



# GENDER, CLIMATE AND AI

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**Leveraging AI for Climate Change Adaptation and Mitigation to benefit Women in the Global South**



# **GENDERISE**

## **WHO WE ARE**

GENDERISE is dedicated to research and policy advocacy on the interrelated impacts of economic stress, environmental degradation, climate change, and violent conflict on women's economic advancement and national security. Through rigorous research, policy engagement, and collaborative knowledge sharing, we aim to shed light on the two-causal links: how these global challenges affect women, and how women's economic empowerment can mitigate these issues.

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## **INTRODUCTION**

Artificial Intelligence (AI) could provide fresh insights and tools to foster climate adaptation, and for countries in the Global South. AI can significantly address environmental sustainability and climate change, with profound implications for gender equity. However, to ensure equitable benefits and inclusive growth, we must consider the gender dimensions of these AI technologies. This paper explores recent research on AI's role in climate action, emphasizing its relevance to countries in Sub-Saharan Africa, Asia and Latin America and its impact on gender equity.

AI tools could promote climate adaptation strategies by providing accurate predictions and efficient resource management. For rapidly urbanizing cities like Mumbai and Lagos, AI tools and methodologies can predict and support the mitigation of the impacts of extreme weather events, which disproportionately affect women and children due to their often more vulnerable socioeconomic positions. In tropical regions, AI-driven cooling solutions can improve living conditions, reduce health risks, and support women's roles in the household and workforce by ensuring safer living environments.

AI also plays a crucial role in reducing greenhouse gas emissions and promoting sustainable energy use. For resource-limited countries like India and Nigeria, AI can optimize energy use and support the transition to renewable energy sources. Women, who often manage household energy needs and are more reliant on natural resources, can benefit significantly from cleaner, more reliable energy. Therefore, integrating AI into national climate strategies can enhance the effectiveness of climate mitigation efforts while promoting women's involvement in green technologies and AI-driven initiatives.

AI-driven climate strategies offer significant socio-economic benefits, especially for women. In regions where agriculture is a primary livelihood, AI tools can improve agricultural practices, boost food security, and empower women farmers. AI tools can protect communities and infrastructure from climate impacts, improving disaster response and urban planning, and reducing vulnerability to climate-related disasters.

This paper makes the argument that incorporating gender perspectives into AI-driven climate strategies can lead to more inclusive and effective outcomes, fostering a more resilient and sustainable future for countries in the Global South.

## **ADDRESSING GENDER DATA GAPS**

One of the significant challenges in leveraging AI for climate action in the Global South is the gender data gap. This gap refers to the lack of comprehensive, disaggregated data that captures the different ways men and women experience climate change. Without accurate data, it is difficult to design AI-driven solutions that effectively address gender-specific vulnerabilities.

For instance, in many developing countries, data on women's access to resources, mobility patterns, and economic activities are often incomplete or outdated. This lack of data can lead to AI models failing to capture the full scope of women's needs and contributions. Therefore, it is crucial to invest in collecting and analyzing gender-disaggregated data to inform AI applications in climate adaptation and mitigation.

Ensuring that data collection methods are inclusive and sensitive to gender differences is essential. This can involve using participatory approaches that engage women in the data collection process, ensuring that their voices and experiences are accurately represented. Additionally, collaboration between governments, NGOs, and local communities can enhance the quality and scope of gender data.

By closing the gender data gap, we can develop AI systems that are more responsive to the needs of all community members, particularly women who are often at the frontline of climate impacts. This will not only improve the effectiveness of climate adaptation and mitigation strategies but also promote gender equity and empower women in the Global South.

## **AI IN CLIMATE CHANGE ADAPTATION**

AI can enhance climate adaptation strategies by providing accurate predictions and efficient resource management. In "[Remote sensing and AI for building climate adaptation applications](#)," Sirmacek and Vinuesa (2022) discuss how AI combined with remote sensing improves urban climate models. For rapidly urbanizing cities in the Global South, such as those in Africa and South Asia, AI can predict and mitigate the impacts of extreme weather events, which disproportionately affect women and children due to their often more vulnerable socioeconomic positions.

