities, availability of data, and institutional coordination. This poses critical questions regarding the distribution of the benefits and impacts of AI-led climate governance across regions. The paper uses a qualitative and comparative approach to analyse the policy integration strategies, governance structures and capacity conditions that affect the application of AI in both situations. The findings suggest that the United Kingdom has a comparatively well-integrated policy frameworks and institutional settings, which can enable data-driven solutions to climate governance, but many African settings are limited by infrastructure, funding, and fragmentation of governance. These gaps characterize the extent to which AI can be optimally utilized in addressing climate problems. This article posits that AI is not a neutral technology, but it is an element of existing structural conditions, which impact access, use, and outcomes. Its inclusion within climate governance can, therefore, solidify existing inequalities in the environmental risk, adaptive capacity and participation. The paper concludes that the interaction of AI and climate governance cannot be analyzed without addressing larger issues of capacity and justice, particularly in the form of offering emerging technologies to improve more inclusive and equitable environmental outcomes.

Keywords:

Artificial Intelligence, Climate Governance, and Environmental Justice.

Introduction

The increasing impacts of climate change have brought about increasing demands to governments and institutions to adopt more effective and responsive practices in terms of environmental governance. Artificial intelligence (AI) has become an important technological resource in this regard and has provided new opportunities in climate modeling, environmental monitoring, disaster forecasting, and resource management (Shinde, 2025). These applications are often expressed in terms of enhancing the precision, pace and integration of the decision-making procedures in relation to climate, and thereby capacity of states to respond to intricate and evolving environmental challenges. Consequently, AI is being implemented into the frameworks of climate governance, and it influences the process of environmental risk identification, interpretation, and response (Sarker and Nuruzzaman, 2024). Nonetheless, the increase in AI use in climate governance occurs within a more globally dispersed environment with high variations in technological availability, institutional advancement, and access to digital infrastructure. The causes and effects of climate change are also disproportionate, as third world countries, particularly Africa, are disproportionately exposed to climate change despite contributing minimal emissions to the world. These disparities form the core of environmental justice discourses that emphasized equitable distribution of environmental damage and advantage, and equitable participation in the decision-making process. The emergence of AI in the field of climate governance therefore raises important questions as to whether new technologies can help in reducing these inequalities or whether they may perpetuate existing patterns of exclusion and marginalisation.

The adoption of AI in climate governance is closely related to the overall structural conditions including availability of data, technical skills, funding, and institutional alignment. The adoption of AI in policy-making and its support by established research and innovation platforms is becoming increasingly embedded in the United Kingdom and other jurisdictions. The environment allows the use of AI-powered tools in climate-oriented planning and implementation. Conversely, most African contexts may be described in terms of biased digital infrastructures, lack of technical capacities, and diverse levels of dependency on external developed technologies. Such variations not only affect the uptake of AI but also the extent to which its advantages can be achieved in combating climatic problems. Even though AI has turned into a major concern in environmental governance, the discussion of climate policies and technological innovation often does not consider the concept of environmental justice. Minor attention is paid to the intersection of AI integration with the already existing differences in governance capacity and environmental vulnerability, particularly in comparison with each other. This gap creates a critical concern as to how AI-driven climate governance will impact the allocation of environmental risks, resources, and decision-making authority in various regions.

To this end, a critical question that arises is the extent to which growing AI application in climate governance influences environmental performance in settings with varying capacities and vulnerabilities. In particular, it is necessary to know whether the United Kingdom and African contexts have disparities in technological and institutional conditions that affect access to, and the benefits of, AI-driven climate solutions, and what it implies about environmental justice.

The aim of this paper is to examine the role of artificial intelligence in climate governance and its implications for environmental justice, using a comparative perspective of the United Kingdom and Africa. To achieve this aim, the paper seeks to:

(i) analyse the role of AI in contemporary climate governance processes;
(ii) assess how differences in technological and institutional capacity influence the use of AI in the United Kingdom and African contexts; and
(iii) examine the implications of these differences for environmental justice and the distribution of climate-related risks and benefits.

