

Can the climate crisis be resolved through new technologies?

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The climate crisis has mounted to such immense levels of concern that in 2024, the Earth's average surface temperature was at an all-time high, with July 2024 seeing the three hottest days ever recorded. The World Economic Forum has named three key climate risks as the top global challenges--extreme weather conditions, critical change to Earth systems and biodiversity loss. All three are interconnected and can have devastating consequences, including the collapse of ecosystems and the loss of biodiversity. As per predictions, the world is likely to breach the 1.5°C threshold within the next year, with temperatures reaching 1.48°C above pre-industrial averages. This increase will lead to intense and more frequent natural disasters such as hurricanes, droughts and wildfires.



Climate Crisis (Shutterstock)

In 2024 alone, the number of natural disasters across the world has been alarming. In the United States (US) alone, there have been disasters roughly costing \$ 11 billion, with most of them occurring in the spring. With the frequency and the severity of natural disasters increasing, an average of 400 natural disasters occurs every year, affecting about 200 million people. This is nearly double the number of natural disasters that occurred 20 years ago. Some of the countries most prone to natural disasters include the Philippines, with a risk index of 46.82 due to its location in the typhoon belt and its susceptibility to landslides, tsunamis and earthquakes. Indonesia stands at a risk index of 41.46 due to volcanic activity, earthquakes and flooding. India stands at a risk index of 42.31 due to droughts, flash floods and severe thunderstorms.

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The three types of natural disasters on the rise across the globe include, hydrometeorological events like droughts, tornadoes, hurricanes, floods, and mudslides and these are linked to climate change. Earthquakes are also on the rise, particularly in regions with high volcanic activity. The climate crisis does not directly cause earthquakes. However, the climate crisis can indirectly contribute to increased seismic activity. Melting glaciers and ice sheets alter the weight of the Earth's crust, potentially triggering earthquakes, or even thawing permafrost can lead to instability in the ground, potentially triggering landslides and earthquakes, and so on. Tsunamis are on the rise too which have devastating effects on coastal communities in particular. The need for disaster preparedness and mitigation efforts has never been earlier. As such, to address these risks, it is essential to prioritise faster emissions reduction and credible steps towards a clean transition, which will include transitioning to renewable energy sources, increasing energy efficiency and promoting sustainable land use.

While there is a need for behavioural change to address climate change, it is difficult to come by. It needs to be complemented by technology. Some technological solutions include renewable energy, including solar, wind, hydro and geothermal power, usage of hydrogen fuel cells and batteries, for energy storage, reliance in carbon capture, utilisation and storage, electric vehicles and public transportation, smart grids and energy efficiency, sustainable agriculture and forestry, climate resilient infrastructures, advanced materials and recycling, ocean fertilisation and geoengineering.



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Artificial Intelligence can be used for climate modelling and prediction, blockchain can be used for carbon tracking and verification, the Internet of Things (IoT) can be used for energy management, 5G and 6G networks can be used for smart grids and remote monitoring, advanced nuclear power and small modular reactors can be leveraged, along with bio energy and carbon capture and storage. Direct Air Capture and Carbon Utilisation can also go a long way.

However, there are limitations and challenges to all these technology-based challenges and they range from scalability and cost-effectiveness to a lack of infrastructure as well as a lack of deployment timelines, to the existence of difficult policy and regulatory frameworks to a lack of public acceptance and resistance to behavioural change to difficulties in energy storage and grid resilience and so on. There is also a problem in terms of addressing non-CO2 greenhouse gases such as methane and nitrous oxide. There is a need for complementary solutions that include climate policies and governance, climate resilient agriculture, ocean conservation and restoration, sea walls and coastal protection, flood resilient construction, green roofs and urban forestry, international cooperation and climate finance, smart grids and energy efficiency.

As such, technology can mitigate the climate crisis but it has to be essentially accompanied by ambitious climate policies, international cooperation, behavioural changes, climate justice and equity considerations and constant and continuous innovation and research. Developing countries have been playing a crucial role in combating climate change and several countries stand out for their efforts, which are worth emulation elsewhere. Some notable examples include Bangladesh, which is known for its climate resilience and adaptation strategies, as it has made significant progress in reducing greenhouse gas emissions and has made strides in promoting renewable energy. India is another noteworthy example, with its ambitious renewable energy targets and initiatives like the International Solar Alliance, India is emerging as a leader in the global climate action landscape. Egypt, as the host of COP27 has demonstrated its commitment to address climate change through sustainable development and green economy initiatives. South Africa has also prioritised climate-resilient infrastructure and green finance, while Indonesia has displayed a steadfast focus on sustainable forest management and renewable energy. It is also actively combating deforestation and greenhouse gas emissions. These countries are not just addressing climate change but also leveraging it as an opportunity for sustainable development and economic growth. Their experiences and strategies, while not all-encompassing, can serve as valuable lessons for other developing countries.

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