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Disasters cost more than $120 billion in 2025

Rajesh Tiwari
Publisher
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Asia accounted for four of the top six costliest disasters with flooding in India and Pakistan killing more than 1,860 people, costing up to $6 billion and affecting more than 7 million people in Pakistan alone.

Climate disasters like heat waves, wildfires, droughts, and storms cost the world more than $120 billion in 2025, according to a new report. The report — Counting the Cost 2025 — by Christian Aid underscores the escalating cost of climate change, with fossil fuel companies playing a central role in driving the crisis.

The cost of climate inaction is equally clear, as communities continue to bear the brunt of a crisis that could have been averted with urgent action to reduce greenhouse gas emissions.

The ten most financially costly events all had an impact of more than $1 billion with the combined total topping more than $122 billion in damage.

Most of these estimates are based only on insured losses, meaning the true financial costs are likely to be even higher, while the human costs are often uncounted, according to a Christian Aid press statement.

In terms of events which caused the biggest financial cost in 2025, the US bore the brunt, with the fires in California topping the list as the single biggest one-off event at $60 billion in damage and leading to the deaths of more than 400 people. Second on the list was the cyclones and floods that struck Southeast Asia in November causing $25 billion in damage and killing more than 1,750 people across Thailand, Indonesia, Sri Lanka, Viet Nam and Malaysia. Third were the devastating floods in China which displaced thousands, caused $11.7 billion in damage and killed at least 30.

No continent was spared from crippling climate disasters in 2025, with at least one disaster in each of the six populated regions of the world making the report. Drought in Brazil, summer wildfires in Spain and Portugal and February cyclones in Australia and Réunion island off the coast of Africa meant no corner of the world was spared.

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More than $5billion in damage was caused by typhoons in the Philippines with more than 1.4 million people displaced.

While the top ten focuses on financial costs, which are usually higher in richer countries because they have higher property values and can afford insurance, some of the most devastating extreme weather events in 2025 hit poorer nations, which have contributed little to causing the climate crisis and have the least resources to respond.

"This year has once again shown the stark reality of climate breakdown. Violent storms, devastating floods and prolonged droughts are turning lives and livelihoods upside down. The poorest communities are first and worst affected," Patrick Watt, CEO, Christian Aid.

Making the second list of 10 was also some events that stood out for being particularly unusual such as the record breaking heat that led to wildfires in the highlands of Scotland, with 47,000 hectares burned. Japan faced an extreme year of both heavy snowstorms and record breaking heat waves. Worrying climate related extremes were also recorded in Antarctica and the world's oceans which recorded record breaking sea temperatures and coral bleaching in West Australia which pose major threats to biodiversity.

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CSR: E-Bikes handed over to the Primary Healthcare Centers in Bagepalli Village in Karnataka

United Way Bengaluru (UWBe), with the CSR support of Marvell, is implementing Rural Rising, an integrated rural development flagship campaign in Bagepalli taluk of Chikkaballapura district. The initiative is guided by a shared vision to strengthen rural communities through focused interventions in education, health and sanitation, livelihoods, and environmental sustainability.

As part of this Rural Rising program, an E-Bike Handover Ceremony was organised to support frontline healthcare delivery in the district. The event witnessed the key handover of 10 E-Bikes to the Primary Healthcare Centres (PHCs), aimed at improving mobility and outreach of healthcare staff in remote and underserved areas.

The District Collector of Chikkaballapura highlighted the practical impact of enhanced mobility on healthcare delivery and the importance of people-public-private partnerships in accelerating rural development outcomes.

The Rural Rising program has improved the quality of early childcare and development services, supported school infrastructure, promoted drinking water, improved the health and sanitation standards and livelihood enhancement resources such as solar lights, and e-bikes for the PHCs. Distinguished delegates and community leaders graced the occasion, including representatives from District Collectorate, Marvell Technology, United Way Bengaluru, and Gram Panchayats, and the local community.

Through Rural Rising, United Way Bengaluru and Marvell continue to demonstrate how collaborative efforts can create sustainable, on-ground impact and contribute meaningfully to holistic rural transformation in Karnataka.

At Marvell, we believe that lasting change in rural India comes from investing in foundational needs that drive sustainability. Our partnership with United Way Bengaluru through Rural Rising is aligned with our vision of greater self-reliance and long-term wellbeing," said Navin Bishnoi, Associate Vice President and Country Head (India), Marvell Technology.

United Way Bengaluru works as an ecosystem enabler. In Rural Rising, collaboration is not just a principle but a practice, bringing together communities, government systems, and partners to deliver change that is locally anchored and scalable," said Rajesh Krishnan, CEO, United Way Bengaluru.

Varthana secures USD 6 million loan from WaterEquity to expand access to safe water and sanitation in underserved schools across India

Varthana Finance, a leading NBFC in the affordable education sector in India, has secured a USD 6 million loan from WaterEquity, a global asset manager exclusively focused on water and sanitation. The funding aims to expand access to safe water and sanitation in underserved school communities across India. The proceeds will be deployed exclusively toward school improvement loans that incorporate water, sanitation, and hygiene (WASH) infrastructure, enabling affordable private schools to provide clean drinking water, improved sanitation facilities, and promote healthy hygiene practices for students.

This investment aligns with Varthana's commitment to creating sustainable impact through education-focused financing. With deep geographical reach across peri-urban and rural India, Varthana is well-positioned to scale access to water and sanitation infrastructure in affordable private schools. WaterEquity brings sectoral expertise through prior investments in microfinance institutions, housing finance companies, and SMEs. This transaction introduces school financing to WaterEquity's India portfolio, expanding its support of long-term impact.

"Access to safe water and sanitation is fundamental to creating a healthy and conducive learning environment," said Steve Hardgrave, Wholetime Director and Executive Vice Chairman, Varthana. "By integrating WASH improvements into our school financing model, we are ensuring that quality education goes hand in hand with the well-being of students. Our collaboration with WaterEquity helps us deepen our commitment to sustainable school ecosystems, especially in communities that need it most."

"Children spend a significant portion of their day at school, and access to safe, dignified WASH facilities is essential to improving attendance and learning outcomes - particularly for girls," said Amit Agarwal, Head of South and Central Asia for Financial Institutions, WaterEquity. "Varthana's extensive network of affordable private schools presents a strong platform to scale these improvements. This transaction marks WaterEquity's first global investment in the school finance sector adding WASH lending for schools as a new product in our debt portfolio. That portfolio currently generates water and sanitation impact in 23 countries through households and enterprises loan products from Microfinance Institutions, Banks, Housing Finance Companies and other non-Banking Financial Institutions. We are pleased to support Varthana in expanding sustainable school infrastructure and improving access to water and sanitation in underserved communities."

This initiative is expected to contribute to improved public health outcomes, increased school attendance, and India's progress toward the United Nations Sustainable Development Goal 6, ensuring availability and sustainable management of water and sanitation for all. By combining WaterEquity's expertise in impact investing and Varthana's on-ground reach and financial acumen, this collaboration seeks to help bridge the gap that often prevents vulnerable communities from accessing basic water and sanitation facilities.

NSE and Mumbai Climate Week Launch MCW 2026 Innovation Challenge to Spotlight Climate Solutions from the Global South

In a significant step towards strengthening India's climate innovation ecosystem, Mumbai Climate Week (MCW), in partnership with National Stock Exchange (NSE), announced the launch of the MCW 2026 Innovation Challenge – a flagship platform designed to identify, evaluate, and accelerate high-impact climate solutions aligned with India's sustainable development priorities.

The Innovation Challenge invites early-stage, growth-ready, and sector-focused innovators from startups, civil society, academia, and the wider climate ecosystem from across the Global South to apply with breakthrough solutions aligned to MCW's three core themes: Food Systems, Urban Resilience, and Energy Transition. The Challenge aims to surface scalable, equitable, and investment-ready innovations that address climate vulnerabilities while contributing to India's long-term vision of inclusive and sustainable growth.

Shortlisted innovators will progress through a structured and rigorous evaluation journey, including application screening, expert jury rounds, mentorship and acceleration clinics with thematic partners, and final-stage presentations during Mumbai Climate Week 2026, scheduled to be held from 17–19 February 2026. Selected innovators will also benefit from enhanced visibility through exchange-supported platforms and access to MCW's curated Investor "Speed-Seeding" sessions, connecting them with investors, ecosystem partners, and enablers.

Speaking on the launch, Ashishkumar Chauhan, MD & CEO, NSE, said: NSE, in collaboration with Mumbai Climate Week, has launched the Climate Innovation Program: our call to action for new-age climate startups to bring forward transformative ideas that can shape India's green future and become capital market–ready enterprises of tomorrow. Product Innovation has always been at the heart of NSE's journey. By launching instruments such as Electricity Futures, ESG Debt Securities to designing the next generation of market solutions: including Contracts for Difference (CfDs) for the power market, Green Equity Criteria, and Social & Development Impact Bonds, we are embedding sustainability into the very fabric of capital markets, positioning them as gateways to climate finance in India. In the years ahead, such enterprises and instruments will play a vital role in bridging the gap of climate financing of estimated USD 10.9 trillion climate finance required for India's path to Net Zero by year 2070.

Through these efforts, NSE is building public markets that not only enable growth, but define the pathways to a more resilient, low-carbon, and inclusive economy for the future."

Speaking on this occasion Shishir Joshi, Founder & CEO Project Mumbai said, "Mumbai Climate Week is fundamentally about creating the conditions for India's climate solutions to thrive—building the infrastructure where innovation becomes impact. By partnering with NSE, we're connecting India's most innovative climate minds with the capital and platforms they need to scale. Through the MCW Innovation Challenge, we're creating a rigorous, credible platform that welcomes breakthrough innovations from across the India & Global South, evaluated on merit, innovation and ability to scale for impact potential. This is about turning climate ambition into a competitive advantage where climate action can become a driver of economic and social progress, while establishing India as a launchpad for Global South climate innovation"

The Innovation Challenge is open to early-stage and growth-ready innovators, with a strong emphasis on Global South relevance, climate impact, innovation quality, equity and inclusion, and scalability. Only complete applications meeting the eligibility criteria will be evaluated. Global North entities may participate as observers or technical contributors but will not be eligible for selection.

HPWWI Convocates its First-Ever Women Batch in the Woodworking Sector

The Hettich Poddar WoodWorking Institute (HPWWI) held the Convocation and Award Ceremony for their first-ever batch of women trainees in Woodworking , marking a key moment in women's participation within the Woodworking and furniture and fittings sector , as this is also India's first Girls batch in this sector.

Held at Hotel Park Plaza, Faridabad, the ceremony recognised 108 graduating students, including 50 women trainees, who completed HPWWI's three-month Short-Term Training (STT - Mobilized) programme. For many of the women graduates, the programme represented their first formal entry into a highly technical and traditionally male-dominated trade, thus girls were given the "Ice Breaker Award' for the courage shown by them.

The initiative reflects HPWWI's belief that access to technical skills should not be limited by gender, and that expanding women's participation is essential to building a more inclusive, resilient, and future-ready workforce. By creating an industry-aligned environment, HPWWI aims to open sustainable career pathways for women while bridging the skill gaps within the woodworking ecosystem.

The ceremony was graced by Amit Prasad, Director - HPWWI and Chief Human Resources Officer, Hettich India, as Guest of Honour. In his address, he emphasized the significance of structured, industry-aligned pathways for skilling. "At HPWWI, our objective is not just skill creation, but inclusive skill creation. By enabling women to enter technical trades through structured training and real industry exposure, we are working towards a more balanced and future-ready workforce - one where opportunity is driven by capability, not convention," he said.

Graduates received certifications recognised by the National Skill Development Corporation (NSDC) and the Furniture and Fitting Skill

Council (FFSC). Along with HPWWI certification the awards included the Medal of Merit, and the Ice Breaker Award, as already stated.

The program's curriculum combines skill enhancement with the latest woodworking trends, techniques, and technologies, delivered by highly experienced trainers. Trainees receive extensive hands-on exposure, including training on modern machine handling such as CNCs and pneumatic tools, ensuring strong industry readiness.

Reflecting HPWWI's strong industry connect, 15 to 20 students received on-the-spot offer letters from placement partners such as StudioKon Ventures Pvt. Ltd., Decora Kitchen Interiors Pvt. Ltd., Delbergia, Wudley, Mobel Grace, among others.

The cohort included students hailing from Haryana, Delhi, Rajasthan, Punjab, Bihar, and Uttar Pradesh, with 30 trainees from

underprivileged backgrounds, underlining HPWWI's CSR-led focus on widening access to skill development and employment. Operating across three centres in India located in Mumbai, Faridabad, and Kolkata, HPWWI continues to strengthen the Woodworking and furniture and fittings ecosystem through structured programmes focused on skilling, upskilling, and reskilling, in collaboration with NSDC, FFSC, ITIs, PBSSD, and industry partners, in support of the Skill India Mission.

Also present with their active participation and words of gratitude on the occasion, were industry partners such as Canadian Wood, Biesse, Rehau, Felder, Imos, WoodTech, SS Coatings, and Groz Tools.

The event proved to be a success with the effort of Deepak Sharma, Deputy Director and his core team of Trainers namely Kulwant Jangra, Jyoti Ashutosh, and Swapnil Verma.

The convocation highlighted how focused, hands-on training and industry collaboration can translate into sustainable livelihood opportunities and employment outcomes, while steadily increasing women's participation in the Woodworking sector.

ADM and Bayer Expand Food Value Chain Commitment, Quadrupling Reach to 100,000 Soybean Farmers in Maharashtra

ADM , a global leader in innovative solutions from nature, and Bayer, a global enterprise with core competencies in the life science fields of healthcare and agriculture, have announced a three-year extension of their partnership to support farmers in Maharashtra, building on the success of the programme launched in 2022.

With the extension, the programme will now scale fourfold to 100,000 farmers through FPOs and expand its coverage from 35,000 hectares to 200,000 hectares. The expansion will cover seven districts in Maharashtra, adding Nanded, Parbhani, Hingoli and Solapur to its original footprint of Latur, Dharashiv (formerly Osmanabad), and Beed.

The partnership, launched in June 2022 to strengthen sustainable soybean farming practices in Maharashtra, successfully reached 25,000 farmers by May 2025, achieving its targets and laying a strong foundation for further scale.

The partnership also draws from a credible sustainability framework, the ProTerra Foundation, with a focus on five critical areas of supply chain sustainability: customised production management (Production); tailored spray programmes that emphasise pre-harvest intervals and biodiversity protection (Protection); professional implementation guidance (Programme Monitoring); detailed crop-management documentation (Passport); and collaborative post-harvest pest management expertise (Post-harvest Management).

Complementing these efforts, Bayer led extensive in-person and digital training programmes to strengthen farmer's capacity in Good Agricultural Practices (GAP), biodiversity, and sustainability practices. Through a combination of model demonstration plots and large-scale outreach, the company has engaged thousands of growers, including connecting with over 58,000 farmers through audio bridge calls on Integrated Pest Management (IPM)-based crop management. Across project districts, Bayer has also delivered hundreds of pre-sowing and crop-management camps, while a carefully chosen cohort of farmers underwent rigorous BayGAP training to adopt globally benchmarked sustainable farming practices.

In parallel, ADM's cluster agronomist team receives regular training on comprehensive crop cultivation practices, including nutrient and pesticide management schedules, as well as Good Agricultural Practices (GAP). This equips them to guide

farmers effectively in implementing sustainable practices while safeguarding the economic viability of farming communities.

Building on this groundwork, ADM has leveraged its extensive network in India, which spans origination, oilseed processing, commodities trading, and animal and human nutrition, to deepen support for farming communities. This includes on-the-ground engagement through its Krishi Vikas Kendras (KVKs), a network of more than 50 crop-development and procurement centres.

Together, Bayer and ADM will continue to apply the same proven training and sustainable farming practices in their extended partnership. Commenting on this outlook, Amrendra Mishra, Managing Director of Ag Services & Oilseeds and Country Manager India, ADM, said: "Our extended partnership with Bayer reflects a long-term vision to safeguard food systems and foster a resilient future. By leveraging ADM's market linkages and global resources, we aim to equip 100,000 farmers with the tools to strengthen economic resilience, enhance sustainable livelihoods, and lead the future of Indian agriculture through practices that advance environmental and supply chain sustainability."

Reflecting the shared commitment to sustainability, Simon Wiebusch, Country Divisional Head – Crop Science Division of Bayer for India, Bangladesh & Sri Lanka, said: "Sustainable development in agriculture cannot be achieved in isolation, it demands deep, purpose-driven partnerships. Our expanded collaboration with ADM demonstrates what is possible when organisations come together with a shared commitment to farmer prosperity, climate-smart practices, and responsible stewardship. By scaling proven solutions across Maharashtra, we aim to help farmers improve yields sustainably while building a more resilient, future-ready agri-ecosystem."

Kotak Education Foundation Launches Impact Film on Kotak Shiksha Nidhi, Honoring Resilience and Hope, Post-Pandemic

Kotak Education Foundation (KEF) unveiled the Kotak Shiksha Nidhi Impact Film, a powerful tribute to the resilience, courage, and transformation of students whose education was safeguarded in the aftermath of the COVID-19 pandemic through one of Kotak Mahindra Group's timely and extensive initiatives- Kotak Shiksha Nidhi.

Launched pan-India in response to the unprecedented crisis caused by COVID-19, Kotak Shiksha Nidhi was conceived to ensure the continuity of education for students who had lost one or both parents, or a primary earning family member, to the pandemic. The initiative supported over 1,500 students from Class 1 to graduation and diploma courses, spanning the ages of 6 to 22 years, at a time of profound personal loss and financial vulnerability, with financial aid of up to Rs 2.5 lakhs per annum.

The initiative supported over 1,500 students from Class 1 to graduation and diploma courses, spanning the ages of 6 to 22 years, at a time of profound personal loss and financial vulnerability, with financial aid of up to Rs 2.5 lakhs per annum.

More than a financial aid programme, Kotak Shiksha Nidhi was thoughtfully designed as a holistic support system, extending academic assistance, career guidance, analytical skills training, mental health and wellness counselling, and coaching in personality development and life skills. This integrated approach enabled students not just to remain in the education system, but to rebuild confidence, rediscover purpose, and envision a future beyond adversity.

