INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD)
© 2026 IJNRD | Volume 11, Issue 4, April 2026 | ISSN: 2456-4184 | IJNRD.ORG

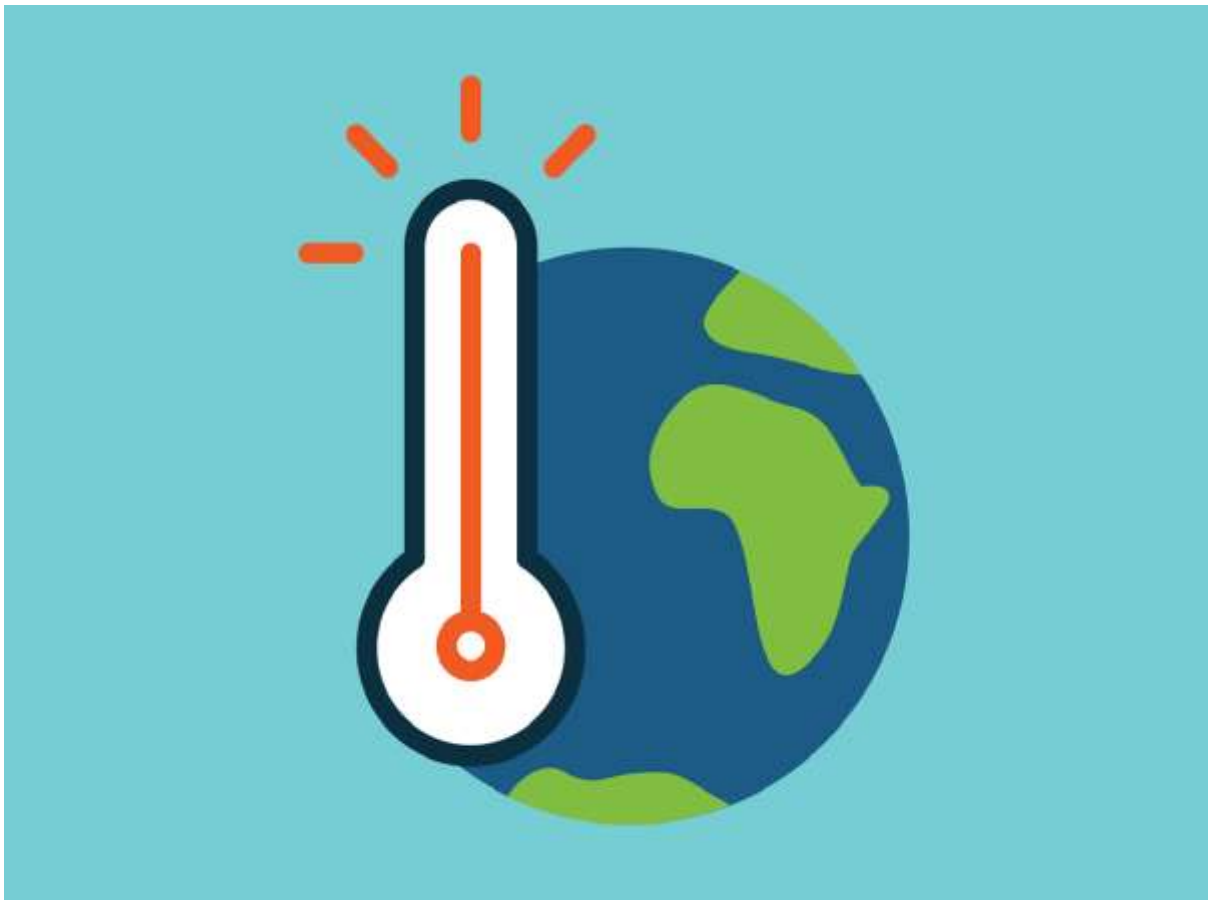
THE ROLE OF TECHNOLOGY TRANSFER IN HELPING COUNTRIES ADAPT TO CLIMATE CHANGE

Kartikeya Sharma
Student, M.A Defence and Strategic Studies
Amity Institute of Defence and Strategic Studies,
Amity University Uttar Pradesh, Noida, India.