AI and Climate Governance

The quest to resolve climate-related issues have promoted the implementation of emerging technological strategies in climate governance. These include artificial intelligence that has demonstrated possibilities to process large datasets and produce information that can support policymakers and environmental managers in environmental monitoring, climate forecasting, disaster management, and natural resources planning (Parameshwari and Gnanaguru, 2024). The processing of large and complex amounts of data with the help of AI contributes to a more precise examination of climate patterns and the development of data-based mitigation and adaptation plans. In this respect, AI is not just a technical addition to the existing systems but is increasingly being integrated in the ways in which climate decisions are made and acted upon. Besides the technical capacities, AI is also influencing the governance aspect of climate action. It impacts the information generation process, risk assessment process, and prioritisation of policy responses. As an example, AI-driven systems can inform early warning systems of extreme weather, guide land and resource management strategies (Naik, 2025), help in decision-making in areas like agriculture, energy, and urban planning. These capabilities place AI as a tool with which states and institutions aim to enhance the effectiveness and coordination of climate governance.

Nonetheless, AI application in this field is strongly connected with the larger governance frameworks and abilities. The success of AI-based interventions in climate-related matters is determined by the availability of high-quality data, the existence of institutional structures to interpret and implement the output of technologies, and the possibility of integrating the tools into the policy process. Where these conditions are present, AI can help in more proactive and coordinated action to address climate problems. In the regions where it is limited, it may be fragmented or limited, and this affects its overall contribution to the outcome of governance. At the same time, AI introduces more recent considerations of climate governance, which are rooted in control, access, and decision-making power. Development and deployment of AI systems may be extremely localised to some institutional and technical spaces and may precondition the choice of whose knowledge is prioritised and the way in which the environment makes decisions. This raises questions of inclusivity and representation in AI-driven governance processes, particularly in regions where limited local capacities to develop or acculturate such technologies exist. The perception of AI as both a technology and a tool of governance is therefore key in the evaluation of its role in climate related decision-making. It emphasizes the importance to focus not only on what AI can do, but on how it is implemented in the institutional environment and how its use influences the overall trends in environmental regulation. This perspective provides a starting point to examine the role of different contexts

in interacting with AI in climate governance and the ways in which these interactions create different effects of capacity, access, and environmental justice.

Contextual Capacities: The United Kingdom and African Contexts

The United Kingdom: Policy Integration, Data Systems, and Institutional Support

The policy approach to climate governance in the United Kingdom is relatively integrated and has brought together regulatory mechanisms, market-based mechanisms and sector-specific initiatives. The policy frameworks of emissions trading schemes, climate change levies and sectoral programmes have been established to align mitigation activities in various sectors of the economy and this can be characterized by focus on the structured and multi-level governance (Makuch & Makuch, 2008). These strategies are complemented with wider strategies to harmonise policy instruments, reinforce international engagement as well as to integrate adaptation planning by use of climate risk assessment and national adaptation programmes (Bowen and Rydge, 2011). Additional attempts to incorporate climate targets into governance activities can be observed through the concepts of economic and technological policy instruments, such as the low-carbon innovations in research funding, deployment incentives, and carbon price mechanisms (Nelson, 2020). More recent policy directions also focus on the growth of pricing tools, specific regulatory interventions, and investment in green infrastructure as a part of a coherent roadmap towards net zero emissions (OECD, 2022). Generally, these measures imply a climate governance model, rooted in the coordination of policy instruments between sectors and governance tiers.

In this policy landscape, data and digital tools, such as new uses of artificial intelligence, can be placed within the context of larger initiatives to improve environmental monitoring, planning, and decision-making. Such tools have been associated with the effectiveness of institutions that facilitate the coordination of governmental bodies, research institutions, and other stakeholders. Such arrangements offer a framework through which data-driven methods can be integrated in climate governance despite the fact that the level of AI adoption might differ across sectors. The institutional support also influences the integration of technological tools in the processes of governance. The organisational structure and policy framework support the coordination and offer direction on how data and digital technologies can be utilised in environmental management. In this respect, the UK context represents an environment where climate governance is facilitated by policy integration and institutional frameworks that can facilitate the incremental integration of AI and associated technologies in environmental decision-making processes.