Many beneficiaries of the programme have since gone on to successfully graduate, pursue higher education, secure internships, and gain full-time employment, bringing renewed stability and hope to their families and communities. The impact film is a testament to the programme's enduring legacy and the lives it has shaped.

Avro India Leads Waste-to-Wealth Shift with India's Largest Flexible Plastic Recycling Unit

Avro India Limited, a leading manufacturer of plastic-moulded furniture, is set to address one of India's most complex environmental challenges—recycling difficult-to-process plastic waste—with the launch of its state-of-the-art greenfield recycling facility in Ghaziabad.

Operating under AVRO Recycling Limited, a 100% owned subsidiary of Avro India Limited, the facility houses India's largest flexible plastic recycling plant, with a current processing capacity of 500 metric tonnes per month (MTPM). The capacity is scheduled to scale up to 1,000 MTPM by Q4 of FY 2025–26.

The capital expenditure invested in the recycling plant stands at Rs 25 crore as of date, with plans to invest an additional Rs 30 crore by FY 2027. As part of its long-term sustainability vision, the company also plans to expand pan-India through future greenfield recycling projects.

Founded in 2002, Avro India Limited has consistently delivered durable, high-quality, and affordable plastic-moulded furniture to households, businesses, and institutions across India. Today, the company enjoys nationwide prominence and is listed on both the NSE and BSE.

Avro has built one of India's most extensive distribution networks, comprising over 30,000 retailers, supported by more than 300 distributors across 24 states.

Historically, difficult-to-process plastic waste—such as cement bags, salt bags, sugar bags, putty bags, and calcite packaging—was considered largely non-recyclable and was either downcycled or handled by the unorganised sector. After more than three years of intensive research, trials, and technological innovation, Avro has developed a proprietary system capable of upcycling such complex plastic waste at scale, enabling the responsible processing of nearly 1 million metric tonnes per annum (MTPA) of such waste generated in India.

The recycled granules produced at the facility are fully utilised in the manufacture of high-value end products, including plastic furniture, air coolers, washing machines, automotive components, and other industrial and consumer applications. These granules are available at up to 40% lower cost than virgin plastic, while meeting stringent technical and durability standards—helping manufacturers remain cost-efficient, compliant, and environmentally responsible.

With the implementation of Extended Producer Responsibility (EPR) norms by the Government of India—mandating the use of at least 30% recycled plastic content in rigid plastics—brand owners are facing a significant supply gap of high-quality recycled raw materials. Addressing this challenge, Avro India has emerged as the largest and most reliable organised player in the flexible plastic recycling space, offering consistent volumes at industrial scale.

Commenting on the development, Mr. Sushil Kumar Aggarwal, Chairman and Whole-Time Director, Avro India Limited, said"India's plastic challenge cannot be solved through fragmented efforts. It requires scale, technology, and intent. At Avro, we have invested years of research to build a system that converts complex plastic waste into valuable raw material. Our vision goes beyond recycling—we are building a nationwide ecosystem that transforms waste into opportunity while protecting our planet."

Looking ahead, Avro India is developing a pan-India network of 'mother and baby' recycling plants, aimed at decentralizing waste processing and accelerating India's transition to a circular economy. Through innovation, scale, and collaboration, the company aims to play a defining role in positioning India as a global leader in sustainable plastic management.

Mr. Hardeep Singh Brar at Golf For Everyone

From Grassroots to Greens: Golf for Everyone

In a pioneering effort to make golf more inclusive and accessible, BMW India Foundation has joined hands with The Golf Foundation to launch 'Golf for Everyone' - a nationwide initiative aimed at identifying and nurturing golfing talent among underprivileged children.

Mr. Hardeep Singh Brar, President and CEO, BMW Group India said, "Golf has traditionally been perceived as a sport limited to the privileged few due to accessibility and resource constraints. The 'Golf for Everyone' program seeks to change this narrative by creating opportunities for talented young athletes regardless of their socio-economic background. By bringing golf to the doorsteps of underprivileged children, we hope to foster a truly community-driven sporting culture that celebrates diversity and equal opportunity. BMW India Foundation's vision is to nurture projects that transcend socio-economic boundaries and becomes truly inclusive. We strongly believe projects like 'Golf for Everyone' hold that tremendous transformational power."

As part of this endeavor, BMW India Foundation and The Golf Foundation are conducting India's largest annual golf talent hunt for 2025-26. Through this extensive grassroots golf discovery program, the search for talent will begin with in-school talent identification camps across government and low-income schools. To participate in the talent hunt, children can also WhatsApp "I am Talent" on +91 93106 92833.

Using portable hitting mats, nets, and putting kits, children undergo simple athletic evaluations such as throws, sprints, jumps, and coordination drills. This initial screening helps identify young athletes who show potential in physical agility and coordination. Children shortlisted from these camps will progress to regional on-range golf camps, hosted at golf facilities across multiple Indian states. Here, participants will be introduced to the fundamentals of golf and assessed for basic skills, creating a bridge between raw talent and formal training. Over 1,800 - 2,000 children are expected to be screened through these multi-stage processes, culminating in a National Talent Hunt that will select approximately 30 promising young golfers to receive advanced support. The selected children will benefit from a comprehensive support framework that includes regular professional coaching, access to high-quality equipment, tournament exposure, mentorship, and financial assistance. This holistic development program aims to empower these young athletes to pursue golf professionally while also supporting their overall personal growth.

The 'Golf for Everyone' initiative not only aims to identify future champions but also strives to instill values of discipline, perseverance, and sportsmanship among the youth. By democratizing access to golf, the program hopes to inspire a new generation of achievers who will carry forward the legacy of Indian sports on national and global platforms.

On Farmers Day, Vedanta Aluminium Reaffirms Commitment to Empowering over 20,000 Farmers with Technology and Sustainable Farming Practices

Vedanta Aluminium, India's largest aluminium producer, marked National Farmers Day (Kisan Diwas) by announcing continued progress in empowering over 20,000 farmers across Odisha and Chhattisgarh through practical, science-backed interventions in agriculture and allied livelihoods. Designed to strengthen soil fertility, secure water access, livelihood development, and bring affordable technology to the farmgate, these initiatives equip farmers with scientific knowledge, training and on-ground resources to improve productivity, conserve natural resources, and build resilient farming systems.

Of the farmers supported, 12000+ are women and 8000+ are men, reflecting the company's focus on inclusive development. These initiatives span across Jharsuguda and Kalahandi in Odisha, and Korba in Chhattisgarh, where farmers have reported an average 15-20% increase in productivity and 18-22% rise in income through sustainable cultivation practices, reduced input costs, and diversified income streams.

Vedanta Aluminium's agricultural programmes combine traditional wisdom with modern science. Flagship initiatives such as Mor Jal Mor Maati in Chhattisgarh, Vedgram and Sangam in Odisha have introduced climate-smart farming models, regenerative agriculture, and water resource strengthening. The company has also signed MOUs with leading institutions, including ICAR-CTCRI to convert red mud into a sustainable soil conditioner, and partnered with NABARD to promote rural

skilling and agricultural innovation. Digitalization is a key enabler, with tools such as Ayushman CowFit collars, Digital AI Guns, and Automated Weather & Water Stations helping farmers adopt precision farming and livestock management.

Rajiv Kumar, CEO, Vedanta Aluminium, said, "Our journey with farming communities in Odisha and Chhattisgarh reflects a larger vision, where industrial progress and rural prosperity move forward together. These regions are among India's most farming-intensive landscapes, and by empowering over 20,000 farmers with technology, knowledge and sustainable practices, we are creating ecosystems that thrive beyond agriculture alone."

In Odisha, Vedanta Aluminium's interventions have reached 12000+ farmers across 60+ villages through projects like Project VedGram in Jharsuguda, which promotes soil health, water conservation, and Agri-horticulture through WADI models, and Project Sangam in Lanjigarh, which scales System of Rice Intensification (SRI) to improve paddy yields while reducing water use and input costs. Farmers have also benefitted from livestock breed improvement services, organic farming workshops, and applied field trials that strengthen climate resilience.

In Chhattisgarh, the Mor Jal Mor Maati programme has transformed farming practices for over 8000 farmers across 40 villages, focusing on water security, sustainable agriculture, and mechanisation. Farmers have adopted solar irrigation pumps, custom hiring centres, and digital livestock solutions, while allied livelihoods such as lac cultivation have delivered additional income opportunities.

The Government of India's Kisan Diwas places strong emphasis on scientific soil management, digital agriculture, farmer-friendly technologies and financial support schemes such as PM-KISAN,

PM-Fasal Bima Yojana, Soil Health Card Mission, and Digital Agriculture Mission. These initiatives aim to build a productive, self-reliant and technologically empowered farming ecosystem. Vedanta Aluminium's work supporting soil restoration, precision farming, smart weather-linked advisories, livestock strengthening, and horticulture development complements this national vision by ensuring rural communities have both access and ability to adopt modern, sustainable agricultural practices. In line with the United Nations Sustainable Development Goals: SDG 1 (No Poverty), SDG 8 (Decent Work & Economic Growth), SDG 9 (Industry, Innovation & Infrastructure) and SDG 13 (Climate Action), the company is also advancing circular economy solutions such as crop-residue utilisation, biofuel pilots and renewable energy integration, creating additional revenue for farmers while reducing environmental impacts.

Vedanta Aluminium's agricultural interventions form part of its broader social impact agenda, which spans education, healthcare, skill development, and women's empowerment.

Vedanta Aluminium's agricultural interventions form part of its broader social impact agenda, which spans education, healthcare, skill development, and women's empowerment. The company's community development programmes have touched the lives of more than 7 lakh beneficiaries across Odisha and Chhattisgarh. As India advances towards a future of industrial growth and rural prosperity, Vedanta Aluminium remains committed to working hand-in-hand with communities to ensure development is inclusive, equitable, and sustainable.

Vedanta Empowering Nearly 50,000 Farmers Through Farmer-Led Institutions and Resilient Livelihoods

On Kisan Diwas, Vedanta Limited (NSE: VEDL) reaffirmed its commitment to strengthening India's rural economy by enabling farmers to move beyond subsistence and become leaders of resilient, enterprise-driven livelihoods. Through a long-term, farmer-led development strategy focused on institution-building, climate-smart agriculture, and livelihood diversification, Vedanta is supporting rural communities to generate stable incomes and build economic resilience.

In FY 2024–25, Vedanta's integrated rural development initiatives impacted nearly 50,000 farmers across its operational regions, generating nearly ₹14 crore in rural income through dairy and allied activities. By investing in farmer-owned institutions, local enterprises, skills, and natural resource management, the company is helping farmers transition from fragmented farming practices to collective, market-linked, and future-ready rural enterprises.

At the core of Vedanta's approach is the creation and strengthening of farmer-owned institutions. Across its businesses - including Hindustan Zinc Ltd., Vedanta Aluminium, Cairn Oil & Gas, Iron Ore Business, ESL Steel Ltd. and FACOR, the company has facilitated the formation of seven Farmer Producer Organisations (FPOs). These institutions enable farmers to collectively manage dairy operations, cattle feed and mineral mixture units, biomass facilities, and value-added agriculture enterprises. As a result, participating farmers have recorded an average income growth of 10% and up to 25% higher crop yields, while gaining leadership, ownership, and decision-making power over their livelihoods.

Complementing institution-building is Vedanta's focus on diversified and climate-resilient livelihoods. Farmers are supported to expand into dairy, horticulture, oilseeds, and allied activities, backed by improved irrigation, better agronomic practices, and assured market linkages. In Rajasthan, Hindustan Zinc Limited has supported farmers across nearly 200 villages, where FPO-led interventions have generated nearly ₹80 lakh in income over the past three years, marking a 40% growth since inception. In Odisha and Chhattisgarh, initiatives such as Project Jeevika Samriddhi at Vedanta Aluminium, Jharsuguda, and Mor Jal Mor Maati at BALCO have strengthened farm incomes through improved irrigation, agronomy, and technology-enabled practices like the System of Rice Intensification (SRI), a method of rice cultivation that increases yields while using fewer resources, increasing household incomes by up to 50% in select locations.

Technology and natural resource management form the third pillar of Vedanta's rural strategy. Smart agriculture interventions including Automated Weather and Water

Stations provide farmers with real-time weather forecasts, soil health insights, and pest alerts, while watershed development and solar-powered irrigation systems enable multi-cropping in water-stressed regions. In western Rajasthan, initiatives such as Maru Sagar Dairy and Barmer Unnati have strengthened milk procurement systems, developed orchards and pasturelands, promoted organic farming, and collectively conserved over 45 crore litres of water, reinforcing long-term agricultural sustainability.

Recognising that resilient rural livelihoods extend beyond crops, Vedanta also invests in skills development and livestock care as parallel income pathways. In Odisha and Jharkhand, the Iron Ore Business supports farmers through training in mushroom cultivation, composting, beekeeping, and scientific farming techniques, while FACOR's Project Sathi Pashukalyan focuses on animal health through vaccination drives and community awareness, strengthening dairy- and livestock-based incomes.

Women and youth remain central to Vedanta's rural development model. Across Rajasthan, Odisha, Chhattisgarh, and Jharkhand, women are emerging as leaders managing FPOs and Self-Help Groups, running agricultural and dairy enterprises, and improving household nutrition through kitchen gardens. Youth-focused programmes equip the next generation with modern agricultural, enterprise, and technology skills, ensuring the long-term sustainability of farmer-led institutions.

Reflecting the household-level impact of these interventions, Pochu Devi, a beneficiary of the Maru Sagar initiative, shared, "Through the training I received, I started my kitchen garden and now it's flourishing with organic chillies, guar, lady fingers, lemons, curry leaves, and more. This garden not only provides my family with fresh, pesticide-free vegetables but also earns me an income of ₹20,000 to ₹30,000."

As India marks Kisan Diwas, Vedanta's initiatives underscore the potential of farmer-led, enterprise-driven development to reshape rural economies at scale. By combining local leadership, innovation, and long-term investment in rural systems, the company is contributing to a model of inclusive growth that strengthens livelihoods, builds resilient communities, and supports India's broader economic and social transformation.

Ambuja Cements Revives Traditional Ponds to Strengthen Water Security in Rajasthan

Ambuja Cements, the 9th largest building materials solutions provider globally and part of the diversified Adani Portfolio, is strengthening rural water security in Rabriyawas region of Rajasthan through large-scale revival of traditional village ponds under its CSR initiatives. Launched in 2006–07, the programme focuses on restoring neglected and silted water bodies through a people-centric model that combines technical expertise with strong community participation, enabling sustainable water management and long-term climate resilience in water-stressed rural areas.

One of the key interventions under this programme is the revival of Gawai Pond in Balada village, where Ambuja Cements provided advanced machinery and technical expertise, while the community contributed manpower and transport support. The initial desilting created 20,000 cubic metres of additional storage, and for over two decades the pond was revived 17 times, expanding its cumulative capacity to 2,15,000 cubic metres, turning it into a vital source for drinking water, livestock and irrigation.

The enhanced water storage in Gawai Pond Balada has enabled cultivation of over 185 hectares, ensured consistent groundwater recharge even during peak summers, and improved soil fertility through nutrient-rich silt, resulting in better crop yields, increased kharif and rabi cropping, and reduced dependence on erratic rainfall.

To date, Ambuja Cements has revived 200+ ponds across 33 villages around Rabriyawas, creating 23,16,935 cubic metres of rainwater harvesting capacity and benefiting nearly 70,000 people and over 50,000 livestock annually. The initiative has also supported ecosystem restoration, biodiversity regeneration and reduced soil erosion, reinforcing the company's commitment to sustainable water stewardship in Rajasthan.

IIT Guwahati Develops Sunlight-Driven Catalyst to Convert Carbon Dioxide into Methanol Fuel

In a significant step towards clean fuel and environmental protection, researchers at Indian Institute of Technology Guwahati have developed a photocatalytic material that can convert carbon dioxide (CO_2) into methanol fuel using sunlight. This effort addresses one of the most essential challenges, how to meet rising energy needs without further harming the environment.

Led by Prof. Mahuya De, Professor, Department of Chemical Engineering, IIT Guwahati, along with her research scholar Mr. Nayan Moni Baishya, the findings of the study have been published in the prestigious Journal of Materials Science.

Mr. Nayan Moni Baishya, Research Scholar, IIT Guwahat

The dependence on petroleum-based fuels continues to be a source of carbon dioxide emissions, causing environmental stress and global warming. To address this, researchers are working on designing photocatalytic methods to convert carbon dioxide into clean fuels.

Researchers worldwide have been working on addressing this critical challenge by utilising graphitic carbon nitride, a low-cost, metal-free, non-toxic material. However, due to limitations such as rapid energy loss and low fuel generation, no prominent solution has been developed so far.

To overcome this challenge, the IIT Guwahati research team combined graphitic carbon nitride with few-layer graphene. Known for its electrical conductivity and energy transfer capabilities, this ultra-thin carbon material helped minimise energy loss within the catalyst.

Speaking about the research, Prof De, said, “The present work is expected to contribute towards mitigating environmental problems with simultaneous contribution towards green energy. Converting Carbon dioxide to greener fuel using solar energy is a promising technology towards this direction.”

The study demonstrated that the incorporation of few-layer graphene improved the photocatalytic energy retention of carbon nitride under visible light/sunlight exposure. It kept the catalyst active for a longer duration resulting in better light absorption and improved charge generation. Among the composites tested, the catalyst with 15 weight percentage (wt%) graphene demonstrated the most efficient conversion of Carbon Dioxide to Methanol. It also displayed strong stability, an important quality for its practical applications.

Prof. Mahuya De, Dept of Chemical Engineering, IIT Guwuahati

The technology developed by IIT Guwahati team holds the potential to be used in industries such as thermal power plants, cement manufacturing units, steel production facilities, and petrochemical refineries, supporting the transition towards a circular carbon economy and a cleaner energy future.

As the next step, the research team aims to scale the technology for practical use. The team also plans to develop a long-lasting photocatalytic system that can convert industrial CO_2 emissions into clean fuels.

