

# CSR TODAY

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# The world needs ocean-based climate solutions



**Rajesh Tiwari**  
Publisher  
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**Countries which govern half the world's territorial oceans have yet to integrate ocean-focused solutions into their nationally determined contributions, or NDCs, due for an update by February 2025.**

Following the recent 2024 United Nations Climate Change Conference (COP29) in Baku, we are confronted with one pressing question: What's next? With countries set to submit their updated nationally determined contributions (NDCs) under the 2015 Paris climate agreement early next year, the world has an opportunity – and a responsibility – to take transformative action to address the climate crisis. The ocean must be central to this effort.

“Nobody understands this better than small island developing states (SIDS) like Palau. For us, climate policy is not some abstract debate about hypothetical future risks; it is a fight for survival. Already, coral reefs are undergoing bleaching; storms are becoming increasingly frequent and destructive; and droughts are undermining food security. Rising sea levels threaten not just our land, but also our culture, our way of life, and our very existence.” says Ilana Seid is Palau's ambassador to the United Nations, sherpa co-chair of the High Level Panel for a Sustainable Ocean Economy, and co-chair of the steering committee for the Blue Economy and Finance Forum.

To date, international support for climate action has fallen far short of meeting developing countries' needs. SIDS collectively receive less than two per cent of global climate finance, even as they oversee 30 per cent of the world's territorial waters. It is a striking imbalance, especially given the ocean's enormous untapped potential to help mitigate climate change.

The ocean is our planet's largest carbon sink, absorbing 25 per cent of all carbon dioxide emissions and a staggering 90 per cent of the excess heat generated by a warming atmosphere. According to a 2023 report, ocean-based climate solutions can get us as much as 35 per cent closer to our emissions-reduction targets for 2050, on a

pathway that limits the global temperature increase to 1.5 degree Celsius. And mitigating climate change is just the beginning; a healthy ocean plays a pivotal role in creating sustainable livelihoods for vulnerable communities worldwide.

Consider nature-based solutions like the restoration of mangroves, seagrasses, and coral reefs. Beyond sequestering carbon, these ecosystems act as natural defenses against rising seas and extreme weather, and they form the basis of local livelihoods. In Palau, marine protected areas safeguard biodiversity, support sustainable fisheries, and bolster the tourism industry.

So far, the ocean – including the ecosystems it supports – has largely been treated as an afterthought in global climate strategies, sidelined in favor of more visible priorities like renewable energy and curbs on emissions. The High Level Panel for a Sustainable Ocean Economy has revealed that many of its member countries – which together govern half the world's territorial oceans – have yet to integrate the ocean fully into their NDCs.

This omission represents a vital opportunity, which countries should seize as they prepare their NDC submissions before the February deadline. Putting the ocean at the center of our climate strategies would transform it from a silent victim of global warming into an active force for mitigation and resilience-building.

The Blue Economy and Finance Forum (BEFF) takes place in June, one of the “special events” that will set the stage for the third UN Ocean Conference in Nice, France. The BEFF aims to unlock financing for ocean-based solutions, particularly biodiversity-positive investments that simultaneously support economic development and climate goals. But, as we saw at COP29, public budgets are already stretched thin. Mobilising private capital alongside public investment is thus essential to drive meaningful change. 