African Contexts: Uneven Infrastructure, Capacity Constraints, and External Dependence

Capacity constraint and skewed infrastructure are factors that affect the design and implementation of climate-related interventions in most African settings. Some of the key constraints on the adoption of integrative and proactive approaches to climate resilience have been cited as the fragmented system of governance, the archaic structures, and the reliance on external sources of funding (Drammeh and Leniwati, 2025). These structural conditions influence the coordination of intersectoral and intergovernmental climate policies and may limit the ability of local authorities to plan and act in a proactive manner to respond to sustained adaptation. These dynamics are also determined by infrastructure inequalities. Financial

resources, access to technology, and availability of human resources affect the possibility of creating and maintaining climate-resilient systems, particularly in such areas as energy and environmental management (Singh et al., 2018). In such contexts, climate change is often operationalised within the context of established systems which are not necessarily well-positioned to support more progressive or data-intensive forms of governance. In this context, the application of data-driven tools, including new applications of artificial intelligence, is still uneven and context-specific. The effectiveness of these tools is very much linked with the presence of sound data systems, technical skills, and institutional capabilities. In regions where these conditions are constrained, AI can be integrated in climate governance via externally funded projects instead of locally based systems. This has consequences on the assessment and management of climate risks, and on the degree to which local priorities and knowledge systems are represented in decision-making.

Institutional and structural factors are thus at the centre of determining the evolution of climate governance in the African contexts. Infrastructure gaps, capacity constraints, and governance fragmentation do not only affect the adoption of climate-resilient practices but also the possibility to implement advanced technological tools in environmental management. The African context in this aspect represents an environment where the implementation of AI in climate governance is mediated by the wider conditions of development and institutionalism, and it also has implications on the effectiveness and inclusivity.

Structural Conditions

The capabilities noted in the United Kingdom and African settings can be interpreted within the wider structural parameters, such as trends in economic growth, investment in infrastructure, and structure of governance systems. In the United Kingdom, the coordinated policy frameworks and institutional arrangements reflect these conditions that facilitate the incorporation of data-driven approaches into climate governance. Conversely, in most African settings, capacity limitations, infrastructure deficits, and disjointed governance frameworks influence the formulation of climate policies and constrain the capacity to effectively deploy advanced technological tools (Drammeh and Leniwati, 2025; Singh et al., 2018). Such institutional variations affect resource availability, data system development and institutional settings in which climate governance functions. They also determine the degree to which artificial intelligence and associated digital technologies can be integrated into the environmental decision-making process. The knowledge of these dynamics offers a foundation on which governance capacities are created and maintained over time and how they influence the role of technology in managing climate issues under varying contexts.

Environmental Justice Implications

These contrasting capacities described above have profound effects on environmental justice, especially concerning the distribution of the benefits and risks of AI-mediated climate governance across contexts. Environmental justice goes beyond exposure to environmental damage to encompass access to resources, involvement in decision-making, and equitable allocation of technological benefits. In this respect, the introduction of AI into climate governance adds new dimensions to the current disparities, particularly where the access to technological devices and infrastructure is unequal. One of the major concerns is associated with access. The application of AI in climate governance relies on the data availability, computational capacities, and technical skills. Where these conditions are clearly defined, AI

could help in making climate risk assessment, resource allocation, and adaptation planning more effective. In the areas of their scarcity, however, the use of AI is often confined or influenced by externally motivated initiatives, which leads to questioning who gains access to AI-driven climate solutions and who does not. The second dimension addresses the allocation of both environmental risks and adaptive capacity. Even though the accuracy of climate modelling and forecasting can be enhanced through AI-driven tools, they are not equally distributed, which can result in unequal capacities to predict and react to environmental problems. This may support the pre-existing vulnerability differences especially those that are already influenced by a structural constraint situation.

Participation and representation also influence the implications of AI-driven governance in terms of justice. The institutions engaged in designing AI systems are likely to influence the design and deployment of the systems, which may limit its ability to incorporate local knowledge and context-specific priorities in situations with limited capacity. This affects the relevance of technological interventions and the degree of representation of the communities that are being affected in the decision making. All these dynamics imply that the use of AI in climate governance does not have a neutral implication. Rather, it coexists with structural inequalities that already exist, in a way that affects access, influences how risks are allocated and affects the inclusivity of the governance processes. Such implications are essential in the assessment of the role of AI in improving or even redefining environmental justice in most circumstances.

Position and Implications

The paper posits that the incorporation of artificial intelligence in climate governance is transforming environmental decision-making disproportionately in varied ways across global contexts. Although the use of AI can bring significant benefits to climate modelling, monitoring and adaptive planning, the introduction of this technology is predetermined by disparities in technological ability, data accessibility, and institutional integration. Consequently, AI is not a neutral tool but instead exists within the structural conditions that exist and determines the way its advantages are achieved and shared. In this respect, AI in climate governance should be viewed within the context of more general issues of equity and environmental justice. The unequal access to technology resources and the ability to manage them can also affect the development, implementation, and use of AI-driven tools to deal with climate problems. AI has the potential to enhance more active and integrated environmental management with enabling conditions. Where such conditions are limited, it can nevertheless limit its application, which affects the level and effectiveness of climate interventions.