The Habitats Trust Invites Applications for its 9th Edition of Grants

The Habitats Trust, a not-for-profit organisation focused on addressing some of the most pressing developmental challenges arising from biodiversity loss, the climate crisis, and global water scarcity, has announced the 9th edition of The Habitats Trust Grants, inviting applications from conservation practitioners and non-profit organisations across India. Applications opened on January 10, 2026 and close on February 10, 2026.

India is home to nearly 7-8 percent of the world's biodiversity, yet many of its species and ecosystems remain underfunded and poorly documented, particularly outside formally protected areas. The THT Grants are designed to address this gap by supporting holistic, innovative, and replicable projects dedicated to the conservation of India's endangered wildlife and natural habitats, with a particular focus on lesser-known species and underrepresented ecosystems.

The grants, totalling ₹3.5 crore, will support projects that demonstrate strong ecological outcomes alongside community engagement and long-term sustainability. Application forms will be available at www.thehabitatstrust.org

Since its inception in 2018, the THT Grants programme has supported over 38 projects across 21 States and Union Territories, disbursing more than ₹16.2 crore to date. Funded projects encompass species recovery, habitat restoration, applied research, and community-led conservation, contributing to tangible on-ground outcomes while strengthening local conservation capacities.

Rushikesh Chavan, Director, The Habitats Trust said, "India's conservation challenges are complex and deeply interconnected with climate pressures and local governance. Through the THT Grants, we aim to back organisations that are not only addressing urgent conservation needs but are also building models that can be sustained and replicated. We are particularly keen to support work on lesser-known species and habitats that often fall through the cracks of traditional funding."

Evaluation Process

The panel of 12 experts, including scientists and subject-matter specialists, will conduct a thorough screening of applications. Criteria such as relevance, expected conservation impact, stakeholder engagement, scalability, replicability, and sustainability will guide the selection process, ensuring that funded projects demonstrate both depth and long-term value.

IMPORTANT DATES TO NOTE

Application submission dates:
10th January to
10th February, 2026

Grant Recipient Announcement:
First Week of August 2026

Prospective grant recipients and non-profit organizations working towards conserving India's biodiversity are invited to apply under the following categories:

- **THT Conservation Grants (₹1,00,00,000):** Supports organisations addressing India's conservation challenges, with a focus on lesser-known species and critical habitats. The grants are intended to promote holistically designed conservation efforts. It will be administered over three years and will be awarded to two shortlisted applicants.
- **THT Research Grants (₹40,00,000):** Supports organisations engaged in interdisciplinary research on ecological, social, and technological aspects of conservation. The emphasis is on research that directly informs on-ground conservation action in India. It will be administered over two years and will be awarded to two shortlisted applicants.
- **THT Action Grants and Action Service Projects (₹25,00,000):** Supports organisations and individuals engaged in urgent on-ground conservation action, particularly for lesser-known species and/or habitats. These grants are administered for two years and awarded to three shortlisted applicants.

Last Year, THT received 119 applications, of which 36 were shortlisted and field-evaluated. From these, 12 projects were presented to the Jury following a rigorous four-stage evaluation process that assessed relevance, scalability, sustainability, and measurable impact.

In 2025, eight grantees collectively received ₹3.8 crore

- Grameen Sahara (Assam) and Hume Centre for Ecology and Wildlife Biology (Kerala) received the THT Conservation Grant, 2025.
- The Coastal Conservation Foundation (Mumbai) and the Wildlife Institute of India (Trans-Himalayas) received the THT Research Grant, 2025.
- ATREE (Kanchenjunga), Bryan Miranda (Goa & Chennai coasts), Noel Giri (Darjeeling) and Sunil Harsana (Delhi NCR) received the THT Action Grants, 2025.

The 2026 edition of THT Grants reaffirms The Habitats Trust's commitment to addressing India's most pressing and underfunded conservation priorities. By combining immediate on-ground action with research-driven insight, THT aims to create scalable, sustainable solutions that protect biodiversity while empowering local communities and conservation practitioners.

CSR INDIA UNITED

Adani Foundation Drives Early TB Detection with Portable X-ray Tech for Communities near ACC Gagal, Ametha, Tikaria Plants

ACC, part of the diversified Adani Portfolio and the fastest-growing building materials and solutions company, is supporting India's TB Mukt Bharat Abhiyan through technology-enabled healthcare interventions. In partnership with the Adani Foundation, ACC has strengthened TB detection efforts in the hard-to-reach regions of Ametha, Tikaria and Gagal.

Limited access to diagnostic facilities in these locations had often delayed TB detection and treatment. To address this gap, ACC deployed handheld portable TB X-ray machines, enabling rapid, on-site screening within communities and eliminating travel-related barriers.

The portable system provides an immediate X-ray and generates reports on-site within minutes, saving significant time for the Government Health Department and reducing repeated follow-ups. It also improves patient convenience, avoiding the loss of a full working day previously required for hospital visits, thereby ensuring timely diagnosis and better compliance during TB screening campaigns.

The intervention has delivered strong outcomes. TB screening increased by 140% in Ametha, 382% in Tikaria and 359% in Gagal. Presumptive TB identification rose by over 260–285% across all three locations, leading to faster confirmation and timely treatment linkage. TB Preventive Therapy (TPT) coverage also improved significantly, with some locations recording an increase of up to 200%.

This initiative is part of ACC and Adani Foundation's contribution to the Government of India's Nikshay Mitra programme. In addition to early diagnosis and prevention, TB patients across several cement locations are being supported with six months of ration kits, ensuring nutritional support during treatment and recovery.

Casio India partners with SHEOWS to launch 'Every Second Counts' initiative to support homeless elderly

Casio India Co. Pvt. Ltd., a subsidiary of Casio Computer Co., Japan, has launched its CSR initiative "Every Second Counts" to support abandoned, destitute, and homeless elders in India. The initiative is in partnership with SHEOWS (Saint Hardyal Educational & Orphans Welfare Society), a "home away from home" for the country's abandoned elderly. Through this initiative, Casio India will fund medical care and staff salaries for doctors, nurses, and caregivers across SHEOWS centres.

To mark the launch, Casio India hosted an awareness-led activation at its Connaught Place (CP) Store in Delhi. The experience highlighted how visitors at the Casio store can contribute towards elderly care through a QR-based donation system.

Commenting on Casio's commitment, Mr. Takuto Kimura, Managing Director, Casio India, and Mr. Akira Watanabe, Director, Casio India, said: "Creativity and Contribution lie at the heart of Casio. Through Every Second Counts initiative, we are translating this belief into meaningful action by supporting elderly individuals who have been left without care. Every second invested in society has the power to create a real difference, and through our partnership with SHEOWS, we aim to stand alongside abandoned and elderly citizens with compassion and consistent care, helping restore dignity, access to healthcare, comfort, and essential medical attention to those who need it most."

Commenting on the partnership, Saurabh Bhagat, CEO, SHEOWS, said, "Elderly abandonment in India worsens every winter, leaving countless seniors without warmth, food, or timely medical care—often turning survival into a daily struggle. Our collaboration with Casio marks India's first focused corporate–NGO partnership dedicated to the long-term care and rehabilitation of abandoned elders. Through Every Second Counts, we aim to build a sustainable ecosystem that restores dignity, delivers quality healthcare, and ensures that no elderly individual is left behind."

At the CP Store activation, guests met SHEOWS representatives, heard stories of lives being cared for, and were encouraged to contribute through the initiative's QR-enabled donation platform. Together, Casio India and SHEOWS aim to provide dignified living conditions and essential healthcare to more than 400 elderly residents, aged 60 and above, across SHEOWS Old Age Homes in Delhi and Garhmukteshwar.

For over three decades, SHEOWS has offered free shelter, food, clothing, medical care, and compassionate support to elderly citizens suffering physical and mental health challenges. With the help of mindful and generous community members, SHEOWS has built comprehensive care facilities that include a Special Care Unit, 24/7 medical staff, physiotherapy unit, in-house pathology lab, digital X-ray monitoring, physician-prescribed medication, and rehabilitation therapies, ensuring every resident's health, dignity, and comfort.

Mankind Pharma Inaugurates Digital Smart Classrooms, Advancing Community-First Education Under KindCare

Mankind Pharma Limited has inaugurated Digital Smart Classrooms across government schools in Uttar Pradesh as part of its CSR platform, KindCare, marking a continued expansion of the company's social investment beyond healthcare delivery. The initiative has enabled 460 digital classrooms across 400 government schools, supporting technology-led learning in under-served communities.

While healthcare remains central to Mankind Pharma's CSR strategy, the Digital Smart Classroom Initiative reflects a broader focus on strengthening education as a key

determinant of long-term public health outcomes and human capital development. A core component of the programme is teacher empowerment, with over 2,400 teachers trained to effectively integrate digital tools into classroom teaching. The initiative was inaugurated in Ghaziabad by Shri Sunil Kumar Sharma, Hon'ble Cabinet Minister for Information Technology and Electronics, Government of Uttar Pradesh, and is being implemented in partnership with SEEDS Impact.

Speaking at the inauguration, Sunil Kumar Sharma, Cabinet Minister for Information Technology and Electronics, Government of Uttar Pradesh, said, "Mankind Pharma deserves recognition for its commitment to strengthening education in underserved communities through the Digital Smart Classroom Initiative. By enabling technology-led learning in government schools, the initiative addresses critical gaps in access and quality at a time when digital literacy is essential for future opportunity. Its community-first approach, with a strong focus on empowering teachers and strengthening local school ecosystems, ensures that the benefits are sustainable and reach those who need them most."

Sheetal Arora, Promoter & CEO, Mankind Pharma Limited, said, "Education has the power to shape not just individual futures but the destiny of communities. Through KindCare, our CSR platform, we have consciously taken a community-first approach, focusing on areas where access to quality education remains a challenge. The Digital Smart Classroom Initiative is rooted in empathy and responsibility, recognising that true progress begins when students and teachers are given the right tools, confidence, and support to succeed. This initiative is not about technology alone; it is about dignity, opportunity, and ensuring that children in remote and underserved regions are not left behind in an increasingly digital world."

FAI Annual Seminar 2025 Concludes with a Shared Commitment to Green Agricultural Pathways and Farmer-Centric Innovation

The Fertiliser Association of India (FAI) concluded its 61st Annual Seminar 2025 in New Delhi after three days of focused discussions centered around driving Atma Nirbharta in fertilisers, policy reforms, nutrient stewardship, green production technologies and digital marketing innovations. The seminar brought together senior government officials, international experts, industry leaders, global suppliers, scientists and farmer representatives to shape a collective roadmap for the country's nutrient future.

S. Sankarasubramanian, Chairman, FAI, and MD & CEO, Coromandel International Ltd., said, "Our journey towards a greener future begins with smarter, responsible fertiliser use. The fertiliser industry is working to strengthen domestic capacity, promote balanced and precise nutrient application, and ensure farmers have timely access to advanced technologies. FAI will continue to serve as a strong and unified voice of the industry, championing key policy reforms while working hand in hand with the farming community to advance sustainable agriculture. We also remain focused on the development and responsible marketing of novel solutions including nano fertilisers, ensuring their benefits are clearly and effectively communicated to the farming community."

The Chief Guest, Dr. Himanshu Pathak, Director General, ICRISAT, Hyderabad, commended the seminar for fostering meaningful dialogue on sustainable nutrient management and advancing innovations that directly benefit farmers.

The event featured four thematic sessions- Session-I- Policies for Green Fertiliser, chaired by Ms. Aneeta C. Meshram, Additional Secretary, Department of Fertilizers; Session II: Nutrient Management to Empower Farmers, chaired by Mr. Devesh Chaturvedi, Secretary, Department of Agriculture & Farmers Welfare; Session III: Green Solutions for Fertiliser Production, chaired by Mr. K.J. Patel, MD, IFFCO; and Session IV: Futuristic Fertiliser Marketing, chaired by Dr. Siba Prasad Mohanty, Co-chairman, FAI.

Dr. Suresh Kumar Chaudhari, Director General, FAI delivered the welcome remarks. He highlighted how the proceedings of the seminar were structured across four technical sessions and referred to the concerns raised by the Shri Rajat Kumar Mishra, Secretary, Department of Fertilizers, Ministry of Chemicals and Fertilizers, Government of India, during the inaugural session. He also mentioned the points made by the Mr. Devesh Chaturvedi, Secretary, Ministry of Agriculture & Farmers Welfare in the second session, which focused on agriculture.

Dr. Siba Prasad Mohanty, MD, HURL, concluded the seminar by presenting the vote of thanks. He expressed gratitude to the speakers, participants, and organizers, acknowledging their contributions and the collaborative discussions that will advance sustainable, farmer-focused solutions in the fertiliser sector. These sessions brought together leading experts who highlighted the evolving global and domestic policy landscape, sustainability imperatives, and India's shifting fertiliser ecosystem. Speakers underscored the changing global policy environment for green fertilisers, emphasized the need for reforms in the urea sector and reinforced the strategic importance of boosting indigenous P&K production to strengthen the nation's self-sufficiency goals.

HCLFoundation celebrates India's rich handicraft heritage, facilitates dialogues to strengthen sector

My E-Haat Conclave 2025 brings together artisans and industry stakeholders for an afternoon of discussions, product showcases and cultural performances

HCLFoundation, which drives the corporate social responsibility agenda of HCLTech in India, hosted the My E-Haat Conclave at Noida Haat, in Noida, to celebrate India's rich handicraft heritage and explore ways to strengthen the sector through technology, innovation and enhanced market access.

HCLFoundation's My E-Haat initiative has assisted over 5,500 artisans to date across multiple craft traditions in India, supporting the government of India's "vocal for local" vision. It operates in over 40 clusters across 10+ states, enabling artisans to become entrepreneurs. Artisans from over 110 clusters can sell their products directly to customers through the My E-Haat portal, thereby eliminating the role of middlemen and resulting in a 20–30% increase in income for the artisans.

The My E-Haat Conclave 2025, now in its third edition, brought together artisans, industry stakeholders and representatives from the government, civil society and academia for an afternoon of dialogue, product showcases and cultural performances.

TRIFED Managing Director Shri M. Raja Murugan delivered the keynote address on "Culture, Commerce & Community: Vision for Artisan Empowerment & Social Impact", while Dr. Sunil Shukla, Director General, Entrepreneurship Development Institute of India, delivered a speech on "Entrepreneurship as a Catalyst for Craft Revival-Building Sustainable Livelihoods through Innovation & Market Linkages". HCLFoundation collaborates with the Tamil Nadu Department of Prisons and Correctional Services to provide meaningful employment opportunities to prison inmates by enabling them to produce and sell various products.

"Through the My E-Haat initiative, HCLFoundation is aiming to strengthen the value chain of the Indian handicraft sector. My E-Haat empowers artisans to thrive in today's competitive global markets by guiding them from product inception to market connectivity, enhancing their craftsmanship, product showcase and digital literacy," said Dr. Nidhi Pundhir, SVP, Global CSR, HCLTech and Director, HCLFoundation. The theme for this year's conclave was "Woven Stories: The Looms of Legacy" and two panel discussions were featured around this theme. The topic of the first one was "Interwoven Dialogues on Culture, Craft & Commerce: Turning Heritage into Economic Power" while the second focused on "Unlocking Entrepreneurship & Market Access for Artisans through Technology".

India's handicraft sector provides livelihood to over 7 million people and over 56% of the artisans are women. In FY25, India exported handicrafts worth Rs 15,000 crore, according to Statista.

Silvin Additives launches Divadandi, a student development initiative

Silvin Additives, a leading manufacturer of advanced additives for PVC and CPVC pipes, has launched Divadandi, a long-term CSR initiative.

Named after the Gujarati word for lighthouse, Divadandi reflects the idea of guidance and direction during crucial stages of life. Through this initiative, Silvin aims to support students in building stronger academic habits, developing essential life skills, and gaining confidence as they prepare for board examinations and other age-specific challenges.

The programme, which began earlier this month at Sheth H H Shirolawala High School, Bodeli, District Chhota Udaipur, will reach nearly 1,800 students from Standards 9 to 12.

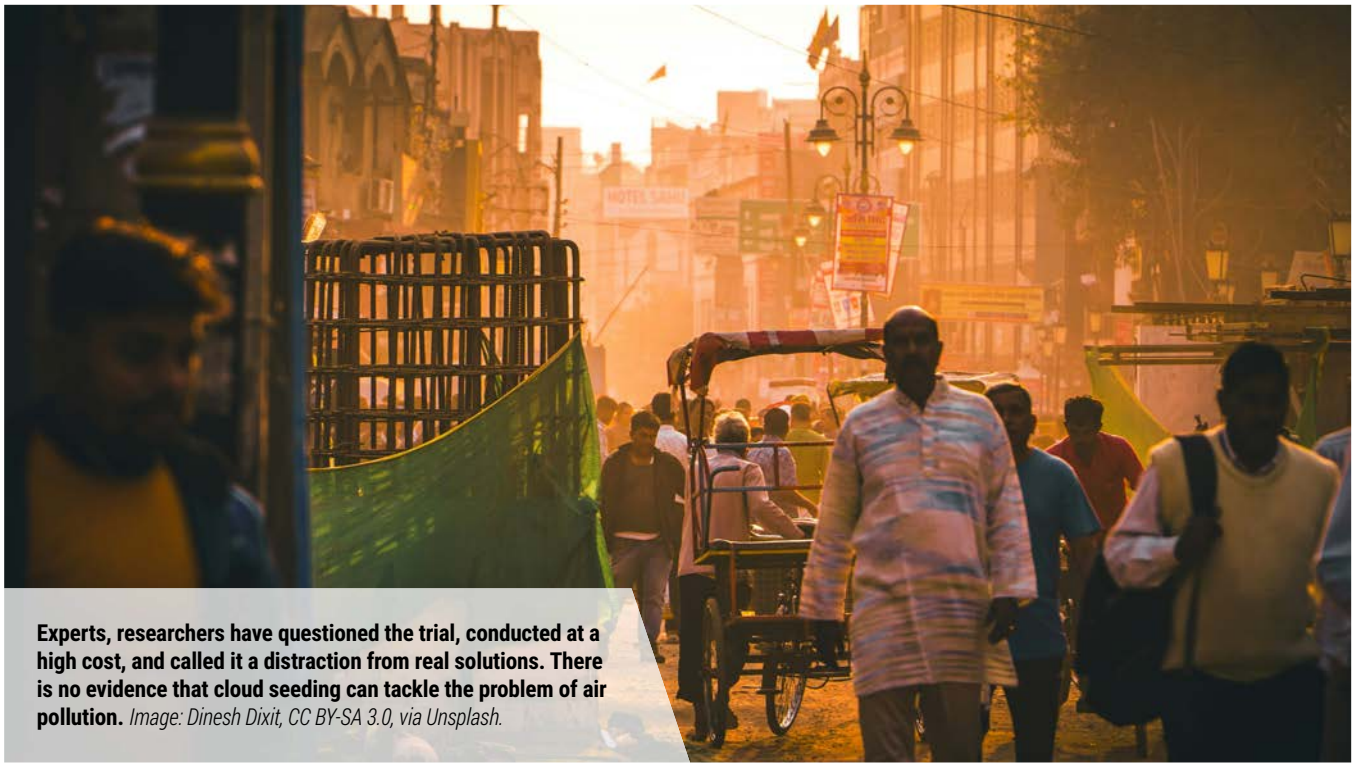
Each student will undergo nine hours of structured training delivered across three sessions. The sessions are conducted by Kamal Dabawala and his team, who specialise in student engagement and skill development.

