India's AI-Driven Climate Adaptation: A New Dawn for Monsoon Resilience

TDT | agencies

The monsoon has always been more than a season for India: it is a lifeline. Yet, as climate change disrupts rainfall patterns, what was once predictable has become precarious. This year's unusual monsoon, with its early arrival and a rare midseason hiatus, illustrates just how fragile agricultural rhythms have become. But this year was also different for another reason: millions of Indian farmers had artificial intelligence on their side.

From Supercomputers to Smartphones

For decades, accurate weather forecasting was a privilege afforded only to governments and well-funded institutions, reliant on hundred-million-dollar supercomputers and massive datasets. But AI has begun to dismantle that exclusivity. With open-source models like Google's NeuralGCM and the European Center for Medium-Range Weather Forecasts's AI systems, highly granular predictions are now possible on devices as modest as a farmer's smartphone.

This democratization of forecasting is not just technological innovation—it is a political and social breakthrough. In India, where smallholder farmers make up the bulk of the agricultural workforce, the government sent AI-driven forecasts to 38 million farmers this monsoon season. That number is staggering, not just because of its scale but because of its precision. Rather than offering broad weather summaries, forecasts were tailored to the needs of individual farmers: whether to plant early, buy more seed, or prepare for drought-like pauses.

"Up until very recently, to run a weather model, you needed a 100 million-dollar supercomputer," Google Research's Olivia Graham explained. Today, Parasnath Tiwari, a farmer in Madhya Pradesh, can receive predictive rainfall alerts on his phone. This shift represents more than efficiency—it is empowerment.

The Promise of Democratized Forecasting

What makes India's experiment remarkable is not merely its technological sophistication but its accessibility. Weather forecasting, once dominated by elite institutions, is now being reframed as a public good. Researchers at the University of Chicago, working with the Indian government, helped bridge the gap between machine learning outputs and actionable advice. As Amir Jina, an assistant professor involved in the project, observed: "What dots hadn't been connected before was this tailoring of forecast to purpose."

That tailoring matters. A generic national forecast might warn of heavy rains, but a farmer in Bihar needs to know whether to delay planting rice seedlings, while a sugarcane grower in Maharashtra must decide whether to irrigate fields ahead of schedule. By delivering locally relevant insights, AI makes forecasting meaningful.

This democratization also creates a template for global adaptation. If India can deploy AI-driven forecasts at scale for some of the world's poorest farmers, then other developing nations may follow suit. In the face of climate change, information is not just power—it is survival.

The High Stakes of Climate Volatility

The urgency could not be greater. Climate change threatens to destabilize India's agriculture sector, which supports nearly half of the country's population. Irregular monsoons disrupt sowing schedules, reduce yields, and imperil livelihoods. Michael Kremer, a Nobel laureate economist who studies agriculture in developing countries, underscores the stakes: "Climate change is really threatening their livelihoods in many cases."

This year's monsoon provided a live stress test. The early onset suggested abundant rains ahead, but the 20-day midseason stall left crops vulnerable. The AI forecast's accuracy in predicting this hiatus allowed farmers to adapt, buying time and avoiding catastrophic losses. That precision may well have saved lives and incomes.

Such resilience is vital for India's food security. Crops like rice, wheat, and sugar cane form not just the backbone of rural economies but also the diet of hundreds of millions. When weather falters, hunger looms. AI, then, is not merely a convenience—it is an instrument of national security.

Private Sector Innovation and Public Sector Reach

India's initiative also signals a broader shift: climate adaptation is no longer solely the realm of governments. Technology companies and startups are accelerating innovation. Microsoft's Aurora model, for instance, joins a growing commercial industry focused on AI weather forecasting. Meanwhile, corporations across sectors are installing mini weather stations to protect operations and supply chains from climate volatility.

Yet India's program stands apart because of its emphasis on equity. By leveraging open-source AI and government networks, forecasts reached farmers who would otherwise be excluded from private sector tools. The lesson is clear: when innovation is paired with public infrastructure, it amplifies resilience at scale.

This is not to say private enterprise lacks a role. Startups can refine hyperlocal forecasts, companies can build complementary data-gathering hardware, and multinationals can deploy AI expertise. But the Indian case shows that governments must ensure that access to life-saving forecasts is universal, not market-driven.

Global Lessons from India

India's AI-powered adaptation offers lessons for the world, especially for countries grappling with agricultural vulnerabilities. First, open-source technology is essential. By removing barriers to entry, it enables broader participation in climate adaptation. Second, localization matters. Forecasts must be translated into actionable insights relevant to specific crops and geographies. Third, collaboration is key. Governments, universities, and technology companies each bring unique strengths, but only together can they deliver at scale.

These lessons are particularly urgent given the fragility of weather data infrastructure elsewhere. In the United States, cuts to the National Oceanic and Atmospheric Administration under the Trump administration raised alarms about data availability. If even wealthy nations face gaps, the case for collaborative, open-source, AI-driven forecasting grows stronger.

Risks and Responsibilities

Of course, AI is not a panacea. Its models are only as good as the data that trains them. Historical rainfall data may not always capture the novel extremes of a warming climate. Moreover, over-reliance on AI could create new vulnerabilities if forecasts fail. A missed prediction in the midst of climate chaos could have devastating consequences.