These dynamics have implications in the allocation of environmental risks and benefits. As AI continues to be more integrated in climate governance, inequality in its application may contribute to the disproportional outcomes of adaptation and mitigation. This highlights the significance of context-based governance approaches especially in the area of access, local capacity, and involvement in decision making processes. In totality, the integration of AI in climate governance highlights the need to change the perception towards a more sophisticated view of innovation. Institutional and structural contexts must be paid attention to so that AI could facilitate more balanced and inclusive environmental outcomes, rather than strengthen the existing inequalities.

Conclusion

This paper has discussed the convergence of artificial intelligence, climate governance, and environmental justice with a comparative view of the United Kingdom and African settings. It has revealed that even though AI is often being presented as a solution to improve climate-related decision-making, its use is predetermined by the existing disparities in terms of policy integration, infrastructure, and institutional capacity. These variations affect the effectiveness of AI deployments and the degree to which the advantages can be achieved in different regions. The analysis shows that the introduction of AI in climate governance does not yield the same results. Instead, it exists under prevailing structural circumstances that define access to technological resources, governance systems organisation, and environmental risks allocation. In this respect, the differences in the capacities between contexts like the United Kingdom and most African states are manifested in the different capacities to use data-driven instruments to adapt to and mitigate climate changes. Such dynamics highlight the necessity to interpret AI not merely as a technical innovation, but as a part of more complex governance structures that affect environmental performance.

Notably, the paper has highlighted the implication of such disparities with regard to environmental justice. Differentiated experiences of climate risk and resilience are all predicated on uneven access to AI tools, differences in adaptive capacity, and differences in decision making processes. These factors may take an even larger role in determining the distribution of environmental benefits and burdens as AI is increasingly integrated in climate governance. In conclusion, the structural and institutional conditions under which the relationship between artificial intelligence, climate governance and environmental justice is mediated are different in various contexts. These dynamics are essential to be identified in a bid to comprehend the broader effects of emerging technologies on environmental governance, and to be able to make sure that technological improvements can be made to achieve more equitable and sustainable outcomes.

REFERENCES

Bowen, A., & Rydge, J. (2011). Climate-Change Policy in the United Kingdom. Research Papers in Economics. https://doi.org/10.1787/5KG6QDX6B5Q6-EN

Drammeh, L. K., & Leniwati, D. (2025). The Sustainable Urban Development in West African Cities: Planning Climate-Resilience Infrastructure in Banjul and Beyond. 5(5), 1177–1184. https://doi.org/10.62225/2583049x.2025.5.5.5090

Makuch, K. E., & Makuch, Z. (2008). Domestic Initiatives in the UK. https://doi.org/10.4337/9781848446038.00018

Naik, M. C. (2025). AI-Driven Climate Modelling And Forecasting Enhancing Environmental Resilience Through Predictive Analytics. International Journal of Environmental Sciences, 1762–1768. https://doi.org/10.64252/0hqedz44

Nelson, S. (2020). Expanding the policy menu: how demand-side interventions can help the UK reach net zero. https://doi.org/10.17863/CAM.50309

OECD. (2022). Policies to reach net zero emissions in the United Kingdom (OECD Economics Department Working Papers, No. 1735). OECD Publishing. https://doi.org/10.1787/f6625f01-en

Parameshwari, M., & Gnanaguru, G. (2024). Artificial Intelligence for Climate Sustainability: A Comprehensive Review of Applications, Challenges, and Future Prospects. 968–976. https://doi.org/10.1109/icses63445.2024.10762990

Sarker, S. U., & Nuruzzaman, M. (2024). The role of perceived environmental responsibility in artificial intelligence-enabled risk management and sustainable decision-making. 04(04), 33–56. https://doi.org/10.63125/7tjw3767

Shinde, R. (2025). AI in Climate Science and Environmental Sustainability: Prediction, Monitoring. https://doi.org/10.5281/zenodo.17315924

Singh, A., Lund, H. G., & Barr, J. (2018). Challenges in Building Climate-Resilient Quality Energy Infrastructure in Africa (pp. 181–189). Elsevier. https://doi.org/10.1016/B978-0- 12-811891- 7.00014-1