Commenting on the initiative, Pradip Chokshi, CSR Head, Silvin Additives Pvt. Ltd., said, “Divadandi reflects our long-standing engagement with communities and our belief that timely guidance can make a real difference in a student’s life. Through this initiative, we want to offer practical support that helps students approach their studies and everyday challenges with greater clarity and confidence.”

The programme is delivered through three structured sessions. The first session focuses on personality development and behavioural skills, covering confidence building, communication, emotional awareness, and teamwork.

The second session centres on academic planning. Students in Standards 9 and 11 receive guidance on effective study planning, exam strategies, and digital discipline. Students in Standards 10 and 12 are supported with board exam preparation, subject-wise planning, stress management, and early career orientation. The final session addresses age-specific challenges. Younger students are guided on early adolescence, self-image, responsible social media use, and balancing academics with personal life. Older students receive practical inputs on managing stress and performance pressure, dealing with future uncertainty, navigating expectations from family and school, and avoiding negative influences. The programme also builds awareness around health, safety, and digital well-being.

The Divadandi initiative builds on Silvin’s earlier education-focused initiatives and reflects its long-term commitment to supporting student learning and development.



Experts, researchers have questioned the trial, conducted at a high cost, and called it a distraction from real solutions. There is no evidence that cloud seeding can tackle the problem of air pollution. *Image: Dinesh Dixit, CC BY-SA 3.0, via Unsplash.*

NO EVIDENCE THAT CLOUD SEEDING CAN CUT AIR POLLUTION: EXPERTS

The Delhi government, in collaboration with the Indian Institute of Technology, Kanpur, recently conducted cloud seeding experiments with the claim of reducing air pollution, writes **Aisiri Amin**, Mongabay.com

In October, as a dense smog enveloped India's capital city, New Delhi, and the air quality reached hazardous levels, the Delhi government, in collaboration with the Indian Institute of Technology, Kanpur (IIT-K), turned to cloud seeding, a disputed weather-modification technique to induce artificial rain.

Using IIT-K's aircraft, flares containing seeding agents were released into the atmosphere. But the experiment didn't lead to precipitation because of a lack of moisture in the air. Cloud seeding doesn't create clouds but works on existing clouds and moisture.

Manindra Agrawal, Director of IIT-K, told Mongabay-India that the team knew the chances of precipitation were low because the moisture content was below 15 per cent, significantly less than the much-needed 50 per cent. However, they went ahead with the experiment as a way to collect data on cloud seeding's impact on air pollution levels.

"We aimed to study the relationship between moisture content, the amount of seeding material used, and its impact on local conditions. Even if no rain occurred, we wanted to know whether humidity levels increased and, if so, whether that helped reduce pollution and to what

extent," he explained. In a statement, IIT-K said that there was a reduction of 6-10 per cent in particulate matter. The claim and the experiment itself has been disputed by other experts.

Over the years, cloud seeding has been constantly proposed as a way to curb Delhi's pollution. Although this cloud seeding experiment in Delhi was conducted after about 52 years, previous governments have also discussed it as an option to mitigate pollution. Last year, the previous Environment Minister, Gopal Rao, sought the Centre's permission for cloud seeding.

In September, after signing the memorandum of understanding (MoU) with the Indian Institute of Technology (IIT) Kanpur, Chief Minister Rekha Gupta even called the cloud seeding trial "a historic milestone for the city". But experts have questioned whether the ₹3.21 crore project can be seen as a possible solution to the air pollution crisis.

Researchers such as Shahzad Gani and Krishna Achuta Rao, professors at the Centre for Atmospheric Sciences, Indian Institute of Technology Delhi (IIT-Delhi), have called it "another gimmick in a series of similar unscientific ideas, like smog towers."

Multiple scientists have also emphasised that there is not enough scientific evidence of cloud seeding having any impact on pollution and any improvement in air quality is minor and temporary.

Complexity of Delhi's pollution

Delhi's pollution stems from an array of reasons, including geographical factors, human-driven emissions, and temperature-linked restraints, which add to its complexity.

Climate scientist Roxy Mathew Koll at the Indian Institute of Tropical Meteorology (IITM) explains how the city's geography makes the problem harder.

"It sits in a low-lying basin bordered by the Himalayas and Aravallis, where winter winds are weak and pollution gets trapped under temperature inversions. But these natural constraints make control of local pollution even more urgent, not optional," he says. Simply put, temperature inversion is a phenomenon where warmer air traps cooler air near the Earth's surface.

Further, slower winds during the winter months do not allow pollution to spread out or move away from the city. Instead, it stays suspended over Delhi.

Agrawal also points out the well-known sources, such as "stubble burning, biomass burning within the NCR area, increased coal use during the cold season, vehicular emissions, and construction activities," contributing to Delhi's pollution.

No evidence that cloud seeding is a solution for pollution

Cloud seeding, first attempted almost eight decades ago, is intended to modify suitable clouds with particles to increase rainfall. These seed particles are cloud condensation nuclei (CCN) on which water vapour condenses and the blend of seeding agents differs based on the temperature of the cloud base.

In the recent experiment in Delhi, a mixture of silver iodide, common salt, and rock salt was used. While cloud seeding has been widely researched, there is no conclusive data and a lack of studies on whether it can be beneficial in addressing air pollution. Agrawal, who led the recent experiment in Delhi, calls it an "SOS measure."

Whether artificial rain induced by cloud seeding can help during a severe air pollution crisis is not well studied, says cloud seeding expert Thara Prabhakaran, scientist at the Indian Institute of Tropical Meteorology (IITM). "There is no documented scientific evidence yet that cloud seeding can reduce pollution," she notes.

Koll emphasises that while cloud seeding is a serious scientific experiment, it is not a solution for air pollution. "It works only when clouds with enough moisture are already present, and even then, its effect is small and short-lived. At best, it may bring a brief drizzle that washes out some dust and particles for a few hours," he explains.

Sachin Ghude, an IITM scientist whose expertise lies in atmospheric chemistry, urban air quality modelling, and urban fog process, also says that the artificial rain is "sometimes very light, and there is only a momentary improvement in air quality because of the pollution."

He further points out that to bring down the air quality level from 'very poor' to 'moderate,' the city would need rain almost every alternate day. "But since cloud cover is only about 20 per cent throughout the winter period, it's practically impossible to actually go for cloud seeding. Moreover, when air quality is severe, cloud cover is largely absent, and only certain types of clouds can be seeded," he adds.

Risks involved in cloud seeding

While much has been talked about cloud seeding as an option for reducing air pollution in Delhi, there hasn't been ample discussion about the risks involved. To trigger rain and initiate condensation, compounds such as silver iodide are used. While these are not so harmful in small quantities, larger amounts and prolonged exposure can harm the environment. "It can be toxic to aquatic systems in large quantities," says Prabhakaran.

She further points out that since the atmosphere in polluted areas such as New Delhi is already loaded with polluted aerosols and gases, dispersing additional particles at high altitudes could have unknown

impacts. "There should be abundant research on the interactions between cloud seeding elements, such as silver iodide, and the aerosols present in the atmosphere," she adds.

There is also uncertainty involved in this process. Artificial rain could coincide with natural rain, causing excessive precipitation, which could result in flooding.

But Agrawal says this uncertainty is "one of the reasons we need more data to understand how we can better deal with consequences such as natural rain and artificial rain coinciding."

However, the lack of clarity is not just regarding the amount of rain but also the region. Prabhakaran says there have been cases where downwind areas, far from the seeding site, have experienced increased rainfall. "This shows that weather modification in one location can affect another, adding to the complexity of evaluating such interventions," she says.

Distraction from real solutions

Experts also worry that focusing funds on experiments such as cloud seeding takes attention away from actual solutions. The hype about cloud seeding's effectiveness could lead to misinformation.

Koll emphasises that cloud seeding cannot offset long-term climate change patterns. "When such experiments are portrayed as climate solutions, they feed a dangerous illusion that technology alone can undo the damage of unchecked emissions. The danger of misinformation is that it delays real climate action while giving the impression that science provides a quick escape pathway," he explains.

He adds that treating cloud seeding as a fix for pollution or water stress risks shifts attention from the real, lasting solutions.

Ghude brings up the smog tower, the first in India, which was installed in Connaught Place, Delhi, in 2021 to combat air pollution. It was built at a cost of over ₹22.9 crore; the tower currently lies defunct. "It didn't even clean the air within the area where it was installed. So, the focus should be on practical solutions and controlling the source," he says.

What should the focus be?

On November 9, hundreds of people held a public demonstration in New Delhi calling for the government to address the city's worsening pollution. Holding placards such as "Breathing is killing us," the capital's residents demanded action, with some protesters asking the government to declare this a public health emergency. During this time, the AQI was between 300 and 400.

Three days later, on November 12, Delhi recorded an AQI of 414, with seven air quality monitoring stations out of 39 reporting AQI levels ranging between very poor and poor.

Furthermore, the World Health Organisation's (WHO) Ambient Air Quality Database (updated in January 2024) reported an annual average fine particulate matter mass concentration of 121 µg/m³ in New Delhi. This is about 24 times higher than the healthy level of 5 µg/m3 recommended by the WHO air quality guideline.

Severe air quality conditions can lead to a long list of acute and chronic health conditions, V. Faye McNeill, Professor of Climate at Columbia University, tells Mongabay-India.

"PM2.5, the smaller fraction of particulate matter, can penetrate to the deepest part of the lungs, be taken up into the bloodstream, and transported to other parts of the body. Therefore, it is connected with negative impacts not just related to the lungs but almost every body system, including the brain and reproductive systems," she explains. In this light, the focus should be on the primary cause of air pollution: emissions.

"The genesis of air pollution lies in emission sources. Human-driven emissions are the primary cause of air pollution. Therefore, what has been observed across various parts of the world is that meaningful progress in reducing air pollution depends on prioritising the control of emission sources," says Chandra Venkataraman, professor of Chemical Engineering and Climate Studies, Indian Institute of Technology Bombay and part of the steering committee of CAPHER-India.

Ghude says the expansion of the city needs to stop. "New construction and development will only increase the pollution problem," he says.

The area of solutions also needs to go beyond cities. Venkataraman says an important intervention is ensuring access to clean household cooking and heating energy, which means transitioning away from biomass fuels commonly used in chulhas. "For example, in China between 2005 and 2015, 90 per cent of the reduction in human exposure to ambient and household pollution came from reducing reliance on household solid and biomass fuels," she elaborates.

She adds that there is a long way to go in implementing and prioritising effective air pollution control measures. "Pollution levels do not always depend solely on local emissions; emissions from neighbouring regions can also influence them through secondary formation processes. Given the inherent complexity of air pollution, there is a need to develop multi-scale, multi-sector approaches to emission control."

(Source: https://www.eco-business.com/news/no-evidence-that-cloud-seeding-can-cut-air-pollution-experts/)

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WHAT CAUSES RECORD-HIGH GLOBAL TEMPERATURES?

The past three years have been exceptionally warm globally, writes **Zeke Hausfather**

A mix of El Niño, cleaner shipping fuels, volcanic effects and a strong solar cycle has driven the recent surge in global temperatures, alongside natural climate variability and human-caused warming. *Image: CIFOR-ICRAF, CC BY-SA 3.0, via Flickr.*

In 2023, global temperatures reached a new high, after they significantly exceeded expectations. This record was surpassed in 2024 – the first year where average global temperatures were 1.5°C above pre-industrial levels.

Now, 2025 is on track to be the second- or third-warmest year on record. What has caused this apparent acceleration in warming has been subject to a lot of attention in both the media and the scientific community. Dozens of papers have been published investigating the different factors that could have contributed to these record temperatures.

In 2024, the World Meteorological Organization (WMO) discussed potential drivers for the warmth in a special section of its "state of the global climate" report, while the American Geophysical Union ran a session on the topic at its annual meeting.

In this article, Carbon Brief explores four different factors that have been proposed for the exceptional warmth seen in recent years. These are:

- A strong El Niño event that developed in the latter part of 2023.
- Rapid declines in sulphur dioxide emissions – particularly from international shipping and China.
- An unusual volcanic eruption in Tonga in 2022.
- A stronger-than-expected solar cycle.

Carbon Brief's analysis finds that a combination of these factors explains most of the unusual warmth observed in 2024 and half of the difference between observed and expected warming in 2023.

However, natural fluctuations in the Earth's climate may have also played a role in the exceptional temperatures, alongside signs of declining cloud cover that may have implications for the sensitivity of the climate to human-caused emissions.

An unusually warm three years

Between 1970 and 2014, average surface temperatures rose at a fairly steady rate of around 0.18°C per decade. Set against this long-term trend, temperature increases during the period from 2015 to 2022 were on the upper end of what would be expected. The increases seen in 2023, 2024 and 2025 were well outside of that range.

The high temperatures of the past three years reflect a broader acceleration in the rate of warming over the past decade. However, the past three years were unusually warm, even when compared to other years in the 2010s and 2020s.

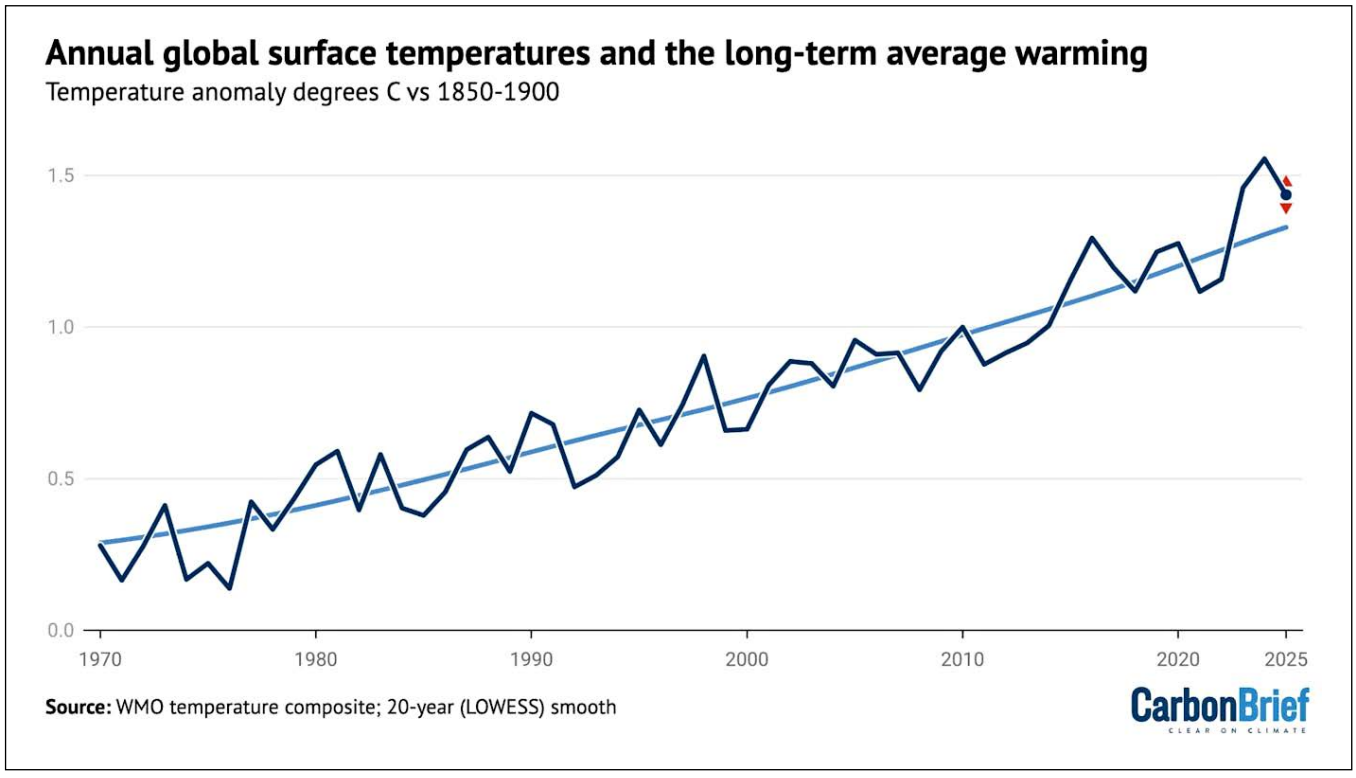
Record-breaking warmth in 2023 meant that it beat the prior warmest year of 2016 by 0.17°C – the largest magnitude of a new record in the past 140 years.

The year 2024 then swiftly broke 2023's record, becoming the first year where average global temperatures exceeded 1.5°C above pre-industrial levels.

The 10 months of data available for 2025 indicates that the year is likely to be slightly cooler than 2023 – though it is possible it may tie or be slightly warmer.

The figure below shows global surface temperatures between 1970 and 2025. (The figures for 2025 include uncertainty based on the remaining three months of the year.)

It includes a smoothed average based on temperature data for 1970-2022 that takes into account some acceleration of warming – and then extrapolates that smoothed average forward to 2023-25 to determine



Global average surface temperature changes between 1970 and 2024 using the WMO average of six groups that report global surface temperature records (dark blue), estimated 2025 temperatures and uncertainties (red) based on the first nine months of the year and a long-term average locally linear smooth (light blue).

what the expected temperature for those years would have been. (This follows the approach used in the WMO's "state of the global climate 2024" report.)

