


# Chapter 7

## Integrating Artificial Intelligence With Sustainable Practices for Effective Climate Change Mitigation and Environmental Protection

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### ABSTRACT

*The current global environment is rapidly, and never before seen in this way, is changing mainly due to human activities and has manifested itself in a many-sided crisis that affects climate change, the stability of ecosystems and the depletion of species. According to the IPCC, climate change, which is observed as a global temperature increase, melting of the polar ice, and increase of the frequency and intensity of extreme weather. The impacts are colossal and occur in the entire physical environment and human society, including sea level rise. Sustainability together with artificial intelligence (AI) is used to address these challenges. Sustainable development is an interconnection of the three aspects of the environment, society, and the economy, while the benefit of analyzing data using artificial intelligence data analysis, modelling as well as, and forecasting increases the usage of resources, and enhances the monitoring of the environment and the decision-making aspect.*

### INTRODUCTION

Climate change is definitely happening. The atmosphere is always restless and unstable, resulting in changes in weather and climate. Climate change refers to long-term changes in temperature and weather patterns that occur, are occurring and will occur (Annear, 2022). Climate change, therefore, encompasses any variation or shifting in the weather-related variables across space and time of varying scales, which results in modifications of climatic characters. How fast climate change changes depends on what causes it, either locally, regionally, or globally: slowly or rapidly, partially or wholly, over a long

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period of time or almost instantly. Natural factors such as large-scale volcanic eruptions or variations in the sun's activity can cause these types of shifts, but for over 200 years since the 1800s, burning fossil fuels consisting mainly of coal, oil, and gas has been the major reason behind climate change due to human activities. This means that energy entering and leaving Earth's system affects its temperature. For instance, heat waves, wildfires, floods, tropical storms, and hurricanes are examples of calamities directly caused by climate change. Hence, their size range frequency plus strength is increasing. As a result, climate change poses a significant threat to human health. It affects not only the physical environment but also influences all aspects of human and natural systems, including economic and social conditions and healthcare operations. Thus, it heightens the danger and can reverse any progress made regarding health in the past decades. With changing climatic patterns, we anticipate more frequent and severe weather events.

## LITERATURE REVIEW

Artificial Intelligence (AI) offers significant potential for addressing environmental challenges and promoting sustainable development. AI technologies can enhance environmental monitoring, optimize resource management, and improve predictive modeling for climate change mitigation (Md.Safikul Isalm, 2024; Uwaga Monica Adanma & Emmanuel Olurotimi Ogunbiyi, 2024). Applications include biodiversity conservation, sustainable agriculture, and energy optimization (Md.Safikul Isalm, 2024). The integration of AI with environmental science enables real-time data analysis and innovative solutions for issues like biodiversity loss and resource depletion (Shuford, 2024; Akter, 2024). However, ethical considerations and cybersecurity risks must be addressed to ensure responsible AI deployment in environmental contexts (Uwaga Monica Adanma & Emmanuel Olurotimi Ogunbiyi, 2024). Interdisciplinary collaboration and stakeholder engagement are crucial for realizing AI's full potential in environmental sustainability efforts (Md.Safikul Isalm, 2024; Shuford, 2024; Akter, 2024). Future research should focus on developing ethical AI solutions and addressing socio-technical complexities in environmental strategies (Uwaga Monica Adanma & Emmanuel Olurotimi Ogunbiyi, 2024).

Artificial intelligence (AI) offers significant potential for addressing sustainability challenges, particularly in areas like energy efficiency, resource management, and environmental conservation (Nishant et al., 2020; Bracarense et al., 2022; Isalm, 2024). However, research in this field faces several challenges, including overreliance on historical data, uncertain human responses to AI interventions, cybersecurity risks, and difficulties in measuring intervention effects (Nishant et al., 2020; Bracarense et al., 2022). To advance AI for sustainability, researchers recommend incorporating multilevel views, systems dynamics approaches, and design thinking (Nishant et al., 2020). Additionally, there is a need for more diverse research topics beyond renewable energy, including studies on human behavior, cybersecurity, and policy recommendations (Bracarense et al., 2022). Interdisciplinary collaboration and stakeholder engagement are crucial for realizing AI's full potential in sustainable development (Isalm, 2024; Liao & Wang, 2020). Future research should focus on expanding the community of practice and exploring new AI application areas for sustainability (Liao & Wang, 2020).

Green Artificial Intelligence (AI) is emerging as a crucial approach to enhance the environmental sustainability of AI systems while maintaining their effectiveness (Bolón-Canedo et al., 2024). This field has experienced significant growth since 2020, with research focusing on monitoring AI model footprints, tuning hyperparameters, and benchmarking models (Verdecchia et al., 2023). Green AI offers

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