There are also ethical questions. Who owns the data collected from farmers? How is it used, and who profits from it? Ensuring that AI remains a tool for empowerment, rather than exploitation, will require transparent governance and safeguards.

Yet, these risks should not obscure the promise. The alternative—leaving millions of farmers to navigate increasingly erratic weather armed only with intuition and tradition—is untenable.

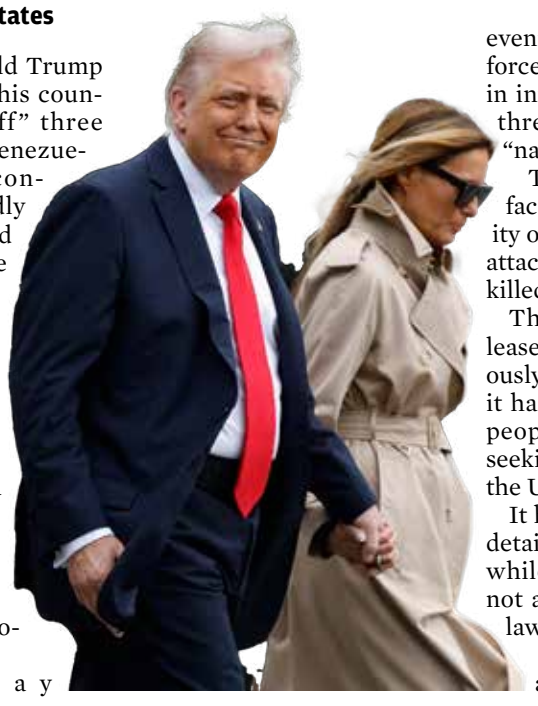
A Future of Climate Adaptation Powered by AI

India's AI-driven monsoon forecasting initiative embodies a broader truth: climate adaptation requires innovation at scale, grounded in inclusivity. By bringing cutting-edge technology to the fingertips of the world's most vulnerable farmers, India has shown how artificial intelligence can serve as a bridge between global scientific advances and local survival strategies.

The monsoon will remain fickle, and climate change will continue to amplify uncertainty. But with AI as an ally, India's farmers have gained not just forecasts, but foresight. And in the struggle against climate change, foresight may be the most precious resource of all.

Trump says US has 'knocked off' three boats off Venezuela

Washington, United States



US President Donald Trump on Tuesday said his country had "knocked off" three boats in total from Venezuela, a day after he confirmed a second deadly US strike on alleged drug traffickers in the Caribbean.

"We knocked off actually three boats not two, but you saw two," he told reporters at the White House before heading to the United Kingdom for a state visit.

He did not elaborate on what had happened with the third boat, or if any more people had been killed.

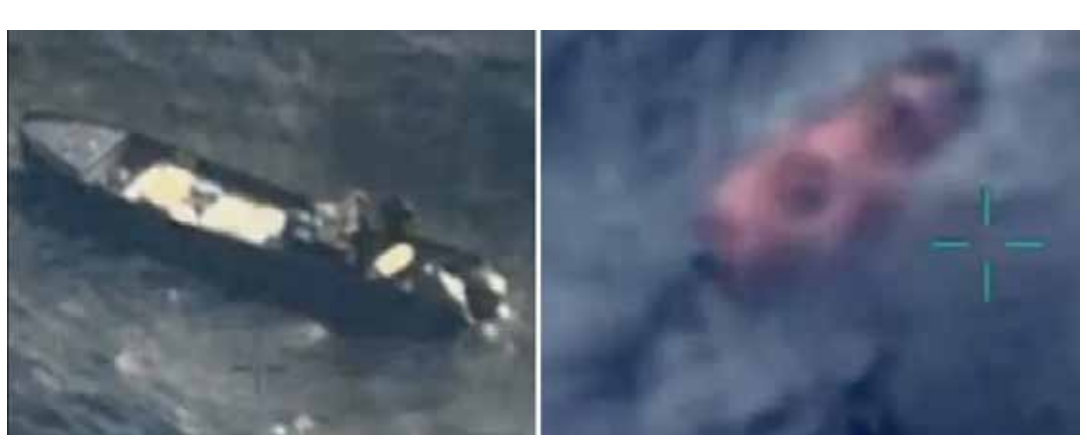
On Monday evening, he announced that US forces had struck a second boat in international waters, killing three people he described as "narco-terrorists."

Trump's administration has faced questions over the legality of such strikes since its first attack earlier this month, which killed 11 people.

The US government has released videos of the two previously known strikes and claims it has irrefutable evidence the people killed were traffickers seeking to ship deadly drugs to the United States.

It has not, however, provided details to back up those claims, while drug trafficking itself is not a capital offense under US law.

The attacks also comes amid spiraling tensions in the Caribbean as a large US naval build-up sparks speculation that Washington may be seeking regime change in Caracas.



Picture for representation only

The United States accuses Venezuelan leader Nicolas Maduro of heading a cocaine trafficking cartel and recently doubled its bounty for his capture to $50 million.

Much of the international community rejected Maduro's July 2024 re-election, with the opposition claiming widespread fraud.

"Stop sending drugs into the United States," Trump said, in response to a reporter who asked him what message he wanted to send to Venezuelan President Maduro.