This approach calculates how much warmer the past three years were than would be expected given the long-term trend in temperatures.

It shows that 2023 was around 0.18°C warmer than expected, 2024 was a massive 0.25°C warmer and 2025 is likely to be 0.11°C warmer.

Researchers have identified a number of potential drivers of unexpected warmth over 2023-25. Here, Carbon Brief looks at the evidence for each one.

A weirdly behaving El Niño event

El Niño is a climate pattern of unusually warm sea surface temperatures (SSTs) in the tropical Pacific that naturally occurs every two to seven years. Strong El Niño years generally have warmer global temperatures, with the largest effect generally occurring in the months after El Niño conditions peak (when SSTs reach their highest levels in the tropical Pacific).

A relatively strong El Niño event developed in the latter half of 2023, peaking around November before fading in the spring of 2024.

This event was the fourth-strongest El Niño ever recorded, as measured according to SSTs in the Niño 3.4 region in the central tropical Pacific. However, it was notably weaker than the El Niño events in both 1998 and 2016.

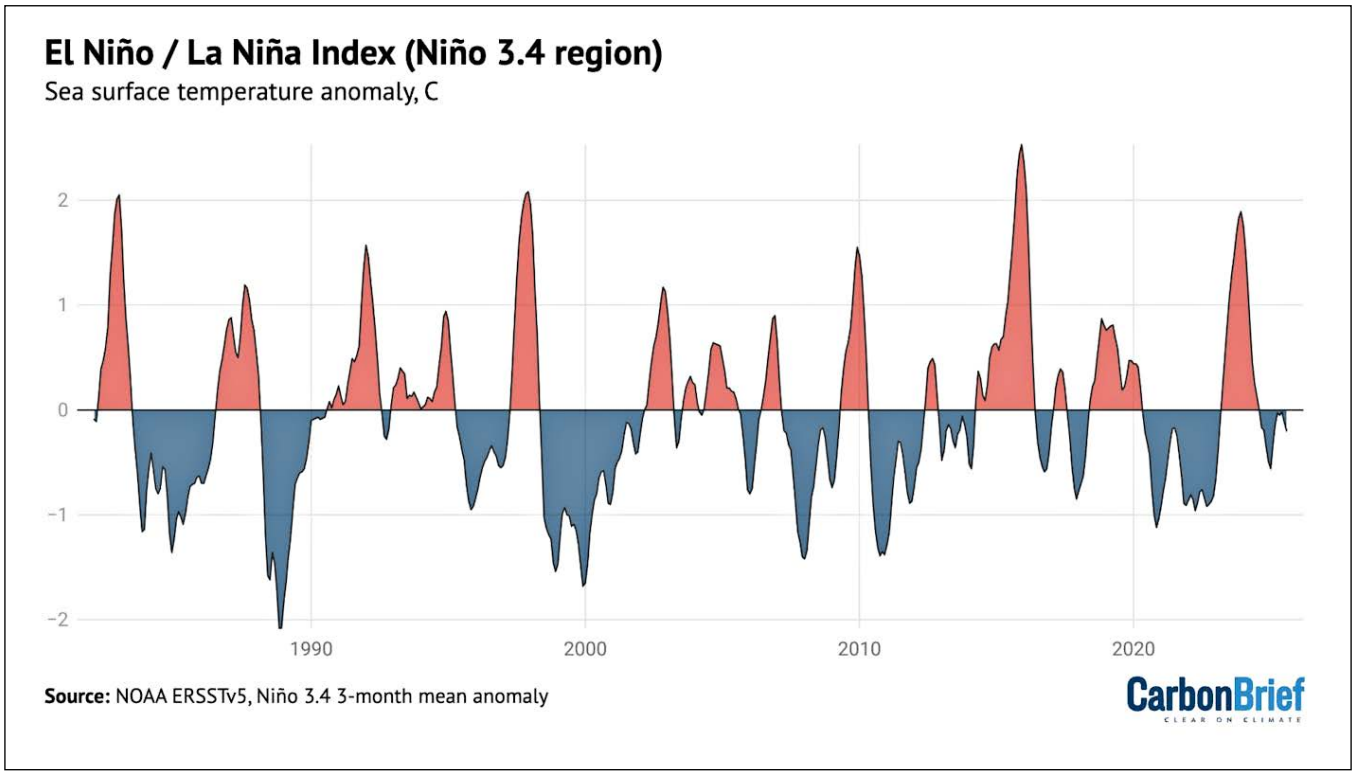
This can be seen in the chart below, which shows the strength of El Niño events (red shading) since the 1980s. (The blue shading indicates La Niña events – the opposite part of the cycle to El Niño, which results in cooler SSTs in the tropical Pacific.)

(It is worth noting that measuring the strength of El Niño events is not entirely straightforward. Other tools used by scientists to monitor changes to El Niño – such as the US National Oceanic and Atmospheric Administration's (NOAA's) multivariate ENSO index – show the 2023-24 event was much weaker than indicated in the Niño 3.4 dataset.)

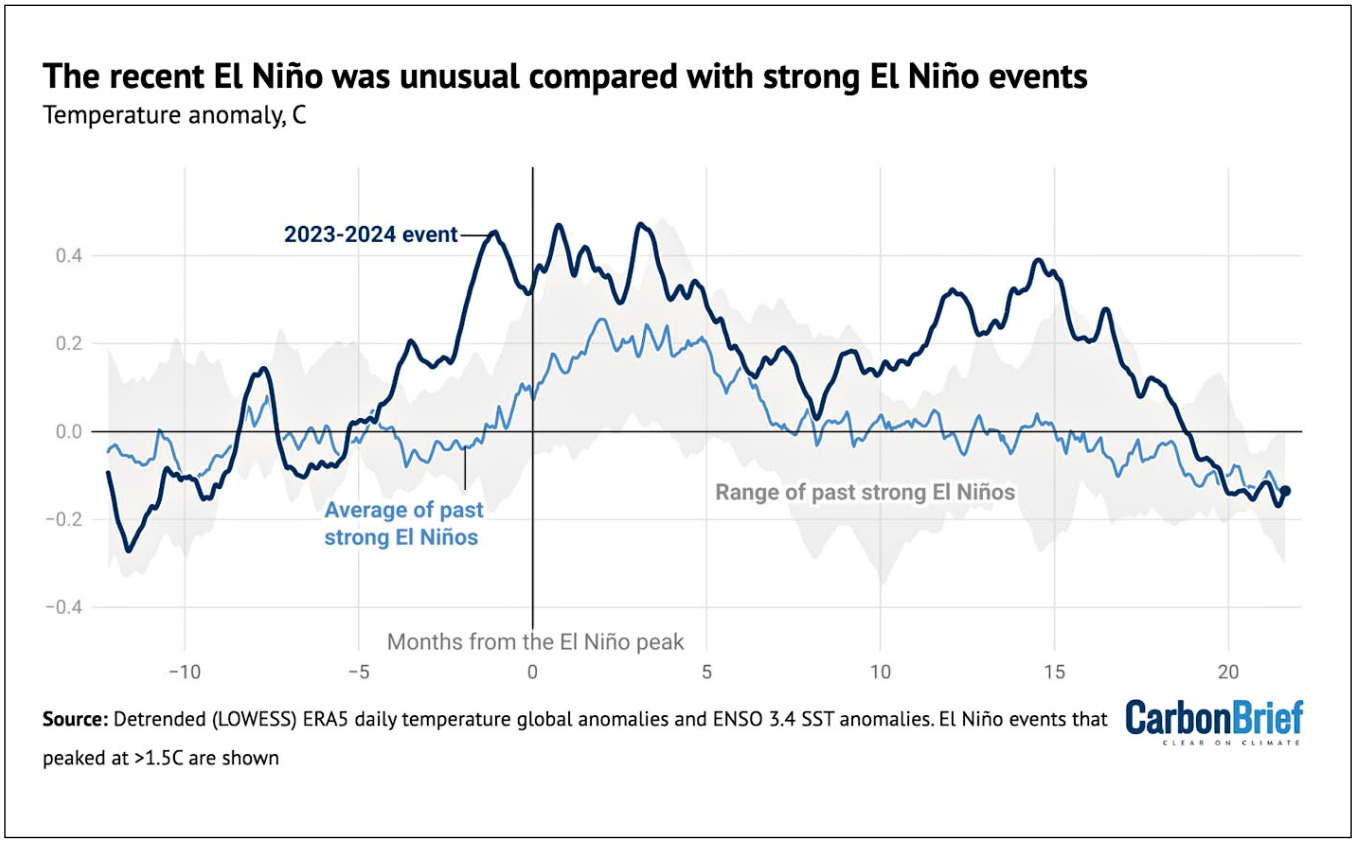
Global surface air temperatures tend to be elevated by around 0.1-0.2°C in the six months after the peak of a strong El Niño event – defined here as when SSTs in the Niño 3.4 region reach 1.5°C above normal.

The figure below shows the range of global temperature change for the 12 months before and 22 months after the peak of all 10 strong El Niño events since 1950. The light line represents the average of past strong El Niño events, the dark blue line the temperature change observed during the 2023-24 event and the shaded blue area the 5-95th percentile range.

The figure shows the 2023-24 El Niño was quite unusual compared



NOAA's Niño 3.4 region Oceanic Niño Index using detrended data from ERSSTv5.



Global mean surface temperatures for the 12 months prior to peak El Niño conditions and the 22 months following for strong El Niño events. Calculations by Carbon Brief using data from Copernicus/ECMWF's ERA5and NOAA's Oceanic Niño Index.

to other strong El Niño events since 1970. Global temperatures rose to around 0.4°C above expected levels – which is on the high side of previous El Niños.

The heat also came early, with high temperatures showing up around four months before the El Niño event peaked. This early heat is unlike any other El Niño event in modern history and is one of the reasons why 2023's global temperatures were so unexpectedly warm.

Global temperatures remained elevated for a full 18 months after the El Niño peaked, well after conditions in the tropical Pacific shifted into neutral conditions – and even after mild La Niña conditions developed at the end of 2024 and into early 2025.

This figure does not explain how much of this unusual heat was actually caused by El Niño, compared to other factors, but it does suggest that El Niño behaviour alone does not fully explain unusually high temperatures in recent years.

Based on the historical relationship between El Niño and global temperatures, Carbon Brief estimates that El Niño contributed a modest 0.013°C to 2023 temperatures and a more substantial 0.128°C to 2024 temperatures, albeit with large uncertainties.

However, it is possible that this 2023 estimate is too low. There are some suggestions in the literature that 2023-24 El Niño's early warmth may have been caused by the rapid transition out of a particularly extended La Niña event. There are indications that temperatures have spiked in similar situations further back in the historical temperature record.

Falling sulphur dioxide emissions

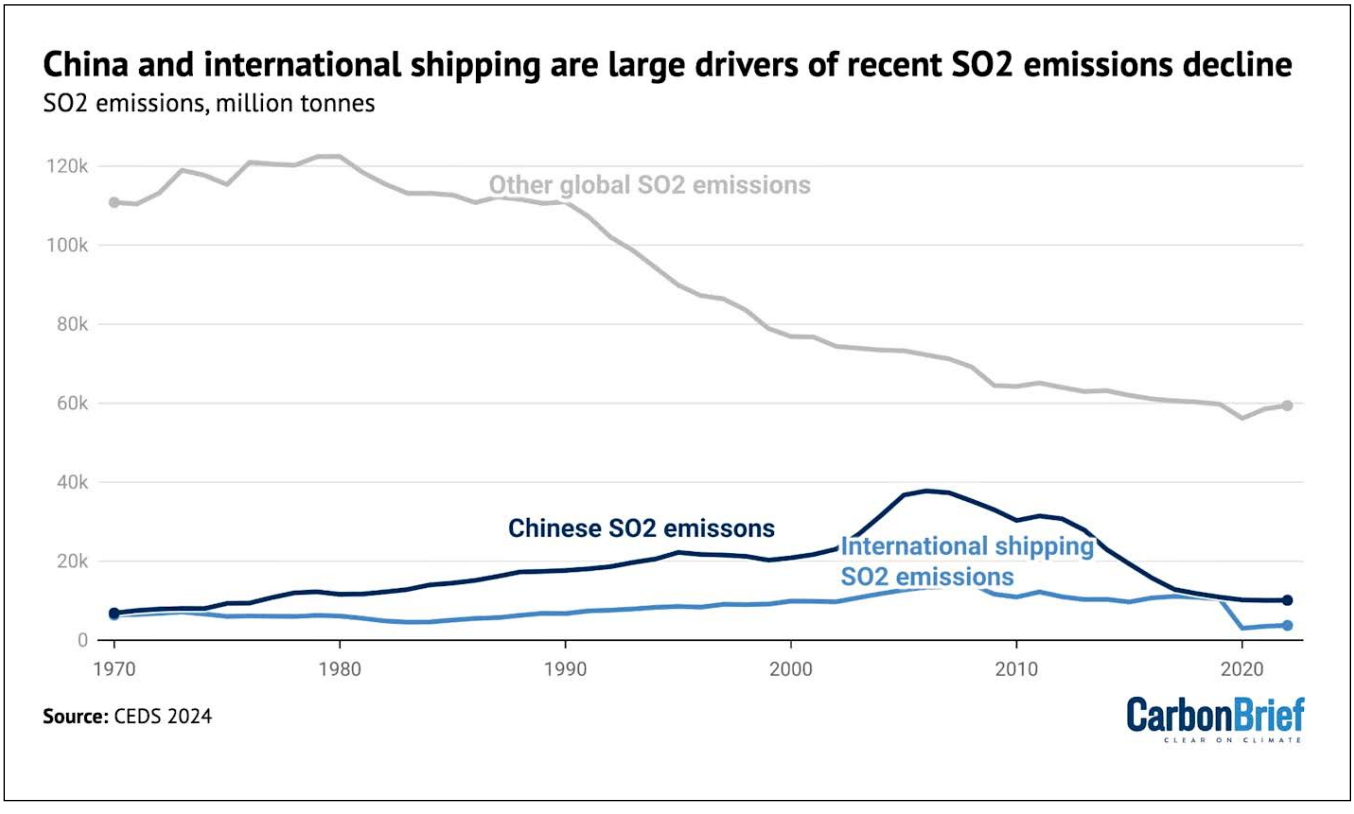
Sulphur dioxide (SO2) is an aerosol that is emitted into the lower atmosphere by the burning of coal and oil. It has a powerful climate cooling effect – Carbon Brief analysis shows that global emissions of SO2 have masked about one-third of historical warming.

Global SO2 emissions have declined around 40 per cent over the past 18 years, as countries have increasingly prioritised reducing air pollution, including through the installation of scrubbers at coal plants.

These declines have been particularly concentrated in China, which has seen a 70 per cent decline in SO2 emissions since 2007. In addition, a rule introduced for international shipping in 2020 by the International Maritime Organization (IMO) has resulted in an 80 per cent decline in the sulphur content of shipping fuel used around the world.

The decline of SO2 emissions is shown in the figure below.

Shipping in particular has been suggested as a potential culprit for recent temperatures, given that ships emit SO2 over oceans where the air tends to be cleaner and so emissions have a bigger effect.



Annual SO2 emissions from China, international shipping and the rest of the world. Data from the Community Earth atmospheric Data System (CEDS).

Seven of the eight studies that have explored the temperature impact of the IMO regulations have suggested a relatively modest effect, in the range of 0.03-0.08°C. However, one study – led by former NASA scientist Dr James Hansen – calculated a much stronger effect of 0.2°C that would explain virtually all the unusual warmth of recent years.

The figure below shows Carbon Brief's estimate of the global average surface temperature changes caused by the low-sulphur shipping fuel rules, using the estimates produced by all eight studies. The central estimate (dark blue line) is relatively low, at around 0.05°C, but the uncertainty range (light blue shading) across the studies remains large.

Overall, Carbon Brief's analysis finds that around 0.04°C of warming over 2020-23 and 0.05°C of warming over 2020-24 can be attributed to SO2 declines from shipping and other sources. However, this approach might slightly overstate the effects of SO2 on the exceptional temperatures of the past three years, as shipping and other SO2 declines would have had some effect on 2021 and 2022 as well.

It is also worth noting that the total effects of SO2 declines on global temperatures have been considerably larger and are estimated to be responsible for around one-quarter of all warming since 2007.

However, these SO2 decreases occurred over a long period of time and do not clearly explain the recent spike in temperatures.