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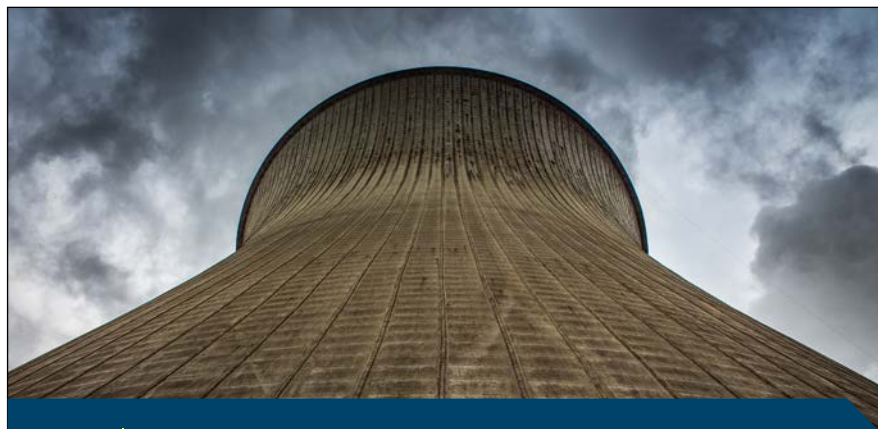
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# CSR NEWS

## Kinetic Green signs MoU with Vishwakarma Institutes and University to advance skill-based training and research



**K**inetic Green Energy and Power Solutions Limited, India's leading electric two- and three-wheeler manufacturer has signed a Memorandum of Understanding (MoU) with Vishwakarma Institutes and University (VI&U) to establish a long-term partnership aimed at advancing concept development, skill-based training, cutting-edge research, and education. This collaboration marks a significant step toward bridging the gap between academia and

industry while fostering the development of future-ready talent.

Through this partnership, Kinetic Green will provide hands-on training, practical exposure, and access to its labs, workshops, and industrial sites, offering valuable real-world experience to both students and faculty. In return, VI&U will adapt its curriculum to meet industry needs, ensuring that students are well-prepared for their careers. The collaboration encompasses industrial training programs, internships, faculty

development, and joint research in AI and sustainable automotive technologies, with a focus on emerging innovations. Additionally, VI&U students will contribute to marketing projects and engage in internships centered on developing AI concepts for Kinetic Green, driving innovation and shaping a future-ready workforce for India's technology and automotive industries.

Speaking on the collaboration, Sulajja Firodia Motwani, Founder and CEO of Kinetic Green Energy & Power Solutions, said, "This partnership reflects our commitment to contributing to society by nurturing students for their future. With the involvement of industry experts sharing their knowledge and experience, students will gain valuable insights and a deeper understanding of the industry. Together, we aim to create an ecosystem of learning, innovation, and sustainability."

Bharat Agarwal, President, VI&U, stated, "Our collaboration with Kinetic Green is a testament to our shared vision of nurturing innovation and excellence in education. Through this partnership, both our students and faculty will gain invaluable insights and practical exposure, enabling them to contribute meaningfully to cutting-edge fields like AI and sustainable automotive technologies."

# History Created by Indian Navy and Jawa Yezdi Motorcycles: First Bike Rally on Atal Setu Sea Bridge

The "Ride of the Marakkars" motorcycle rally concluded in spectacular fashion on December 11, as the convoy became the first-ever group of riders to cross Atal Setu, India's longest bridge. This record-setting ride not only marked a milestone for the Indian Navy and Jawa Yezdi Motorcycles but also made history as Jawa, Yezdi, and BSA motorcycles became the first Indian brands to achieve this extraordinary feat.

The convoy's crossing of Atal Setu Sea Bridge, a bridge typically restricted for motorcycles, marks a landmark moment in India's motorcycling and engineering history. This milestone event highlights the innovative and adventurous spirit shared by the Indian Armed Forces and these legendary motorcycle brands.

Leading the 22-strong convoy were senior officers of the Indian Navy, joined by riders from the Western Naval Command and representatives from the Army and Air Force. All 22 motorcycles, proudly manufactured indigenously, epitomized the Make in India vision, showcasing the synergy between homegrown innovation and the indomitable spirit of the armed forces.

"The sight of a phalanx of Jawa, Yezdi, and BSA motorcycles roaring across Atal Setu fills me with pride. It is fitting that these Made-in-India machines partnered with the Indian Navy to celebrate the 'Ride of the Marakkars' and honour India's maritime history" said Anand Mahindra, Chairman of Mahindra Group and co-founder of Classic Legends.

