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# THE IMPACT OF ARTIFICIAL INTELLIGENCE ON ENVIRONMENT

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**Abstract:**
The integration of Artificial Intelligence (AI) into various sectors has reshaped how societies address environmental challenges and pursue sustainable development. In India, a country grappling with complex environmental issues amidst rapid technological advancement, understanding the implications of AI on environment and sustainable development is crucial. Artificial Intelligence has made inroads into different spheres of life and redefined human life. It raises both opportunities and challenges.This paper explores the multifaceted impact of AI on environmental sustainability in India, delving into its potential dangers, challenges and the path forward.

**Key words:** Artificial Intelligence, technology, infrastructure, projects, DeepSeek, ChatGPT, LLM etc.

## Introduction:

Artificial intelligence is reshaping industries, economies, and geopolitics transcending national borders with data algorithms and innovations flowing seamlessly across regions. In this interconnected landscape, effective governance and safety mechanisms require a unified international approach. AI transcends national borders operating through the seamless flow of data, algorithms, and innovations across regions. Its global sweep means none of us is immune from its impact. Collective action is indispensable to understand the different dimensions of this technology.

Artificial intelligence has proved to be useful leading to significant breakthroughs for many things including language learning. The stakeholders in the society like educators, learners and businesses are relentlessly seeking for effective methods to improve language skills and AI generated solutions have turned out to be invaluable help in this regard.

Artificial Intelligence has become an indispensable part of our lives, shaping how we work, live and do business. In a broader way, one can define Artificial Intelligence; AI includes technologies that imitate human thinking and decision-making. AI has been in existence since the 1950s in terms of its basic forms. In recent times, the field has progressed awfully fast owing to improvements in computing power and exponential growth in data

availability. With the global Al market valued at $200 billion and projected to contribute up to $15.7 trillion to the global economy by 2030, the adaptation and recognition of AI as a major force of economic value has reached unprecedented levels. It is evident from the United States announcement of the Stargate project, involving a $500 billion investment in Al infrastructure over four years. Reliance industry is mulling over to come up with the world's largest data center in Jamnagar in India in collaboration with Nvidia. India has also announced its plan to build its own LLM (Large Language Model) to compete with DeepSeek and ChatGPT. However, as governments are desperate to grab Artificial intelligence's economic potential, it is important to accept that its fast rise brings not only opportunities but also risks, particularly environmental costs. It has several negative impacts mainly due to its high energy consumption and resource demands.

**Impact across stages**

The environmental impact of AI arises across several stages of its value chain, including energy consumption from infrastructure, computing hardware, production cloud data center operations, AI model training, inferencing validation, and related processes. In terms of hardware, data centers, the backbone of AI operations, contribute 1% of greenhouse gas emissions, according to the International Energy Agency (IEA). This figure is likely to go up remarkably as electricity demand from data centers is projected to double by 2026. Generative AI models like CharGPT, which depends on sophisticated machine learning (ML) techniques, needs 10-100 times more computing power than earlier versions, which raises the demand for graphic processing units and worsens environmental footprint. In addition to that, the speedy growth of data centers is also adding to the growing e-waste crisis.

Al's software life cycle emissions come from processes like data collection, model development, training validation, maintenance and retirement. Training an advanced Al model, such as the GPT3, can emit 552 tons of carbon dioxide equivalents, comparable annual emission of dozens of cars. Training a single large AI model can generate as much carbon dioxide as five cars over their lifetime. To reduce these environmental perils, Governments and the private sector must proactively work towards integrating sustainability into AI ecosystem design.

AI consumes high energy. AI systems, especially large language models and deep learning networks require extensive computing power. Data centers housing AI servers consume massive amounts of electricity, often sourced from fossil fuels. The carbon emissions from AI operations contribute to climate change. It is used to optimize mining operations, enhancing efficiency but also increasing energy demand. Mining farms consume huge amounts of electricity for example Bitcoin mining alone consumes more electricity than some small countries like Netherland, Argentina.

There has been a lot of deliberation on this issue globally which is gaining traction. At COP29 , the international telecommunication union stressed the high necessity for greener AI practices like use of renewable energy to power AI data centers, better recycling

programs for electronic waste. These kinds of commitments need to be supported by means of aligning business processes with sustainability targets. Over 190 countries have adopted non - binding ethical AI recommendations addressing the environments, and regions such as the European Union, and the U.S. have introduced the laws to curb Ai's environmental impact. However, such policies are rare. Though governments across the globe are serious about drafting national strategies, they often ignore sustainability, particularly the private sector's role in reducing emissions.

**The way Forward**

To balance innovation and environmental responsibility, action is required across the value chain. Investing in clean energy is an important step towards achieving net-zero emissions. Companies can achieve this by transitioning to renewable energy sources and purchasing carbon credits.

Locating data centers in areas with an abundant supply of renewable resources can also reduce stress on existing resources and help reduce carbon footprints, AI can also help optimize energy grids, particularly integrating renewable energy sources, for example, Google's DeepMind has leveraged ML to improve wind power forecasting, enable more accurate wind pattern predictions, and facilitate better integration of wind power into the grid.

Using energy efficient hardware and ensuring regular maintenance can also significantly reduce emissions. Equally important is the development of efficient AI models. Smaller, domain specific models that are tailored to their applications can provide the same output with less processing power, reducing demand on infrastructure and resources. A study by Google and the University of California, Berkeley found that LLM's carbon footprint could be reduced by a factor of 100 to 1,000 through optimized algorithms, specialized hardware. and energy-efficient cloud data centers. Further, instead of collecting new data or training models from scratch, businesses can adapt pre-trained models to new tasks.

Last but not least, transparency is essential to promote sustainability efforts. Measuring and disclosing the environmental impact of AI systems will help organizations understand their life cycle emissions and address the negative externalities of their operations. Establishing a standardized framework for tracking and comparing emissions across the industry will ensure consistency and accountability.

Sustainability needs to be included in the very design of the AI ecosystem in order to ensure its long-term growth and viability. By balancing environmental responsibility with innovation, we can harness Al's transformative potential without compromising the planet's future.

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