An unusual volcanic eruption in Tonga

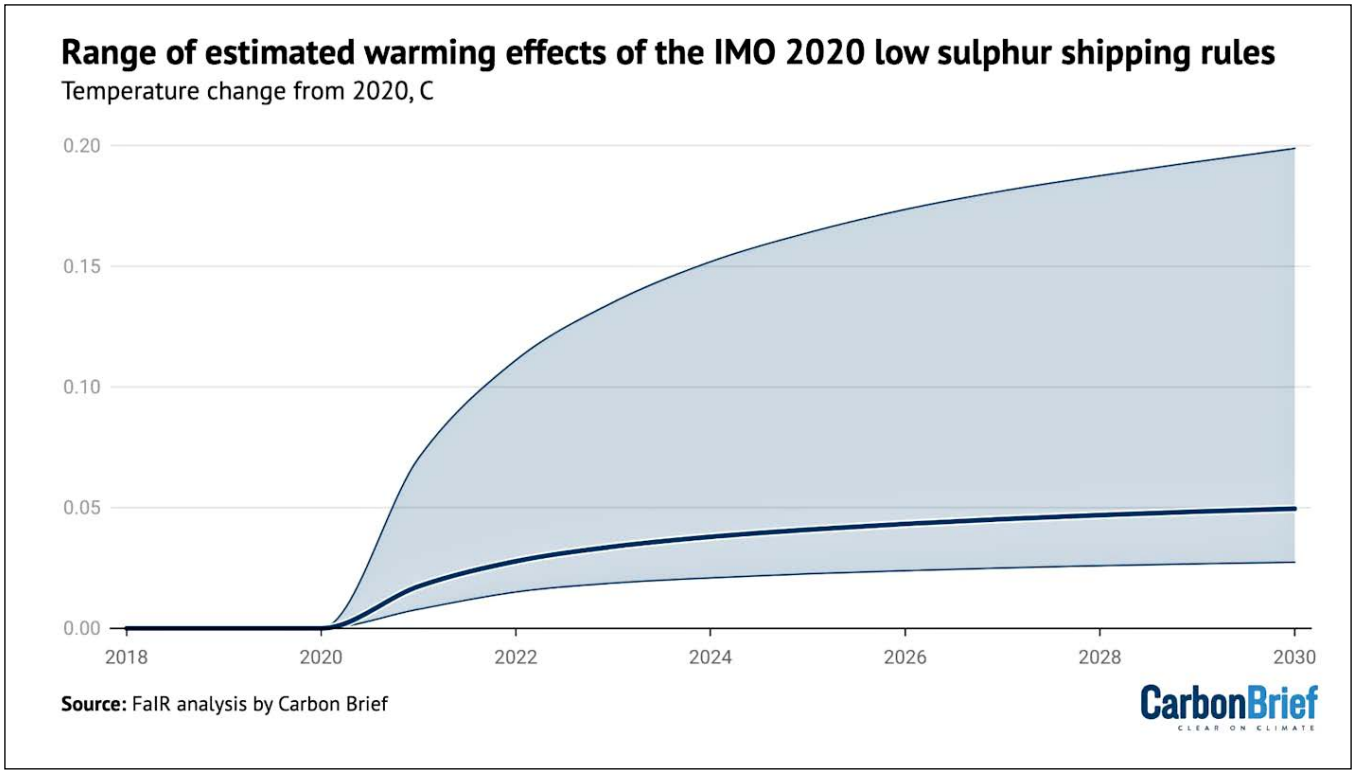
In early 2022, the Hunga Tonga-Hunga Ha'apai underwater volcano erupted spectacularly, sending a plume 55km into the atmosphere. This was by far the most explosive volcanic eruption since Mount Pinatubo erupted in 1991.

This was a highly unusual volcanic eruption, which vaporised vast amounts of sea water and lofted it high into the atmosphere. Overall, around 146m metric tonnes of water vapour ended up in the stratosphere, which is the layer of the atmosphere above the troposphere.

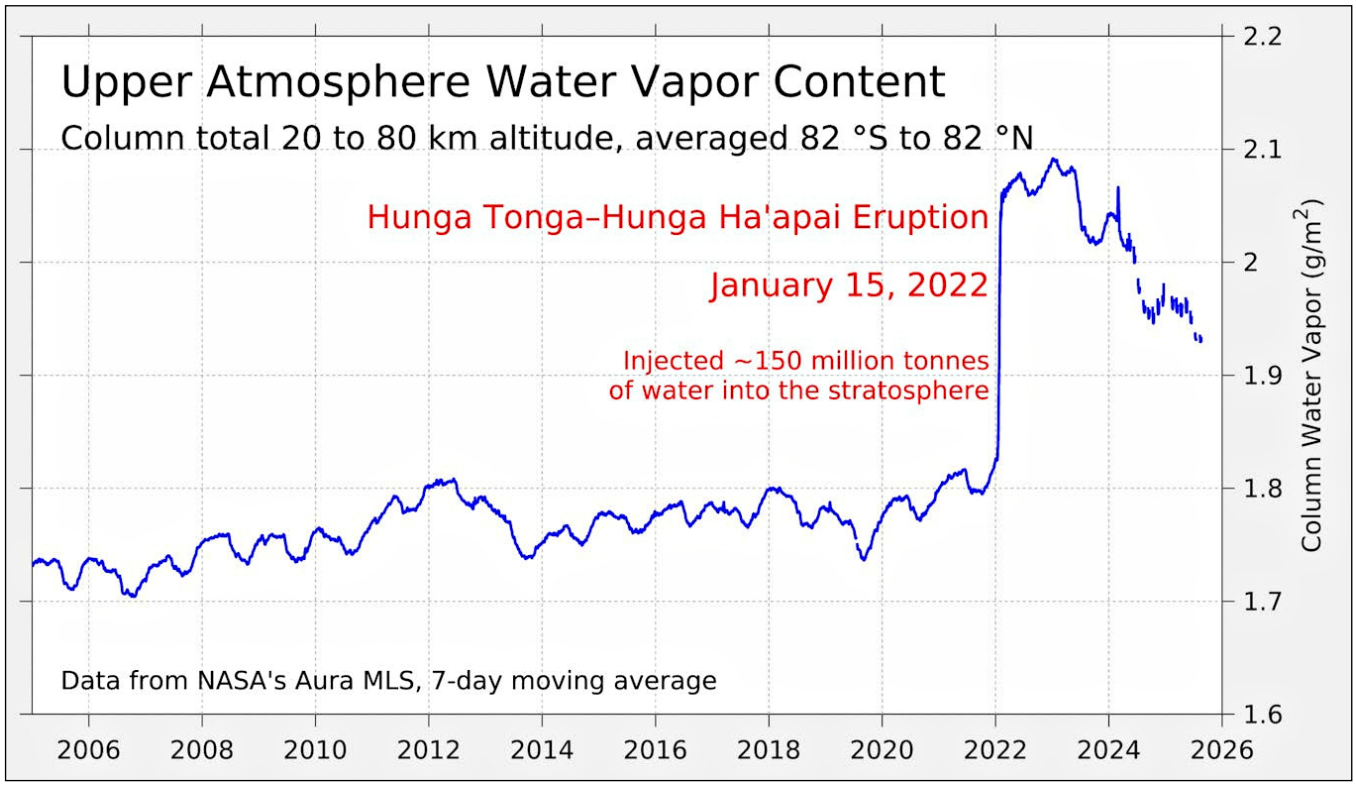
Water vapour is a powerful greenhouse gas. While it is short-lived in the lower atmosphere, it can stick around for years in the stratosphere, where it has a significant warming effect on the climate.

The figure below shows the concentration of water vapour in the stratosphere between 2005 and mid-2025. It shows how the 2022 eruption increased atmospheric concentrations of the greenhouse gas by around 15 per cent. More than half the added water vapour has subsequently fallen out of the upper atmosphere.

Most early studies of the Hunga Tonga-Hunga Ha'apai volcano focused specifically on the effects of stratospheric water vapour. These tended to show strong warming in the lower stratosphere and cooling



Range (5th to 95th percentile) and central estimate (50th percentile) of simulated global average surface temperature responses to the IMO 2020 regulations across the radiative forcing estimates in the literature. Analysis by Carbon Brief using the FaIR model.



Upper atmosphere water vapor content from NASA's Aura MLS satellite. *Figure from Dr Robert Rohde.*

in the middle-to-upper stratosphere, but only a slight warming effect on global surface temperatures of around 0.05°C.

Hunga Tonga-Hunga Ha'apai had much lower sulphur emissions than prior explosive eruptions, such as Pinatubo and El Chichon. However it put 0.5–1.5m tonnes of sulphur into the stratosphere – the biggest increase in "aerosol optical depth" (a measure of how much sunlight is blocked by aerosols) from an eruption since Pinatubo.

Studies that included both sulphur and water vapour effects tend to find that the net effect of the eruption on surface temperatures was slight global cooling, concentrated in the southern hemisphere.

By using the estimates published in a 2024 study published in Geophysical Research Letters, which used the FaIR climate emulator model, Carbon Brief estimates that the Hunga Tonga-Hunga Ha'apai eruption cooled global surface temperatures by -0.01°C in 2023 and -0.02°C in 2024. This suggests that the eruption was likely only a minor contributor to recent global surface temperatures.

A stronger-than-expected solar cycle

The source of almost all energy on Earth is the sun. Over hundreds of millions of years, variations in solar output have a big impact on the global climate.

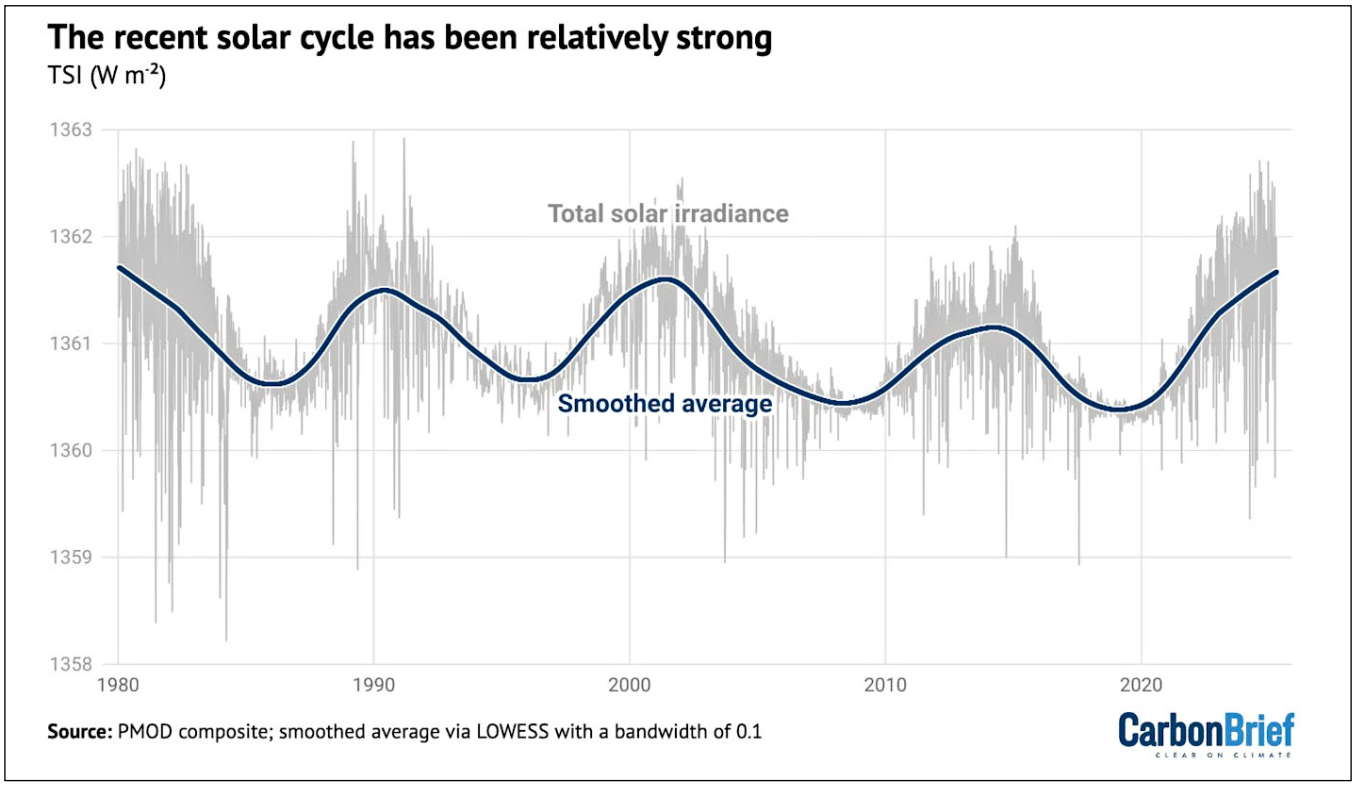
Thankfully, over shorter periods of time the sun is remarkably stable, helping keep the Earth's climate habitable for life. (Big changes – such as ice ages – have more to do with variations in the Earth's orbit than changes in solar output.)

However, slight changes in solar output do occur – and when they do, they can influence climate change over shorter periods of time. The most important of these is the roughly 11-year solar cycle, which is linked with the sun's magnetic field and results in changes in the number of sunspots and amount of solar energy reaching Earth.

The figure below shows a best-estimate of changes in total solar irradiance since 1980, based on satellite observations. Total solar irradiance is a measure of the overall amount of solar energy that reaches the top of the Earth's atmosphere and is measured in watts per metre squared.

The 11-year solar cycle is relatively modest compared to the sun's total output, varying only a few watts per metre squared between peak and trough – amounting to around 0.01 per cent of solar output. However, these changes can result in variations of up to 0.1°C in global temperatures within a decade.

The most recent solar cycle – solar cycle 25 – began around 2020 and has been the strongest solar cycle measured since 1980. It was stronger than most models had anticipated and likely contributed to around



Total solar irradiance from the PMOD composite (blue) along with a smoothed average (red) from 1980 to 2025.

0.04°C global warming in 2023 and 0.07°C in 2024.

Putting together the drivers

By combining earlier estimates of different factors contributing to 2023 and 2024 global surface temperatures, about half of 2023's unusual warmth and almost all of 2024's unusual warmth can be effectively explained.

This is illustrated in the figure below, which shows the five different factors discussed earlier – El Niño, shipping SO2, Chinese SO2, the Hunga Tonga-Hunga Ha'apai volcano and solar cycle changes – along with their respective uncertainties.

The sum of all the factors is shown in the "combined" bar, while the actual warming compared to expectations is shown in red.

The upper chart shows 2023, while the lower one shows 2024.

It is important to note that the first bar includes both El Niño and natural year-to-year variability; the height of the bar reflects the best estimate of El Niño's effects, while the uncertainty range encompasses year-to-year variability in global temperatures that may be – at least in part – unrelated to El Niño.

The role of natural climate variability

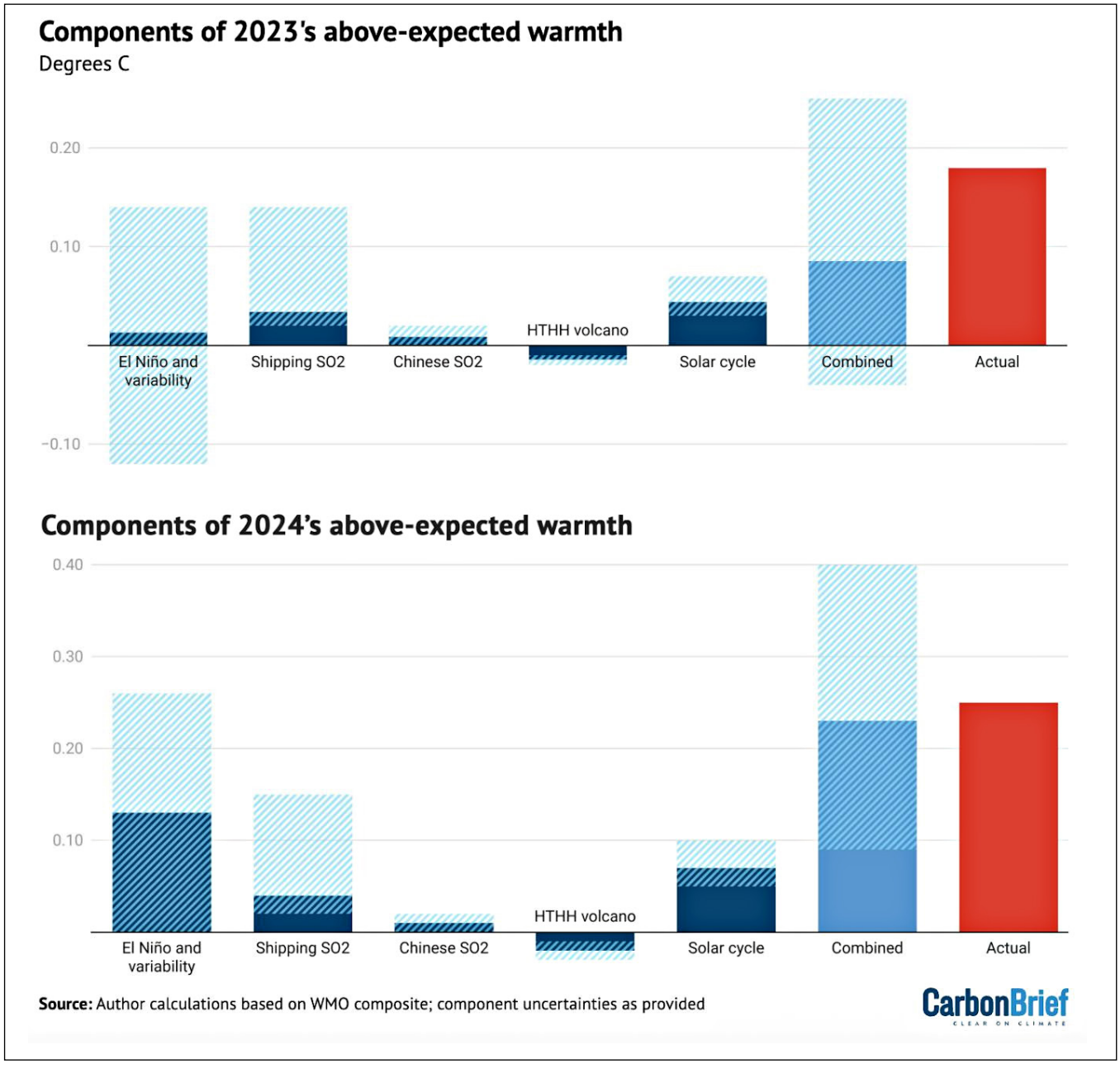
Large natural variability to the Earth's climate is one of the main reasons why the combined value of the different drivers of expected warmth in 2023 has an uncertainty range that exceeds the observed warming – even though the best-estimate of combined factors only explains half of temperatures.

Or, to put it another way, there is up 0.15°C difference in global temperatures year-on-year that cannot be explained solely by El Niño, human-driven global warming, or natural "forcings" – such as volcanoes or variations in solar output.

The figure below shows the difference between actual and expected warming in the global temperature record for every year in the form of a histogram. The vertical zero line represents the expectation given long-term global warming and the other vertical lines indicate the warming seen in 2023, 2024 and 2025. The height of each blue bar represents the number of years over 1850-2024 when the average global temperature was that far (above or below) the expected level of warming.

Based on the range of year-to-year variability, temperatures would be expected to spike as far above the long-term trend as they did in 2023 once every 25 years, on average. The year 2024 would be a one-in-88 year event, whereas 2025 would be a less-unusual, one-in-seven year event.

These likelihoods for the past three years are sensitive to the approach used to determine what the longer-term warming level should be. In this analysis, Carbon Brief used a



Attribution of 2023 and 2024 anomalous warmth. Light blue bars show individual factors and their uncertainties, the dark blue bar shows the combined effects and combination of uncertainties and the red bar shows the actual warming compared with expectations.
Adapted from Figure 12 in WMO's state of the global climate 2024 report.