Abstract: This paper elaborates on an intensive eight-week initiative that combined artificial intelligence (AI) and technology transfer for tackling climate change. The goal was to enhance institutional readiness, develop inclusive training programs, and facilitate collaborative partnerships. Through focused modules, the program highlighted ethical use, predictive analytics, policy integration, and scalable practices. The findings underscore the importance of multi-stakeholder engagement and equitable innovation ecosystems.

Keywords: Climate, Intelligence, Transfer, Adaptation, Sustainability, Resilience, Infrastructure, Innovation, Governance, Training.

INTRODUCTION



Climate change is a growing crisis with widespread environmental, social, and economic consequences. Rising global temperatures, unpredictable weather events, and strained resources particularly impact low-income countries. Although global agreements and national policies exist, their implementation on the ground remains a challenge.

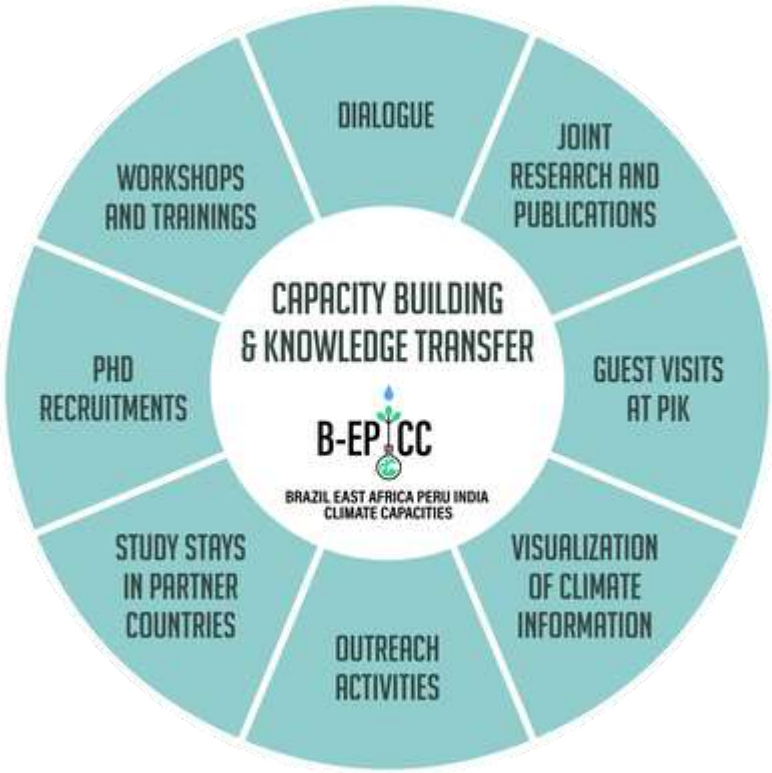
Artificial intelligence offers promising tools for climate modeling, disaster forecasting, and resource management. When combined with localized technology transfer strategies, AI can drive impactful climate adaptation. This paper outlines a capacity-building program aimed at integrating AI with sustainable climate solutions. It followed an interdisciplinary structure involving training design, research analysis, and stakeholder

participation. The primary objective was to create inclusive and replicable systems that align technological innovation with equitable climate action.

CAPACITY BUILDING ON TECHNOLOGY TRANSFER AND AI FOR CLIMATE CHANGE

This capacity-building initiative focused on developing core competencies among policymakers, researchers, and industry leaders by training them in the use of AI for climate adaptation. The project emphasized cross-sector collaboration and the creation of adaptable learning modules. The process began with comprehensive assessments to identify local technology gaps. Based on the findings, tailored curricula were developed. Workshops and seminars were conducted to enhance understanding of AI applications in climate science. Tools and techniques were piloted in real-time scenarios to validate their effectiveness. The project also supported the drafting of institutional policies to facilitate long-term integration of AI in environmental governance. These efforts promoted continuity and scalability, enabling broader knowledge transfer and fostering resilient institutions.