Beginning at INS Kunjali in Mumbai, the rally traversed scenic coastal routes with stopovers at



Pune, Satara, Dapoli, Ratnagiri, and Goa. Along the way, riders visited sites of maritime significance, including Ratnadurg Fort, Fort Aguada, and Sinhagad Fort, honoring India's naval heritage and the legacy of the iconic Kunjali Marakkars.

"It's fitting that this rally ended with a historic first on Atal Setu," said Lieutenant Commander Vishal Nair. "As we crossed the bridge, it felt like a tribute to the countless bridges—both literal and symbolic—that the Navy builds with the

people of this nation." Jawa Yezdi Motorcycles have a strong relationship with the Indian Armed Forces, having participated in landmark events such as the INS Vikramaditya expedition, Kargil Vijay Diwas commemorations, and the launch of the Jawa 42 Tawang Edition. The "Ride of the Marakkars" continues this proud tradition of supporting India's defenders, reflecting the brand's commitment to maintaining the highest standards of performance and reliability.

## Philip Morris International Inc. (PMI)'s India affiliate expands its Sustainable Logistics Network

Reinforcing its commitment to sustainable logistics, Philip Morris International's (PMI) affiliate, IPM India, has adopted energy efficiency practices for optimization of sustainable logistics network. Over the last year the organization's initiatives have helped introduce EV & CNG vehicles and shifted 70% of its sourcing for various non-tobacco materials from air freight to either sea or land, resulting in 684 tonnes of CO2 reduction by FY 2025.

To reduce greenhouse gas emissions, the organization is gradually switching to environment friendly fuels like CNG & EVs for its logistics fleet. Introduced in Delhi-NCR and Mumbai, these vehicles have saved more than 30 tonnes of CO2. In line with the organization's long-term sustainability goals and the core objective of reducing carbon emissions- changing in sourcing & switching from air freight to sea & land routes has helped the organization stay on track to reduce 654 tonnes of CO2 by March'25.

Commenting on the expansion, Navaneel Kar, Managing Director, IPM India, said, "Sustainability and business performance are fully interrelated and mutually reinforcing. The expansion of sustainability logistics network aligns with our core values. We take immense pride in serving as an agent of change and advocate of positive values. Sustainability is more than just a means to minimize negative externalities and mitigate risks while maximizing operational efficiency and resource optimization. As an organization, we see this as a fundamental opportunity for innovation, growth, and purpose-led, impact-driven, long-term value creation. Accordingly, we work hard to integrate it into every aspect of our business. With each new carbon-neutral initiative, we move a step closer to realizing our goal—to transition toward a carbon-neutral model."

Divya Vanshika, Head of Operations, IPM India said, "We firmly believe that investing in sustainability logistics network will have a positive impact on both the long-term resilience of our business and the well-being of society. The Indian government is focusing on sustainability to drive economic growth while protecting the environment. Aligned with the government's focus, with each initiative, IPM India aims to create a sustainable logistics network and support India's journey towards achieving a carbon-neutral environment."

## Centre for Driver Relationship Management (CDRM) in Partnership with Netradyne to Recognize India's Exceptional Fleet Drivers

The Centre for Driver Relationship Management (CDRM), with support from Netradyne, a leader in AI-powered fleet safety solutions, is set to honor India's unsung heroes—India's commercial fleet drivers—for their invaluable contributions to the economy and their commitment to safe driving practices, through the Smart Driver Award program.

Commercial fleet driving remains one of the most challenging yet underappreciated professions in India. These drivers form the backbone of the nation's logistics and passenger transport ecosystem, ensuring goods and essential supplies reach every corner of the country. Despite their critical role, they face immense challenges, including long hours on the road, limited access to rest facilities, suboptimal food options, and prolonged separations from their families—all of which take an emotional and physical toll. This, combined with a lack of recognition, has created a pressing need to highlight their critical role in the economy and uplift their professional standing.