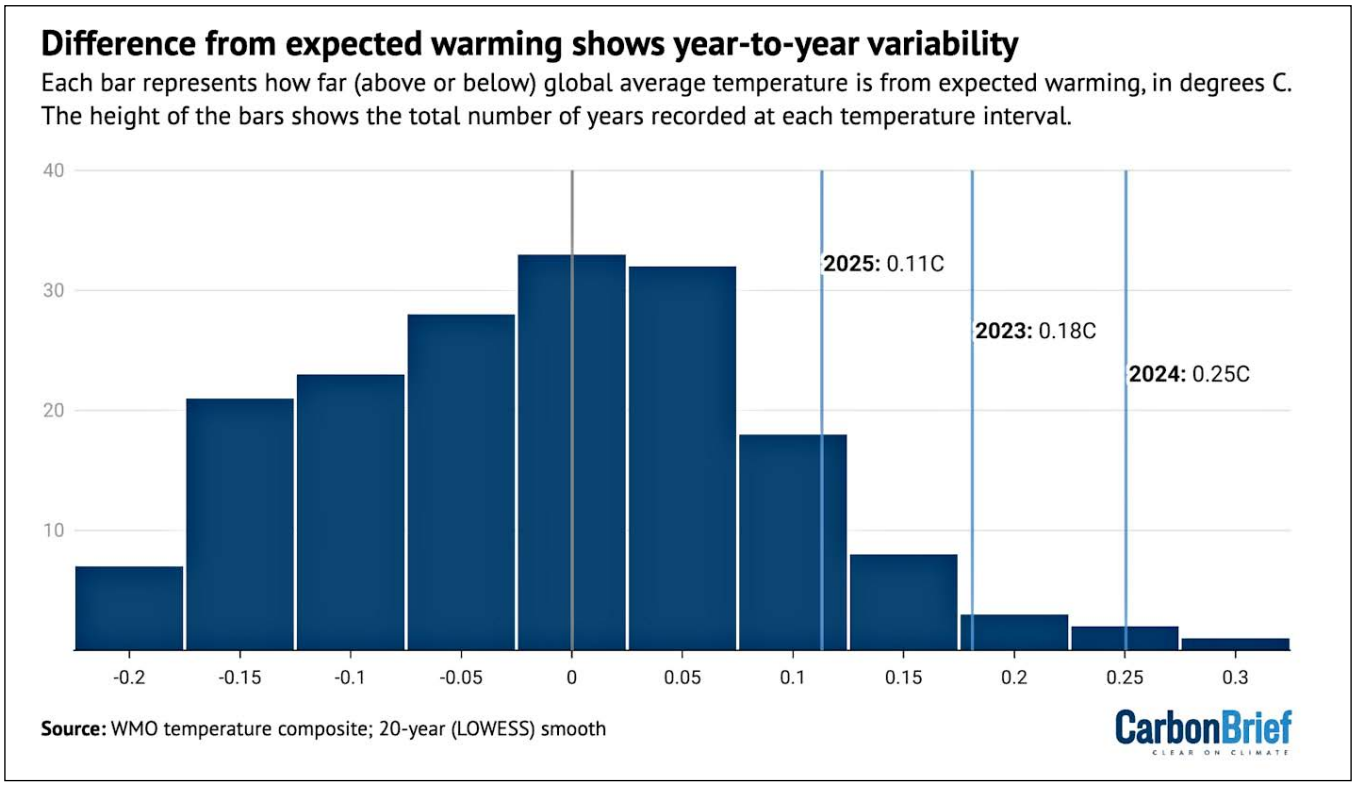
local smoothing approach (known as locally estimated scatterplot smoothing) to determine the expected temperatures, following the approach used in the WMO "state of the climate 2024" report.

This approach results in a warming of 1.28°C in 2023 and 1.30°C in 2024, against which observed temperatures are compared. Other published estimates put the longer-term warming in 2024 notably higher.

Last year, the scientists behind the "Indicators of Global Climate Change" (IGCC) report estimated that human activity caused 1.36°C of recent warming in 2024. They also found a slightly lower overall warming level for 2024 – 1.52°C, as opposed to the WMO's 1.55°C – because they looked exclusively at datasets used by IPCC AR6. (This meant estimates from the Copernicus/ECMWF's ERA5 dataset were not included.)

Based on climate simulations, the IGCC report finds the likelihood of 2024's warmth to be a one-in-six year event and 2023's a one-in-four event.

Using the same assumptions as the IGCC, Carbon Brief's approach



Histogram of residuals between actual and expected warming for all years since 1850, with the values for the past three years highlighted. Expected warming based on a 20-year locally linear smooth of the data.

calculates that 2024 would be a less-common, one-in-18 year event.

However, the IGCC estimate of current human-induced warming is based on the latest estimates of human and natural factors warming the climate. That means that it already accounts for additional warming from low-sulphur shipping fuel, East Asian aerosols and other factors discussed above.

Therefore, the results from these two analyses are not necessarily inconsistent: natural climate variability (including El Niño) played a key role – but this came in addition to other factors. Natural fluctuations in the Earth's climate alone would have been unlikely to result in the extreme global temperatures seen in 2023, 2024 and 2025.

A cloudy picture

Even if unusual recent global warmth can be mostly attributed to a combination of El Niño, falling SO2 emissions, the Hunga Tonga-Hunga Ha'apai volcano, solar cycle changes and natural climate variability, there are a number of questions that remain unanswered.

Most important is what the record warmth means for the climate going forward. Is it likely to revert to the long-term average warming level, or does it reflect an acceleration in the underlying rate of warming – and, if so, what might its causes be?

As explained by Carbon Brief in a 2023 article, climate models have suggested that warming will speed up. Some of this acceleration is built into the analysis presented here, which includes a slightly faster rate of warming in recent years than has characterised the period since 1970.

But there are broader questions about what – beyond declining SO2 and other aerosols – is driving this acceleration. Research recently published in the journal Science offered some potential clues. It found a significant decline in planetary reflectivity – known as albedo – over the past decade, associated with a reduced low-level cloud cover that is unprecedented in the satellite record.

The authors suggest it could be due to a combination of three different factors: natural climate variability, changing SO2 and other aerosol emissions and the effects of global warming on cloud reflectivity.

Natural climate variability seems unlikely to have played a major role in reduced cloud cover, given that it was relatively stable until 2015. However, it is hard to fully rule it out given the relatively short satellite record.

Reductions in SO2 emissions are expected to reduce cloud reflectivity, but the magnitude of the observed cloud reflectivity changes are much larger than models simulate.

Models might be underestimating the impact of aerosols on the

climate. But, if this were the case, it would indicate that climate sensitivity might be on the higher end of the range of model estimates, because models that simulate stronger aerosol cooling effects tend to have higher climate sensitivity.

Finally, cloud cover might be changing and becoming less reflective as a result of warming. Cloud responses to climate change are one of the largest drivers of uncertainty in future warming. One of the main reasons that some climate models find a higher climate sensitivity is due to their simulation of less-reflective clouds in a warming world.

The Science study concludes that the 2023 heat "may be here to stay" if the cloud-related albedo decline was not "solely" caused by natural variability. This would also suggest the Earth's climate sensitivity may be closer to the upper range of current estimates, it notes.

Methodology

Carbon Brief built on work previously published in the IGCC 2024 and WMO state of the global climate 2024 reports that explores the role of different factors in the extreme temperatures in 2023, 2024 and 2025.

The impact of El Niño Southern Oscillation (ENSO) on the temperatures was estimated using a linear regression of the annual mean global temperature anomaly on the Feb/Mar Niño 3.4 index. This resulted in an impact of −0.07°C, 0.01°C and 0.13°C for 2022, 2023 and 2024 respectively (with a 95 per cent confidence interval of ±0.13 °°C).

It is important to note that the uncertainties in the ENSO response estimated here also incorporate other sources of unforced internal (modes of variability in other basins such as AMV), and potentially some forced variability. The bar in the combined figure is labelled "El Niño and variability" to reflect this.

For details on calculations of the temperature impact of shipping and Chinese SO2 declines, see Carbon Brief's explainer on the climate impact of changing aerosol emissions.

Solar cycle 25 was both slightly earlier and slightly stronger than prior expectations with a total solar irradiance anomaly of 0.97 watts per metre squared in 2023 relative to the mean of the prior 20 years. This resulted in an estimated radiative forcing of approximately 0.17 watts per metre squared and an estimated global surface temperature increase of 0.07°C (0.05°C to 0.10°C) with a one- to two-year lag based on a 2015 study. Thus, the impact on 2023 and 2024 is around 0.04°C and 0.07°C, respectively (+/- 0.025°C). This is a bit higher warming than is given by the FaIR model, as the 2015 study is based on global models that have ozone responses to the UV changes, which amplifies the temperature effects a bit.

The Hunga Tonga-Hunga Ha'apai volcanic eruption added both SO2 and water vapour to the stratosphere (up to 55km in altitude). The rapid oxidation of SO2 to sulphate aerosol dominated the radiative forcing for the first two years after the eruption. As a result, the net radiative forcing at the tropopause was likely negative; −0.04 watts per metre squared and −0.15 watts per metre squared in 2022 and 2023, respectively, implying a temperature impact of -0.02°C (-0.01°C to -0.03°C) calculated using the FaIR model.

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(Source: https://www.eco-business.com/news/analysis-what-are-the-causes-of-recent-record-high-global-temperatures/)

Advertisements for brands in aviation, fast fashion, energy, personal care and confectionery were called out for greenwashing in 2025, while Australia led the way in regulating dubious sustainability claims. *Images: Mars, TotalEnergies, Shein, VietJet, Banana Boat, Equinor.*

20 BRANDS CALLED OUT FOR GREENWASHING IN 2025

This year, 'greenrinsing' – shifting climate targets after luring investment – cast a shadow over corporate decarbonisation efforts, while fossil fuel firms leaned on carbon capture technologies to justify ongoing expansion and promoted natural gas as "clean", writes **Robin Hicks**

In 2025, greenrinsing emerged as a new form of greenwashing in which companies set ambitious net zero targets to attract investors – only to water them down or quietly drop them later. Multinationals including Air New Zealand, Shell, BP, Unilever, Volvo and Coca-Cola weakened or delayed their sustainability targets.

This year also saw the fossil fuel sector lean on carbon capture use and storage (CCUS) technologies to justify ongoing expansion, and position natural gas as "clean" and "green". In Southeast Asia, the misuse of carbon credits was identified as the most common form of greenwashing, while the credibility of sustainability-linked loans in financing real environmental progress raised questions.

At the COP30 climate talks, oil and gas giants unleashed a torrent of online advertisements in Brazil, flooding the internet with climate-friendly messaging ahead of talks that were swamped with fossil fuels lobbyists – and ultimately ended without an agreement to phase out

dirty energy. But regulators in some jurisdictions raised their game to combat greenwashing in 2025. Australia led the Asia Pacific region with more than AU$40 million (US$26 million) in penalties from court cases brought by the country's finance regulator and competition commission.

In South Korea, which has seen a surge in greenwashing cases in recent years, the country's antitrust watchdog issued a flurry of enforcement actions as the country moved toward fining firms for false green claims.

Singapore released long-awaited guidelines to curb misleading sustainability advertising in October, while Japan did the same in February, though falling short of regulation.

European regulators wobbled over anti-greenwashing regulations as the regional bloc lurched to the political right, with the withdrawal of the European Union's Green Claims Directive proposal in June. But at the national level, European states such as Germany, Spain and France continued to turn the screw on vague and unsubstantiated sustainability claims.

While the Trump administration has made life easier for polluting corporations in the United States, the country's courts were still busy adjudicating greenwashing cases, although a case against Lululemon, the athleisure company, was dismissed by a Florida judge in February, who ruled that they did not adequately link claims of overhyped environmental statements to any kind of economic injury.

In this listicle, Eco-Business chronicles the times companies were flagged for making sustainability claims that did not stand up to scrutiny.

Driving false solutions

Toyota, the world's biggest carmaker, was called out by Greenpeace for promoting biofuel-powered prototype vehicles as a decarbonisation solution at COP30. The non-profit said that expanding biofuel production threatens tropical forests, food security, and climate goals, and noted that the Japanese carmaker – which is responsible for 1.5 per cent of global emissions – is already lagging on electrifying its fleet. Greenpeace pointed to studies that project that by 2030, biofuels could emit 70 million tonnes more carbon dioxide equivalent (CO2e) per year than fossil fuels.

Toyota, which is responsible for 1.5 per cent of global emissions, promotes biofuels as a climate solution. *Image: Toyota*

Widening the goal posts

In a curious case of setting the wrong goals, Singapore-based agribusiness giant Japfa was flagged by environmental groups for a US$150 million sustainability-linked loan that omitted targets on deforestation-risk commodities and human rights – despite long-standing scrutiny over these issues. Instead, the loan, arranged by DBS and Rabobank, focused on reducing freshwater use and phasing out the company's tiny coal consumption, raising questions about the relevance and ambition of the key performance indicators behind the loan.

Japfa was accused of greenwashing because it picked unambitious targets with easy KPIs to secure a sustainability-linked loan. *Image: Japfa*

Sheinful

Singapore-headquartered ultra-fast fashion brand Shein was slapped with a €1 million (US$1.2 million) fine by an Italian court in August for greenwashing. The Dublin-based operator of Shein's European website was called out for sustainability messaging that the court ruled was "vague", "feel-good", or "simply misleading". Claims made across its #SHEINTHEKNOW, evoluSHEIN and social responsibility pages reportedly overstated recyclability, suggested circular systems that don't really exist, and puffed up the eco-credentials of the "evoluSHEIN by design" line. Regulators also took issue with Shein's climate targets – to cut emissions 25 per cent by 2030 and reach net zero by 2050 – calling them generic and inconsistent with the brand's rising emissions in 2023 and 2024. The watchdog added that Shein should know better, given that ultra-fast fashion is one of the world's most polluting industries and demands extra care when making green claims.

Shein was hit with a US$1.2 million fine for misleading claims about the sustainability of its products. *Image: Shein*

Reef unfriendly

Personal care company Edgewell Group, maker of Banana Boat and Hawaiian Tropical Sunscreen brands, was sued in the United

Banana Boat claimed to be "reef friendly" because it did not contain some reef-harming chemicals – but it contained others. *Image: Banana Boat*

States in March and Australia in June for making claims such as "reef friendly", "reef safe" and "harmless to coral reefs" in consumer marketing. While the products are free of some chemicals that harm coral reefs, such as oxybenzone and octyl methoxycinnamate, they contain other chemicals that are toxic to corals, the Australian Competition and Consumer Commission and the Santa Clara County District Attorney claimed in their lawsuits. Despite being sued multiple times in different markets, the brands have not stopped using environmental claims in China, one of their key markets.

Pulped policy

Unveiled to great fanfare in Jakarta in September, Asia Pulp & Paper's (APP) US$30 million "Forest Positive Policy" was greeted with protest from Greenpeace – the non-profit that helped the paper giant craft its landmark no-deforestation policy more than a decade ago. The environmental group said that the new policy was a downgrade of APP's long-standing pledge, as the company had shifted its no-deforestation cut-off date from 2013 to the end of 2020, meaning that tens of thousands of hectares of forest clearance by APP and its suppliers over that period are now considered "acceptable". "APP's rollback of its cut-off date is nothing short of a deception of progress," said Kiki Taufik, Greenpeace global Indonesian forests campaign lead.

An APP logyard in Sumatra. The company changed its no-deforestation cut-off date, which Greenpeace called "a deception of progress." *Image: Vaidehi Shah/Eco-Business*

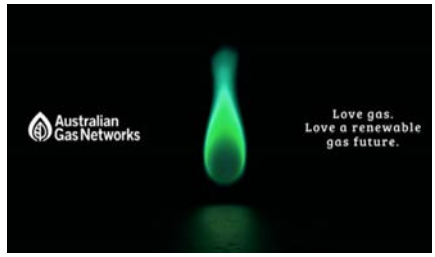
Just (don't) do it

Advertisements for Nike were banned in the UK in December for misuse of the term "sustainable". In its online campaign, the sportswear giant promoted tennis polo shirts as made with "sustainable materials", but the UK's ad watchdog ruled that the claim had not been clearly explained and lacked substantiation. The ad watchdog – which also banned ads for Superdry and Lacoste for misusing the term "sustainability" in the same round of rulings – has been using artificial intelligence to identify ads that flout its rules.

Nike "sustainable materials" ad banned in the UK [click to enlarge]. *Image: Nike*

Too soon for renewable gas

An ad campaign for Australian Gas Networks was removed for making misleading claims about how quickly the energy distributor could scale and sell "renewable gas" – that is, gas produced from organic waste like sewage, farm manure, or food scraps rather than fossil fuels. "We allege that the ads overstated the likelihood of Australian Gas Networks overcoming significant technical and economic barriers to distribute renewable gas to households within a generation," the chair of the Australian Competition and Consumer Commission, Gina Cass-Gottlieb, said in a statement in June, adding that it is not currently possible to distribute renewable gas economically at scale.



Australian Gas Networks' "Love a renewable gas future" ad was banned in June. *Image: AGN*

TotallyEmpty promises

In a landmark case in a Paris court in October, advertising for TotalEnergies was declared illegal for greenwashing. The French oil major has a 2050 net zero target and has been claiming to be a "major player in the energy transition" despite continuing to promote and sell more fossil fuels – with plans to drill for oil and gas in Iraq, Denmark, Tanzania and Uganda. The ruling was the first greenwashing judgment

TotalEnergies ads were declared illegal for greenwashing. *Image: TotalEnergies*

ever issued against the oil industry's decarbonisation narrative, and is expected to have a knock-on effect on how the industry promotes itself in other jurisdictions.