CAPACITY BUILDING MODULE ON TOT

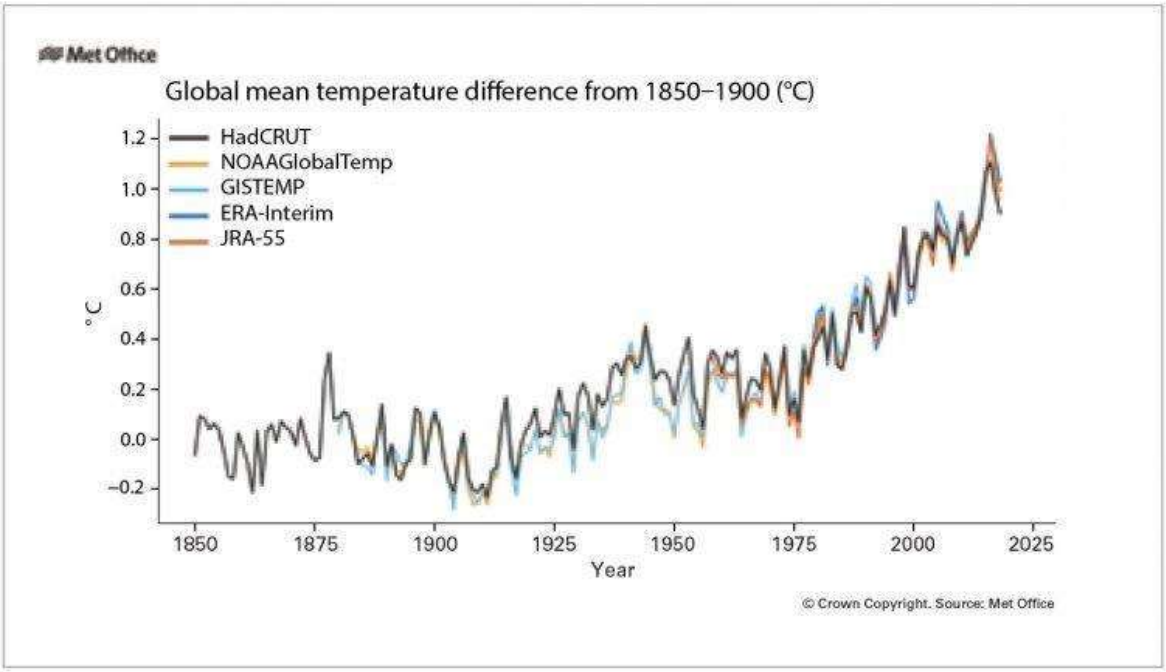


The Training of Trainers (ToT) component of the initiative aimed to cultivate a network of qualified professionals capable of disseminating AI-based climate education. This module emphasized the importance of structured instruction, emphasizing both technical and contextual understanding. The design process involved identifying thematic priorities such as ethical AI use, data literacy, and climate modeling. Existing practices from global institutions were reviewed to establish a benchmark for quality. Partnerships with universities and non-profits were established to co-develop and test the module. Literature reviews provided insights into AI's contributions to climate action, including examples from weather modeling, emission analytics, and sustainable agriculture. These resources informed content development and helped align the module with international best practices.

CAPACITY BUILDING FRAMEWORK FOR TECHNOLOGY TRANSFER AND AI

The technology transfer framework adopted in this project aimed to empower institutions and communities through systematic support mechanisms. Training and skill-building efforts were complemented by improvements in infrastructure and digital capabilities. At the policy level, governments were assisted in aligning national strategies with climate goals. The monitoring, reporting, and verification (MRV) systems were improved to ensure accountability and transparency. Special attention was given to promoting inclusive approaches, including gender-sensitive policies and the incorporation of indigenous knowledge. Countries were supported in acquiring financial and technical resources needed to build electronic platforms for managing climate data. These efforts established a robust foundation for operationalizing innovation and fostering adaptive capacity in climate-sensitive regions.

DEEP RESEARCH ON AI DRIVEN CLIMATE SOLUTIONS



Artificial intelligence is now a central tool in addressing climate challenges across various sectors. In agriculture, AI models such as those used by VineSignal and Cordulus utilize satellite data and climate patterns to optimize crop yields and water usage. In forestry, companies like OCELL are creating AI-driven simulations to improve carbon capture strategies. In the energy sector, AI is being used to optimize smart grids and monitor emissions in real-time, as seen with initiatives from Protium Green Solutions. International platforms such as the UNFCCC's #AI4ClimateAction have showcased the importance of inclusive AI development for regions vulnerable to climate impacts. Discussions at Africa Climate Week highlighted the value of AI in clean energy access and disaster risk reduction, while also calling for ethical frameworks and stakeholder engagement to guide deployment.