"Commercial fleet drivers are the unsung heroes of our economy, working tirelessly under challenging conditions to keep the country moving. At CDRM, we believe their contributions deserve greater recognition," said Ramesh Kumar, Founder of Centre for Driver Relationship Management (CDRM). "Partnering with Netradyne, a global driver safety technology provider, we aim to celebrate drivers' achievements, promote safer roads, and uplift their professional standing through the Smart Driver Awards. The awards will be conducted quarterly across four regions—North, South, West, and East—with nominations open until December 25, 2024. Companies and individuals can submit nominations to [ramesh@cdrm.in](mailto:ramesh@cdrm.in)"

The Smart Driver Awards aim to spotlight these drivers' exceptional safety standards, professionalism, and resilience while inspiring a broader culture of respect and safety on Indian roads.

"At Netradyne, we are deeply committed to improving road safety and empowering drivers with cutting-edge AI-driven technology. The Smart Driver Awards reflect our belief that recognizing and rewarding driver excellence is key to fostering a culture of safety and professionalism on Indian roads," said Amit Kumar, Senior Director of Marketing at Netradyne.

# VisionSpring Foundation and The United Planters' Association of Southern India (UPASI) collaborate for the clear vision of more than 2,00,000 tea and coffee workers and their families in Tamil Nadu, Karnataka, and Kerala by 2028

VisionSpring Foundation has recently begun its collaboration with The United Planters' Association of Southern India (UPASI) under its ongoing 'Livelihoods in Focus' outreach programme. The partnership will provide vision screenings and corrective eyeglasses to more than 2,00,000 tea and coffee workers and their families in Tamil Nadu, Karnataka, and Kerala by 2028, transforming these states into clear vision regions.

The 'Livelihoods in Focus' outreach programme is designed to boost the productivity and earning potential of tea, cocoa, coffee and artisan communities by correcting their vision through eyeglasses. The programme focuses on agricultural workers because they have many tasks that require clear sight, and their work can have an outsized impact on the economy. Evidence supports this approach, a 2018 study demonstrated that providing eyeglasses to tea garden workers increased their productivity by up to 32%

This VisionSpring Foundation and UPASI initiative will improve the visual health of communities in the agricultural and plantation sectors, strengthening Southern India's economy.

2,00,000 tea and coffee workers in Tamil Nadu, Kerala and Karnataka



will have their vision screened, many of whom suffer from uncorrected refractive errors and other vision impairments. This initiative

builds upon the 3,50,000 tea and coffee workers and community members that VisionSpring Foundation has served to date.



By providing eyeglasses, agriculture workers in Tamil Nadu, Karnataka, and Kerala will see a potential increase of INR 323 crore in income.

Anshu Taneja, Managing Director, VisionSpring Foundation, highlighted the broader implications of the outreach programme, saying, "Significant number of plantation workers experience vision problems, and by organizing onsite eye-camps in the plantations to address the urgent need for vision care, VisionSpring Foundation and UPASI are set to make a profound impact on the lives of tea and coffee workers across Southern India".

We are grateful to UPASI for their forward-thinking approach in supporting our work and recognizing the value of providing eyeglasses – a simple 700-year-old technology. We hope their involvement will inspire other organisations to participate, creating a greater impact on workers' well-being and boosting the region's economy."

Sanjit Nair, Secretary General-UPASI, emphasised the significance of this collaboration for the plantation industry, stating, "Vision correction through the expansion of eyeglass coverage to the coffee workers and tea workers in Karnataka, Tamil Nadu, and Kerala is a visionary step

that would transform their lives and help increase productivity as well as income. UPASI is collaborating with VisionSpring Foundation in this optical challenge which puts the well-being of the workers at its focal centre. This initiative not only aligns with Sustainable Development Goals (SDGs) but also empowers communities by enabling individuals to perform better in their jobs, pursue education, and participate more fully in community activities. He added that this initiative is add-on to the welfare and medical facilities provided by the plantations statutorily free of cost to the workers and their families".