[Kim and Kang \(2023\) developed an AI model to optimize fog cooling systems for better thermal comfort. In tropical regions](#), where heatwaves are becoming more frequent, women, particularly those in informal settlements or low-income households, are at greater risk. AI-driven cooling solutions can improve living conditions, reduce health risks, and support women's roles in the household and workforce by ensuring safer living environments.

## AI IN CLIMATE CHANGE MITIGATION

AI plays a crucial role in reducing greenhouse gas emissions and promoting sustainable energy use. In "[A Cutting-Edge Research on AI Combating Climate Change: Innovations and Its Impacts](#)," Gatla (2019) highlights various AI innovations for climate change mitigation. For resource-limited countries like India and Nigeria, AI can optimize energy use and support the transition to renewable energy sources. Women, who often manage household energy needs and are more reliant on natural resources, can benefit significantly from cleaner, more reliable energy.

Kaack et al. (2022) in "[Aligning artificial intelligence with climate change mitigation](#)" emphasize [aligning AI policies with climate goals](#). This is crucial for the Global South, where policy frameworks may not keep pace with technological advancements. By integrating AI into national strategies, these regions can develop effective mitigation plans that consider gender-specific impacts and opportunities. For example, promoting women's involvement in green technologies and AI-driven initiatives can create new economic opportunities and reduce gender disparities in the tech sector.

## IMPLEMENTATION OPPORTUNITIES AND CHALLENGES

AI-driven climate strategies offer significant socio-economic benefits, especially for women. [Nozaki et al. \(2023\)](#) explore the impact of climate strategies on water and food security. In regions where agriculture is a primary livelihood, AI can improve agricultural practices, boost food security, and empower women farmers, who constitute a substantial portion of the agricultural workforce. Enhanced agricultural productivity through AI can lead to better income and nutrition for families, improving overall community well-being. [Jain et al. \(2023\)](#) in "[AI-enabled strategies for climate change adaptation](#)" discuss how AI can protect communities and infrastructure from climate impacts. For women and households in informal settlements, AI can improve disaster response and urban planning, reducing vulnerability to climate-related disasters. AI-driven early warning systems and efficient resource allocation can ensure that women and children receive timely assistance, enhancing their resilience to climate shocks.

Practical applications of AI in the Global South demonstrate its transformative potential and gender implications. [Srivastava and Maity \(2023\)](#) discuss the use of AI and machine learning in urban planning. In cities like Lagos and Mumbai, AI can optimize traffic management, reduce pollution, and enhance infrastructure resilience. These improvements are critical for sustainable urban development and have specific benefits for women, who often face greater mobility challenges and health risks from pollution. Similarly, [Jones et al. \(2023\)](#) review of AI applications in flood risk management show that in countries like Bangladesh and the Philippines, which are highly susceptible to flooding, AI can provide real-time data and predictive analytics. Women, who are often primary caregivers and responsible for household management, can benefit from more effective and timely disaster responses, reducing the burden on their roles during emergencies. Understanding how these technologies can be implemented effectively is essential for addressing challenges and promoting gender equity

## **Urban Planning**

In urban planning, AI could revolutionize the management of traffic, pollution, and infrastructure resilience in cities like Lagos and Mumbai. AI can optimize traffic flow by analyzing real-time data from traffic cameras, GPS devices, and social media updates to predict congestion and suggest alternative routes. This approach can be integrated into city traffic management systems to dynamically adjust traffic signals and reroute vehicles, reducing overall travel time. For women, who often face longer commutes due to inadequate public transportation, these improvements can alleviate daily stresses and time constraints.

Pollution reduction is another critical area where AI can make a difference. AI algorithms can analyze data from air quality sensors and weather stations to predict pollution levels and identify sources of emissions. Cities can use this information to implement targeted measures, such as regulating industrial activities or controlling vehicular emissions during peak times. By reducing pollution, these measures can significantly improve health outcomes for women and children, who are more vulnerable to respiratory issues.