At Africa Climate Week (ACW) held in Kenya, several AI-driven climate initiatives were showcased from creating resilient supply chains and expanding access to clean energy for rural women, to implementing disaster risk management solutions across the region.

The discussions emphasized the importance of ethical AI deployment and the urgent need for clear regulatory frameworks. Participants also highlighted the value of inclusive engagement, urging stronger technical and institutional capacity in developing nations, along with the creation of AI tools that are tailored, accessible, and responsive to real-world needs. The next round of regional dialogue is expected to continue during Asia-Pacific Climate Week in Malaysia.

UNDERSTANDING THE URGENCY OF QI BASED CLIMATE CHANGE

Climate change is a global threat that touches every person, country, and continent. The risks are no longer distant, they're immediate, and our current systems are not prepared to manage the scale of the crisis. Human activity remains the leading driver of this disruption, accelerating greenhouse gas emissions and pushing planetary systems beyond their limits. Sea levels are rising, extreme weather events are becoming more intense and unpredictable, and climate patterns are shifting in ways that endanger ecosystems, livelihoods, and entire communities.

Climate change is no longer a distant threat; it is already reshaping lives and economies everywhere. Human activities remain the main driver, pushing global temperatures higher and triggering more frequent and severe weather events. Without swift and decisive action, hard-won development gains could be wiped out, millions could be displaced, and new conflicts could emerge.

To keep warming below 1.5°C, global emissions must fall by almost half by 2030, yet current trends fall well short of this target. The decade from 2010 to 2019 was the warmest on record, bringing record-breaking wildfires, floods and storms that exposed weaknesses in infrastructure and planning.

Initiatives such as the UNFCCC's AI4ClimateAction platform and the UN AI Advisory Body are accelerating the use of machine learning to address these challenges. By analysing vast datasets, AI can improve climate predictions, deliver early warnings for disasters and support smarter policy choices. Events like COP28 have brought together governments, businesses and civil society to explore how AI can help the most vulnerable countries move toward low-emission, resilient development.

UNDERSTANDING THE INTEGRATION OF AI AND CLIMATE CHANGE

Bringing AI and climate action together requires looking carefully at both the benefits and the hidden costs. Four main connections stand out.

First, AI systems themselves have a significant environmental footprint from the mining of raw materials for hardware to the massive energy and water demands of training large models and the challenge of electronic waste.

Second, AI can act as a powerful tool for mitigation and adaptation, for instance through sensor networks that track urban air quality or precision agriculture systems that reduce water use. However, success often depends on how well these tools are designed for local conditions.

Third, AI is sometimes used to treat climate change as a security issue, leading to surveillance of activists or stricter border controls in response to climate migration approaches that can mask deeper governance failures.

Fourth, AI shapes public conversation around climate issues, sometimes spreading misinformation or amplifying advocacy campaigns. Major online platforms have played a notable role in this process. The 2023 IPCC synthesis report noted how organised disinformation has slowed climate action and increased public confusion. Responsible design and regulation of AI are therefore essential to ensure technology supports rather than undermines collective efforts.

THE CONTRIBUTION OF AI TO CLIMATE - RESILIENT INFRASTRUCTURE

Climate-resilient infrastructure involves designing roads, bridges, buildings and energy systems that can withstand and recover from extreme weather made worse by climate change. AI is proving valuable in this area by helping planners model future risks and test different design options quickly.

Changing climate conditions can damage transport networks, power supplies and other critical services, leading to major economic losses. AI tools can identify vulnerable points and suggest upgrades or new protective measures, such as elevated structures or nature-based solutions like mangrove restoration.

Beyond physical design, AI supports better decision-making by processing complex data on climate projections, economic trends and social needs. It also helps optimize resource use in construction and operation, reducing both costs and environmental impact. When companies adopt sustainable AI infrastructure using renewable energy and efficient cooling systems they not only lower their own carbon footprint but also improve long-term reliability and attract skilled talent. In essence, AI is helping move infrastructure planning from reactive repairs to proactive, forward-looking resilience.