## Adani Foundation at ACC Madukkarai empowers single mother towards financial stability

**A**CC, the cement and building material company of the diversified Adani Portfolio, is committed to empowering women towards self-dependence and sustainable livelihoods. Along with the Adani Foundation the Company is proud to support Pramila, a single mother from Church Colony, near ACC Madukkarai, whose journey to self-reliance highlights the success of its women empowerment initiatives.

Through the Adani Foundation's support, Pramila started a cold-pressed oil business and later expanded into an evening snacks corner, ensuring financial stability for her family. In 2022, the Foundation provided Pramila with hands-on training in cold-pressed oil extraction, along with machinery to launch her micro-enterprise.

"I was earning Rs. 6,000 to 8,000 per month when I lost my husband in 2023. Despite the setback, the continued support from Adani Foundation helped me stay afloat,"



said Pramila. She further expanded her business by opening a snacks corner to fund her daughter's college education.

ACC and the Adani Foundation's commitment to empowering women

and promoting financial independence is highlighted in the success stories of Pramila and other women through community-based programmes in Madukkarai and across the nation.



Dr. Anita Patra, Registrar, Centurion University of Technology and Management and Paneesh Rao, Chief Sustainability Officer, LTIMindtree sign the MoU for Shelter to Habitat program

## LTIMindtree Foundation signs MoU with Centurion University of Technology & Management (CUTM) for tribal housing project

*Shelter to Habitation project will provide new homes to Odisha's tribal villages*

**L**TIMindtree Foundation, the corporate social responsibility arm of LTIMindtree, has signed a Memorandum of Understanding (MoU) to construct over 80 all-weather-proof houses along with essential community

infrastructure in collaboration with Centurion University of Technology & Management (CUTM).

The housing project titled 'Shelter to Habitation' is aimed at providing sustainable and secure habitation for underprivileged tribal communities in Odisha. The project seeks to address the challenges faced by the cyclone-prone Gajapati district, benefiting close to 3,000 villagers across the villages of Alajhola, Gayaljuba, and Rashika Rajpur. These homes

will be all-weather proof and will feature modern sustainability elements, including solar lighting, rainwater harvesting, and climate-resilient designs. Each home will provide a dignified living environment with a bedroom, living room, kitchen, and toilet.

This project is being fully funded by LTIMindtree under its CSR mandate and CUTM will be the project implementation partner. The MoU was signed at a signing ceremony by

Paneesh Rao, Chief Sustainability Officer of LTIMindtree, and Dr. Anita Patra, Registrar of CUTM. Other members of the LTIMindtree Foundation and board members from the Centurion University were in attendance.

Commenting on the project, Paneesh Rao, Chief Sustainability Officer, LTIMindtree stated, "This project reflects our commitment to empowering communities by addressing their most pressing needs. Beyond offering sustainable housing, we are creating opportunities for active community involvement, helping them develop skills, take ownership, and shape their own future. With the support of CUTM and the local administration, we're strengthening the foundation for a stronger, more resilient tomorrow."

In addition to the homes, the project will develop village roads, a community center, an Anganwadi (childcare center), solar street lighting, and a drinking water system. Local villagers will actively participate in the construction process, earning fair wages for their efforts. This will also ensure sweat investment, gaining skill and future sustainability of livelihood. The first batch of homes is expected to be completed by mid 2025, with the full project slated for completion by early 2026.

Dr. Supriya Pattanayak, Vice Chancellor, Centurion University of Technology and Management, expressed enthusiasm about the partnership, "We are excited to partner with LTIMindtree Foundation on this transformative initiative. It aligns with our mission of driving meaningful societal impact. Together, we are addressing a critical need in these underserved communities. By providing essential housing for below-poverty-line families, we are not only addressing immediate needs but also laying the groundwork for sustainable development."