## **Flood Risk Management**

AI's role in flood risk management is crucial for countries like Bangladesh and the Philippines, which are prone to severe flooding. AI can enhance disaster preparedness and response through real-time data collection and predictive analytics. Machine learning models can process data from satellite imagery, weather forecasts, and river sensors to predict flood events with high accuracy. These predictions can be disseminated through mobile alerts and community warning systems, giving people more time to evacuate or prepare.

To implement these solutions, local governments can partner with tech companies to develop and deploy AI-based flood forecasting systems. Training community leaders and local officials to interpret and act on AI-generated data ensures timely and effective responses. Women, who often manage household safety during disasters, benefit from early warnings and preparedness measures, reducing the physical and emotional toll during emergencies.

## **Agricultural Resource Management**

In agriculture, AI can optimize resource management, which is vital for economies in the Global South. AI-driven solutions can monitor crop health using drone imagery and sensor data, predict pest outbreaks, and recommend optimal irrigation schedules. These technologies help farmers make informed decisions, leading to increased productivity and sustainability.

Implementing AI in agriculture involves providing farmers with access to affordable AI tools and training programs. Governments and NGOs can play a role in subsidizing these technologies and facilitating knowledge transfer. For women farmers, who represent a significant portion of the agricultural workforce, AI tools can enhance their productivity and economic independence. By using

AI to predict and manage crop health, women can achieve higher yields and secure better market prices for their produce.

### **Energy Management**

AI also offers solutions for energy management, a critical issue for resource-constrained countries. AI can optimize energy consumption by analyzing usage patterns and predicting demand, enabling more efficient distribution of electricity. For example, AI can help manage the integration of renewable energy sources into the grid, ensuring a stable and sustainable energy supply.

To implement these solutions, utility companies can adopt AI-based energy management systems that forecast energy demand and adjust supply accordingly. These systems can be complemented by smart meters and IoT devices that provide real-time data on energy usage. Women, who often manage household energy use, benefit from reduced energy costs and improved access to clean energy. This not only enhances their quality of life but also supports broader environmental and economic goals.

While AI holds promise, it also raises ethical and governance challenges. [Mehryar et al. \(2024\)](#) stress the need for robust governance frameworks to manage AI applications in climate resilience. This is particularly crucial for the Global South, where regulatory systems may be weak. Ensuring transparency, accountability, and inclusivity in AI deployment is essential to prevent exacerbating existing gender inequalities. For instance, involving women in decision-making processes and ensuring their access to AI technologies can foster more equitable and effective climate solutions.

[Snezhana \(2023\)](#) in "[Applying artificial intelligence \(AI\) for mitigation climate change consequences of natural disasters](#)" highlights the ethical considerations of using AI in disaster management. In the Global South, disaster management systems are often inadequate, and AI can significantly enhance these efforts. However, it is essential to ensure that AI technologies are accessible and beneficial to all, particularly the most vulnerable, including women and girls.

Addressing the ethical and governance challenges associated with AI is essential for equitable implementation. Ensuring that AI technologies are developed and deployed with gender perspectives involves several steps. Policymakers and developers must work together to identify and mitigate biases in AI algorithms. Additionally, involving women in the design and deployment processes ensures that AI solutions meet their specific needs and concerns.

### **CONCLUSION**

AI has the potential to significantly improve climate change adaptation and mitigation strategies for countries in the Global South. By understanding and implementing AI technologies effectively, we can enhance resilience to climate change, optimize resource use for a sustainable future. Addressing ethical and governance challenges is key to ensuring that the benefits of AI are equitably distributed, particularly for women and other vulnerable groups. Integrating gendered perspectives into AI-driven



climate strategies can lead to more inclusive and effective outcomes, promoting a more resilient and sustainable future for the Global South.

By leveraging AI technologies, countries in Sub-Saharan Africa, Asia and Latin America can improve households and communities' resilience to climate change, optimize resource use, and support sustainable development goals. However, addressing the ethical and governance challenges associated with AI is essential to ensure equitable benefits, particularly for women and other vulnerable groups. Incorporating gender perspectives into AI-driven climate strategies can lead to more inclusive and effective outcomes, fostering a more resilient and sustainable future.

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