Leave it worse

In September, Arc'teryx, a Canadian luxury outdoor brand that uses the slogan "Leave it better", drew fire for sponsoring a fireworks display on the Qinghai-Tibet Plateau that damaged ecologically fragile grasslands. The "Rising Dragon" event drew criticism for failing to clean up debris left in the area. Chinese journal Southern Weekly pointed

The Arc'teryx-sponsored "Rising Dragon" fireworks display in Tibet scorched a large area of environmentally-sensitive habitat. *Image: Arc'teryx*

out after the event that despite the brand's claims to be free from per- and polyfluoroalkyl substances (PFAS), or "forever chemicals" on its flagship store on WeChat and JD.com, Arc'teryx products do contain PFAS in some countries, including Canada and Australia.

Woolly commitment

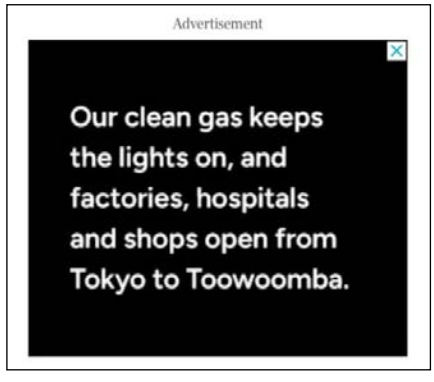
In its 2025 sustainability report, Australian retailer Woolworths hollowed out its no-deforestation pledge by listing beef as a "low-risk" commodity for deforestation. Non-profit Wilderness Society said the supermarket was cherry-picking from a flawed rating system – the European Deforestation Regulation, or 'EUDR' – to conclude that beef poses minimal risk for Australian forests. In 2024, Woolworths had

Woolworths hollowed out its no-deforestation pledge by listing beef as a "low-risk" commodity for deforestation. *Image: Robin Hicks / Eco-Business*

listed beef as a high-risk deforestation commodity, naming livestock pasture expansion as a key driver of deforestation in Australia.

'Clean gas'

A company belonging to Australia's richest person, Gina Rinehart, was investigated for allegedly misleading the public about the cleanliness of methane gas. Advertisements for Hancock Prospecting claimed "Our clean gas keeps the lights, and factories, hospitals, and shops open from Tokyo to Toowoomba." Non-profit Comms Declare lodged a complaint about the ads with Australia's advertising watchdog, pointing out that "a flammable, toxic and polluting fossil fuel is 'clean', fails the pub test and should not be allowed under the law." It was ruled that the ads breached Australia's Environmental Claims Code because the term



Hancock Prospecting ad that ran on futureaustralianjobs.com was found to breach Australia's ad watchdog for its "clean gas claim.

"clean gas" was unsubstantiated and likely to mislead consumers.

Tastes like child labour

Polina Zabrodskaya, an advertising executive working for the London office of agency BBDO was allegedly harassed by colleagues for pointing out that campaigns for client Mars were stretching the truth with claims that it was "making chocolate better," given that child labour, deforestation and low pay are prevalent in West Africa, where Mars sources some of its ingredients, according to reporting by Financial Times. The confectionery and pet food giant declined

Mars brand Galaxy claimed to be "making chocolate better, one piece at a time". *Image: Mars*

to comment on what it called "an internal employment dispute" at BBDO, but pointed out that it spends "billions of dollars" to make its business "more sustainable".

Watch out for carbon neutral claims

Apple was sued by seven consumers in a California federal court in February, who objected to Apple's claim that three versions of the Apple Watch were "carbon neutral" based on the purchase of offsets. The plaintiffs said they wouldn't have bought the watches had they known that the carbon projects on which Apple relied to meet its emissions target – one in Kenya and another in China – did not provide "genuine" emissions reductions. In August, Apple was banned from making carbon neutrality claims for its watches that

Carbon neutral Apple watches?
Image: Apple

were based on a eucalyptus tree-planting project in Paraguay.

Coalescing the press

Australia's National Press Club, one of Australia's most influential public forums, platformed Future Coal chief Michelle Manook – despite pleas from advocacy group Comms Declare to cancel her keynote address on 18 November. Future Coal – the World Coal Association, with a fresh coat of paint – promised

Future Coal CEO Michelle Manook has said that coal "is a legitimate participant in both economic development and emissions abatement."

to unveil "the path to real sustainability" in Manook's talk. Comms Declare pointed to the lobby group's history of climate obstruction, and armed journalists with "climate obstruction bingo" cards to track the expected talking points – like pitching "clean coal."

Cruising on 'clean' fuel

Four travel groups had ads banned in the UK for giving a misleading impression of the environmental impact of cruise ships, which each produce the equivalent emissions of about 12,000 cars or double the emissions of flying. The firms – which included Barrhead Travel, Sunshine Cruise Holidays/Cruise1st, Travel Circle/Cruise Circle and Cruise.co.uk/SeaScanner – made claims including "Powered by LNG, the world's cleanest marine fuel", "Uses new green technologies", "Strong focus on sustainability and

Cruise1st claimed that its cruise liners are "powered by LNG, the world's cleanest marine fuel" and "use new green technologies".
Image: Cruise1st

eco-friendly practices," and "one of the most eco-friendly cruise ships afloat". The UK's ad watchdog ruled that claims had not been fully explained or backed up with evidence, and so were likely to mislead.

Farmed with harm

An ad for farm products supplier Red Tractor was banned in the UK for exaggerating its environmental

The UK's ad watchdog ruled that Red Tractor had provided "insufficient evidence" that its farms complied with basic environmental laws to substantiate its "farmed with care" claims.

benefits with its "farmed with care" claims. A campaign group alleged that Red Tractor members are more likely to pollute the environment than non-assured farms, so its claims were misleading. Red Tractor hit back, claiming that the scheme's focus was on animal welfare, not environmental standards.

Equinot capturing much carbon

Norwegian energy giant Equinor had been massively overclaiming the performance of its carbon capture facility at the Sleipner gas field in the North Sea, according to an investigative report by climate journal DeSmog in February. Equinor's carbon capture facility is often held up by carbon capture evangelists as proof that the technology can work. But DeSmog foundthat the company's claims – that it captures about 1 million tonnes of carbon

An ad promoting Equinor's carbon capture capacity. *Image: Reuters.com*

dioxide a year – were overestimated by a factor of 10. Equinor subsequently withdrew its claims.

'Fly green'

VietJet claimed that flying for less than the price of a round of drinks from Singapore to Vietnam could help its passengers "contribute to a greener future" because the regional airline has a fuel-efficient fleet and digital services that save paper. The

VietJet claimed its customers can "fly green" by saving paper on e-tickets.
Image: VietJet

An ad for Woodside, which observers say is using carbon capture technology to greenwash a massive gas extraction project.
Image: Woodside

DWS's statement in response to its fine for greenwashing [click to enlarge].
Image: DWS

promotion was banned in Singapore after a complaint.

Capturing approval

Australian oil and gas giant Woodside Energy used a carbon capture and storage (CCUS) proposal to gain approval for a massive natural gas project in the Browse Basin, which is estimated to produce 1.6 billion tonnes of carbon dioxide equivalent by 2070, the country's Green Party said at the start of the year. The CCUS project would sequester up to 14,200 tonnes of CO2 per day. However, the "carbon dumping" project near Scott Reef would put already endangered species like the pygmy blue whale and the dusky sea snake at serious risk, the Greens said.

'Sometimes exuberant'

DWS, the investment arm of banking giant Deutsche Bank, was fined €25 million (USD$27 million) in April over charges that it misled investors over its sustainable investing credentials – ending a long-running saga that started in 2021 and peaked in 2022 when Deutsche Bank's Frankfurt offices were raided. In a statement following news of the fine, DWS said that it has "acknowledged that in the past our marketing was sometimes exuberant," and that the firm had improved its control processes to eliminate greenwashing.

This story is part of Eco-Business' Year in Review series, which looks back at the stories that shaped the world of sustainability in 2025.

(Source: https://www.eco-business.com/news/20-brands-called-out-for-green-washing-in-2025/)

Tengah, the site of the most forest loss in Singapore's recent history. What was once secondary forest is being transformed into a "forest town". *Image: Robin Hicks / Eco-Business*

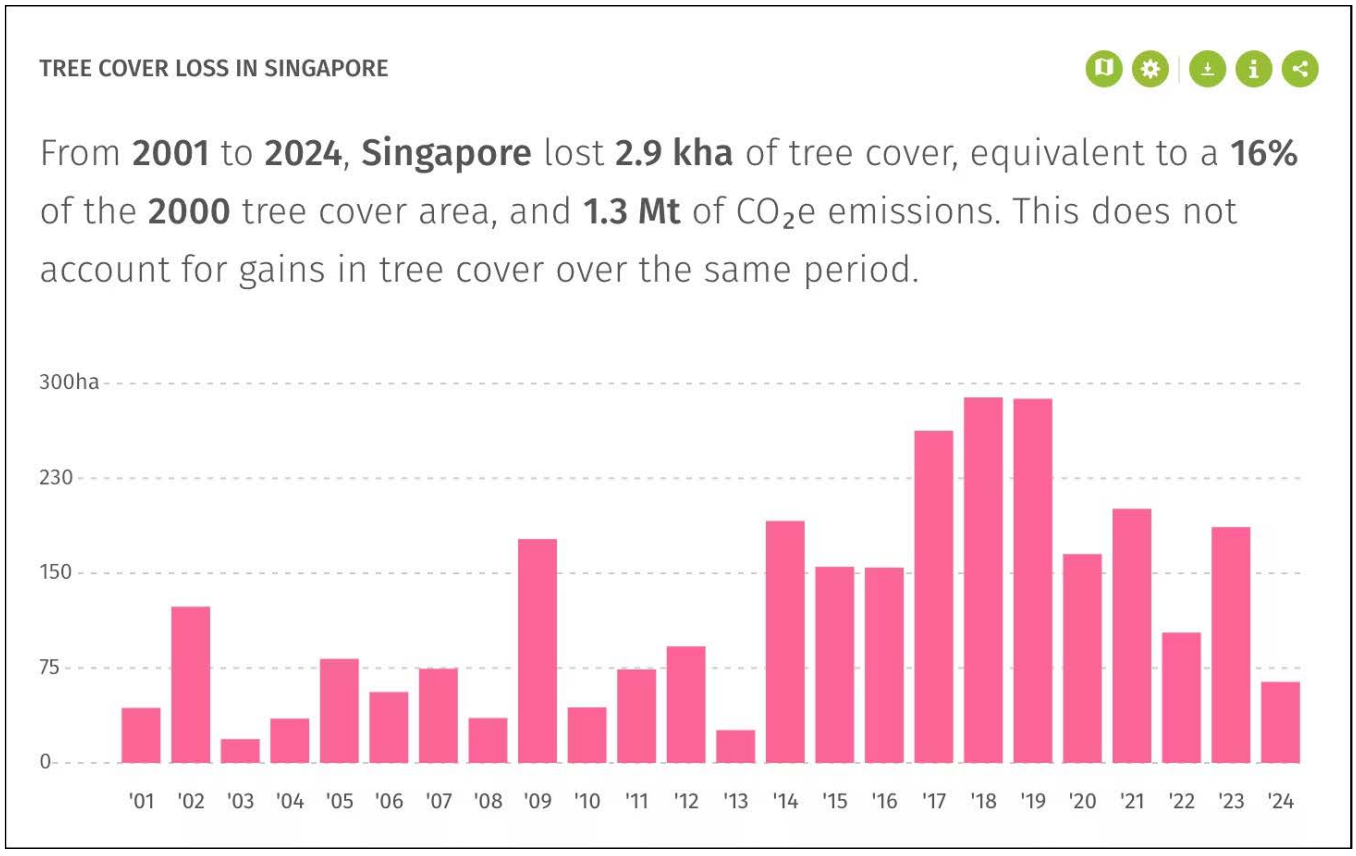
CAN SINGAPORE'S SECONDARY FORESTS PLAY A ROLE IN ITS CLIMATE ADAPTATION PLAN?

Singapore is facing diminishing forest cover from competing land uses – but vulnerable secondary forests could play a key role in helping the city-state adapt to intensifying heat stress and flooding, state **Robin Hicks**

The recently-held COP30 at Belém – billed by many as "the adaptation COP" – saw many governments pledge to step up efforts to help societies live with a hotter, harsher climate. Singapore's highly-anticipated climate adaptation plan, announced at the United Nations summit, promises to chart how the city-state will weather intensifying climate impacts, including shoring up coastlines, accelerating decarbonisation and protecting citizens from heat stress.

While nature-based solutions were also key to this strategy through procuring carbon credits from reforestation projects in Ghana, Paraguay and Peru, Singapore's own forests seemed to be missing.

Singapore's secondary forests, which have regrown over abandoned kampongs(villages) and plantations, continue to be cleared for housing, industrial expansion, and infrastructure. While not at the same rate as its neighbours (Singapore has lost less than 2,000 hectares



Forest loss rates in Singapore since 2001 [click to enlarge]. Source: Global Forest Watch

of secondary forests over the last decade or so, compared to far higher rates in Malaysia and Indonesia) it is nevertheless losing forest cover at a speed noticeable to its residents.

These are not pristine primary rainforests, but they are biodiverse, heat-mitigating, flood-buffering ecosystems – units of climate resilience that have quietly served the city for the last 50 to 150 years.

Though the deforestation rate has slowed since the highs of 2018 and 2019, patches of secondary forest continue to disappear all over the island. What's left is growing thinner and more fragmented.

The most intensely deforested area in recent years is Tengah, where forests have regenerated since the 1850s over gambier and pepper plantations, villages and brick-making factories. Most of these forests have now made way for Singapore's newest public housing precinct.

Other deforestation hotspots in Singapore include Clementi forest – lovingly captured by residents in a drone video that went viral a few years ago – Bukit Batok Hillside Park, Dover East and Turf City. Next year, a 10-hectare (ha) patch of forest in Woodlands, near the border with Malaysia, is to make way for a new transport and business hub. Only yesterday, it was announced that more than 52ha of forested land and streams near Nanyang Technological University will be cleared for the expansion of an industrial district in Jurong.

When the issue of forest loss was debated in parliament in 2021 following an outcry over the zonation of Clementi forest for development, the government spoke of the trade-offs the land-scarce country must make in balancing the needs of development and conservation as it plans for the future, and how green spaces compete with housing, infrastructure and workplaces in land-use considerations.

Singapore rightly earns international acclaim for its lushness – with tree-lined roads, greenery-covered buildings and network of parks that support its enviable "city in nature" image.

But there is reason to worry about how much more secondary forest the city can afford to lose from a climate adaptation perspective.

Singapore is one of the most densely populated countries in the world, but still has a relatively high proportion of green spaces – around 20 per cent of the island – despite its compact size, at 72,860 hectares. Secondary forests account for about one-fifth of the country's green spaces; a tiny 0.16 per cent of its land area is covered by primary forests. However, under the government's redevelopment master plan, more than 7,000 hectares of secondary forest – an area of forest larger

Ramblers walk through Tengah forest, most of which has been cleared for a new residential development. *Image: Robin Hicks/Eco-Business*

than Singapore's parks and nature reserves combined – could disappear over the coming decade or so.

The argument that these forests must make way for public housing as the population expands is compelling, but there has been no serious public conversation so far about the impact of clearing a forested area that covers 10 per cent of Singapore's land area on heating and flooding, and other factors such as humidity, rainfall patterns, soil health, water quality or air pollution.

Crucially, there have been no formal studies on how land use change has, or will affect, the local climate in Singapore. So can the country risk converting so much forest without more scientific understanding of possible consequences?

Heating and flooding risk were topics covered at AlterCOP, a local event that runs parallel to the actual COP conference from 10 to 22 November. But forest loss as a heat stress or flooding risk was not mentioned by speakers from Singapore's national water agency PUB and Nanyang Technological University (NTU).

In his presentation, PUB director Justin Wu pointed to the dangers of coastal flooding from rising sea levels and the government's efforts to protect Singapore's shorelines from inundation through flood barriers and the Long Island reclamation project to protect the East Coast. The potential impact of local forest loss on flooding was not mentioned.

NTU PhD heat researcher Emma Ramsay spoke of the importance of local heat adaptation measures like green spaces and cool surfaces – such as heat-reflective paint on buildings – which can reduce temperatures by up to 2°C. But Singapore's secondary forests weren't mentioned either.

It made me wonder if Singapore has had a sufficient discussion about the role of its secondary forests, which could underpin its own climate resilience strategy?

Secondary forests: foundational climate adaptation assets

Forests are one of the most effective ways to cool a city, reducing temperatures by degrees that no mechanical cooling system can realistically match – and Singapore is fast approaching heat levels that threaten liveability.

In 2024, the annual mean temperature of 28.4°C was the warmest on record, tied with 2019 and 2016.

An abandoned building, likely part of a 19th-century brick factory, in Tengah forest. Approximately 90 per cent of Tengah forest is slated for clearing.
Image: Robin Hicks/Eco-Business

The government's Third National Climate Change Study projects that by 2050, Singapore could experience between 47 and 189 "very hot days", defined as those when the mercury exceeds 35°C, every year, compared with 21 today.

Forests also help rainwater soak into soil instead of rushing across concrete and into drains already struggling with more frequent extreme rainfall or "rain bombs". Forests form natural corridors that allow wildlife to adapt to shifting climate conditions, enabling species that are critical to ecological resilience survive.

And, in a busy city where stress levels run high, forests also support social resilience. On a recent walk through what remains of Tengah forest, Eco-Business found evidence of people still using the forest for leisure and to keep the memories of kampong life alive.

In other words, forests are not just disposable makeweights in Singapore's adaptation strategy; they are foundational assets.

Yet as the government starts crafting its adaptation blueprint, the country's last secondary forests remain vulnerable. Could there be other ways to retain these forests as the city develops?

Singapore is already a global player in blended finance, energy connectivity and carbon-market governance. It is exploring nuclear power, importing low-carbon electricity, supporting developing countries' reporting capacity under the United Nations Framework Convention on Climate Change (UNFCCC), and strengthening climate science across Asean.

Its precious secondary forests deserve some attention by policymakers in the role they could play to build the city-state's resilience.

As Singapore develops its first national adaptation plan over the next five years, it has an opportunity to integrate nature protection into the blueprint. That means recognising forests and spontaneous green spaces not as soft, optional amenities but as critical climate assets integral to heat mitigation, flood control, biodiversity resilience and the mental and social health of its people.

(Source: https://www.eco-business.com/opinion/can-singapores-secondary-forests-play-a-role-in-its-climate-adaptation-plan/)

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