## Worldline India in partnership with Indivish Welfare Foundation rejuvenates 26 water bodies in Maharashtra through Jal Sanjeevani Project

**W**orldline India has announced its continued support for the Jal Sanjeevani initiative under its Corporate Social Responsibility (CSR) program, which has made significant strides in promoting water conservation and improving livelihoods in rural Maharashtra.

As part of its commitment to sustainable development, Worldline India's CSR arm enabled the desilting and rejuvenation of 26 water bodies, contributing to a storage capacity of 29.5 crore liters (295 million liters) of water. This initiative has played a pivotal role in enhancing groundwater levels, benefiting over 2,000 farmers and providing a direct positive impact to 285 farmers through the use of enriched silt for farming.

The project, spearheaded by Indivish Welfare Foundation, began in April 2023 and spanned multiple regions across Maharashtra, including Murbad, Marathwada, and other areas. The intervention is expected to improve water availability for agriculture, livestock, and fishing, and will help farmers access much-needed water for a second crop during the dry season.

Worldline India's support for the project, including its contribution in March 2024, reflects the company's ongoing dedication to driving positive social impact through meaningful, sustainable initiatives. By partnering with local communities, volunteers, and the government, Worldline India is helping create a more water-secure future for the communities in the region.

Ramesh Narasimhan, Chief Executive Officer - Worldline India said, "We at Worldline are excited to collaborate with the Indivish Welfare Foundation on the project Jal Sanjeevani. Their dedicated efforts in water conservation have positively impacted thousands of lives across Maharashtra. A reliable water source, particularly in rural areas, is crucial for ensuring a steady supply of water for agriculture and other essential needs. Worldline is committed to its corporate social responsibility mission of creating long-term value by addressing critical environmental challenges, as we work towards building a more 'green' future."

Shrikant Joshi, Founder and Director, Indivish Welfare Society said, "We would like to express our gratitude to Worldline India for their commitment to rejuvenating water bodies. Our goal is to enhance our surroundings and improve the livelihoods of the people in India. Our initiatives focused on water conservation and the revitalization of water bodies have a positive impact on farmers, the Annadatas of our country and environment. We look forward to collaborating with Worldline India to broaden our efforts and expand our positive influence on society as a whole."

# Virtusa Foundation Conducts Miyawaki Plantation Drive to Combat Climate Change at Indian Universities

**V**irtusa Foundation, the CSR arm of Virtusa Corporation, has launched a large-scale Miyawaki plantation Drive at Gitam University and Guru Nanak University, planting over 11,500 native saplings. This initiative promotes biodiversity, combats climate change, and fosters sustainable urban ecosystems, further strengthening Virtusa's leadership in corporate environmental responsibility.

Spread across 3.1 acres of land in Hyderabad, 8,000 saplings at Gitam University and 3,500 at Guru Nanak University were planted through the widely known Miyawaki method. The Miyawaki method, a Japanese afforestation technique, fosters rapid growth, enhances biodiversity, and improves soil stability. The 50 native species selected for this plantation drive are expected to grow over seven feet within two years, creating a dense, self-sustaining ecosystem that will benefit the local environment. As part of Virtusa's broader environmental efforts, similar plantation drives were conducted at KPR Engineering College and KSR Engineering College in Coimbatore and Tiruchengode, where 5,500 and 4,500 saplings were planted respectively.

Virtusa Foundation emphasizes three pillars of CSR—Environment, Education, and Empowerment—through initiatives that contribute to both societal well-being and environmental sustainability. This plantation reflects Virtusa's dedication to integrating sustainable practices into its core business operations and reducing its carbon footprint across all activities.



During this project, hundreds of volunteers, including employees and community members, joined the cause to help restore greenery and create a vibrant ecosystem. Virtusa's commitment to integrating sustainability into its core business model and reducing its carbon footprint across all operations was evident throughout the initiative.