Artificial intelligence (Al) is becoming increasingly prevalent, leading to a growing need for sustainable Al infrastructure. This is due to the significant environmental impact of Al models, including energy consumption and carbon emissions. To reduce these costs, companies should choose renewable energy sources, use energy-efficient hardware components, and use cooling techniques like immersion cooling. This can reduce energy consumption, improve system performance, and reduce the Mean Time Between Failures (MTBF). Sustainable Al infrastructure also offers additional benefits such as increased resilience to disruptions, improved innovation, and the ability to attract and retain top talent. Companies that invest in sustainable Al infrastructure are often more innovative due to their creative thinking about reducing their environmental impact. Additionally, sustainable Al infrastructure can attract and retain top talent. The Al revolution in sustainable design involves Al systems processing vast datasets to offer design solutions that may be non-intuitive to human designers. Al can suggest building orientations that maximize natural light while reducing heat intake, recommend sustainable substitutes for materials, optimize resource usage, enhance natural integration and optimization, and recommend vegetation for green roofs or vertical gardens. Al can also be instrumental in green infrastructure solutions by analyzing soil quality, sunlight patterns, and local flora, suggesting the best vegetation for green roofs or vertical gardens. By harnessing Al in the realm of sustainable infrastructure, it not only promises a greener tomorrow but also brings forth socio-economic benefits that resonate with communities on multiple levels. Choosing a sustainable Al infrastructure solution is not just an ethical choice; it's a strategic one that can reduce environmental impact, save money, improve reputation, and increase resilience, innovation, and the ability to attract and retain top talent.

CONCLUSION

This initiative has demonstrated that enhancing institutional and community capabilities in artificial intelligence and technology transfer is not just possible, it's critical to tackling climate change effectively. The structure of the program emphasized the value of cross-disciplinary efforts, inclusive access to digital tools, and policy frameworks that can adapt over time.

AI's role in climate adaptation needs to extend beyond technological fixes. It must be implemented through ethical approaches, designed for scale, and shaped by input from a broad range of stakeholders, particularly those facing the greatest environmental risks. When integrated into data systems, infrastructure planning, and disaster response strategies, AI can help strengthen national and local resilience.

Moving forward, it is vital to establish open-data standards and embed training systems like the Training of Trainers (ToT) model within regional and national climate efforts. Equally, flexible policy mechanisms such as regulatory sandboxes and intersectoral task forces can support responsive governance while ensuring fairness and transparency.

The convergence of artificial intelligence and climate action holds meaningful promise. Realizing that promise requires cooperation, ongoing learning, and bold, equity-driven leadership. This initiative offers a model that connects technological readiness with climate responsibility, helping translate innovation into lasting impact.

REFERENCES

UNESCO-UNEVOC. (2017). Training of Trainers: A Guide for Practitioners in Technical and Vocational Education and Training (TVET).

ILO. (2021). Skills for a Green Future: A Global View Based on 32 Country Studies. International Labour Organization.

AI for climate change - UNFCCC (2021). Technology Framework under the Paris Agreement, retrieved from: https://unfccc.int, https://Climateinsider.com, https://unfcc.int

UNFCCC. 2021. Technology Framework under the Paris Agreement. United Nations Framework Convention on Climate Change. https://unfccc.int

United Nations. 2023. AI for Climate Action: Insights from the UN-led AI Advisory Body. https://climateinsider.com

IPCC. 2023. Synthesis Report of the Sixth Assessment Report (AR6). Intergovernmental Panel on Climate Change. https://www.ipcc.ch

OCELL. 2023. "AI Forest Modeling for Carbon Capture." https://www.ocell.io

Protium Green Solutions. 2023. "AI-Driven Emissions Monitoring." https://protium.co.in

World Bank. 2021. Investing in Climate Resilient Infrastructure: A Policy Brief. https://www.worldbank.org

OECD. 2021. Climate Resilience and Infrastructure: OECD Policy Perspectives. https://www.oecd.org