Speaking on the initiative, Denver De Zylva, Global Head of Sustainability and Facilities, Virtusa Corp & Joint Country Head, Virtusa Sri Lanka, said, "At Virtusa, we are proud to integrate sustainability into the core of our business model and reduce carbon footprint across all operations. This plantation drive is a step forward in our ongoing journey toward positively



impacting the environment and our community." Further, he added, "We extend our heartfelt gratitude to all the volunteers who demonstrated unparalleled dedication and to the universities for their collaboration in this noble cause. The enthusiastic participation from our team promises a better environment, testifying to our collective commitment towards a sustainable future."

The project aims to provide a lasting environmental benefit and serve as a blueprint for future collaborative sustainability initiatives between the corporate sector and educational institutions. Virtusa Foundation plans to monitor the plantation's growth and assess its ecological impact over the next few years.

# CSR INDIA UNITED

## Zilla Parishad Ratnagiri & Raintree Foundation sign a MoU for Inclusive Growth



**Keerthi Kiran Pujar, CEO, Zilla Parishad, Ratnagiri (L) and Leena Dandekar, Founder, Raintree Foundation (R)**

The Ratnagiri Zilla Parishad and Raintree Foundation signed an Memorandum of Understanding (MOU) to work together for holistic and integrated development of Ratnagiri District through environment conservation,

watershed development, rural livelihoods, and community wellbeing, with a focus on inclusivity and mental health. Women and marginalised groups will be priority stakeholders with a keen emphasis on strengthening local institutions.

Commenting on the alliance, Keerthi Kiran Pujar, Chief Executive Officer, Zilla Parishad Ratnagiri, said “In Ratnagiri, we have been successfully implementing various developmental and sustainability initiatives across the district, ensuring progress and growth for our communities. This partnership with the Raintree Foundation brings a sharper focus and added expertise to our ongoing efforts, aiding us to further enhance our impact. Conserving natural resources while nurturing growth in communities enables us to comprehensively work towards the development of the district. Together, we are committed to making Ratnagiri a model district not just in Maharashtra but across India, by fostering resilient ecosystems and empowering communities.”

Speaking at the occasion, Leena Dandekar, Founder, Raintree Foundation, said “At Raintree Foundation, our mission has always been to create resilient ecosystems and empowered communities through sustainable, inclusive development. Our work in Velhe, Pune has demonstrated the transformative impact of engaging local communities. We are proud to partner with Zilla Parishad Ratnagiri and are confident that, together, we can replicate the success we have seen in Velhe on a much larger scale in Ratnagiri, which is the focus of our long-term project in Shastri River Basin”

She further elaborated, “We believe this collaboration marks a significant step toward sustainable development in the district. Our aim is to conserve biodiversity, strengthen water resources, and enhance rural livelihoods while prioritizing inclusivity and community wellbeing. Together, we aim to turn Ratnagiri into a thriving ecosystem where communities and nature coexist in harmony, setting an inspiring benchmark.”

# BOSCH and Medhavi Group sign MoU to train thousands of underprivileged youths in employable skills



Bosch and Medhavi sign MoU to train thousands of underprivileged youths in employable skills



**B**OSCH India Foundation, the social engagement arm of BOSCH in India, and Medhavi Group, comprising the Medhavi Foundation and Medhavi Skills University, have signed a Memorandum of Understanding (MoU) to collaborate on advancing skill development initiatives in various locations across India, with special emphasis on Northeastern states. The strategic partnership would implement best-in-class skilling models and practices to empower underprivileged youth

with employable skills through BOSCH's BRIDGE program. The three-month training modules, to be offered at Medhavi Group training centers, are meant for school or college dropouts. They focus on sectors such as automotive, healthcare, manufacturing, and digital technologies. BOSCH would provide and bring knowledge, expertise and placement opportunities to the program.

Said Pravesh Dudani, Founder and Chancellor of Medhavi Skills University: "This collaboration with

BOSCH India Foundation marks a significant milestone in our mission to transform skill development in India. By combining our expertise in education with BOSCH's industrial excellence, we can create meaningful impact in the lives of countless young individuals, particularly in the Northeastern region."

Added Sakina Baker, Head of CSR at BOSCH Limited and BOSCH India Foundation: "The BRIDGE program represents our commitment to creating sustainable employment opportunities for India's youth. Through this partnership with Medhavi Group, we aim to expand our reach and provide industry-relevant skills that will help bridge the gap between education and employability."

The MoU highlights the two organizations' commitment towards the Government of India's Skill India Mission and nurturing the nation's goals in workforce development. It aims to provide training to thousands of youths in the next few years and help provide them job opportunities in diverse industries, resulting in significant positive impact on employment and economic growth in the target regions such as the Northeast.

Bosch is a leading supplier of technology and services in the areas of mobility solutions, industrial technology, consumer goods, and energy and building technology. In 2013, it launched its skilling program encompassing various components such as skilling through BRIDGE and Artisan Training programs, upskilling through short-term courses and reskilling programs to Train the Trainers. These programs are meant to equip individuals with the necessary skills to thrive in a rapidly evolving economic landscape.

# Nearly 10,000 school kids across 30 schools participate in Kho Kho's nationwide program across seven cities

The Kho Kho Federation of India (KKFI), in partnership with Sports For All (SFA), has launched a nationwide program to promote Kho Kho among school students, marking a significant milestone in developing a sport indigenous to India ahead of the upcoming World Cup, to be held from January 13-19 in the National Capital.

Over the past month, the initiative has successfully engaged more than 7,000 school students across seven cities, including Hyderabad, Bangalore, Delhi, and Jaipur. This sport will also extend to Lucknow, Pune and Mumbai in the coming weeks, and having reached 30 schools across India, the programme has targeted 200 schools by January 11.

"Our mission is to transform Kho Kho from a traditional game to a globally recognized sport. By introducing this beautiful sport to young minds, we are not just developing players, but creating ambassadors who will carry forward the legacy of an incredible game that is indigenous to India, to every part of the world," said Shri Sudhanshu Mittal, President of the Kho Kho Federation of India.

Complementing the on-ground initiatives, the KKFI has launched a digital registration campaign in collaboration with the Society Of Digital Entrepreneurs (SODE). "The digital registration campaign has been a game-changer," explained MS Tyagi, General Secretary of the Kho

Kho Federation of India. "We have successfully reached over 7,000 cities and 1,200+ schools across India, from Telangana to Uttar Pradesh."

This registration drive has seen active participation from students in classes 6 to 11, spanning diverse geographical regions. And with the Kho Kho World Cup on the horizon, these grassroots development initiatives are crucial in building national interest and creating a talent pipeline for India's indigenous sport.

This also plays an important role in building the future of Kho Kho in India, with the country bidding for hosting the 2036 Olympics, these young children will play an important role in the future of Kho Kho on a global scale.

## OpenText Signs MoU with Nirmaan to Empower 4 Rural Villages in Mulugu District, Telangana

OpenText, a global leader in information management software and services, has signed a Memorandum of Understanding (MoU) with Hyderabad-based Nirmaan Organization to support the transformation of four villages in Mulugu district, Telangana. This collaboration is part of the 'One Corporate - One Village' initiative, which aims to develop rural and tribal villages into model communities.

Under this partnership, OpenText will adopt four villages - Chandru Thanda, LB Nagar, Kodishalakunta, and Jagannapet, with a planned investment of INR 1 crore. The initiative will focus on a wide range of developmental interventions, including

the construction of Anganwadi buildings, installation of solar lighting systems, provision of water tanks and borewells, school repairs, health camps, and distribution of bicycles to students. These efforts are expected to positively impact over 5,000 individuals, particularly from the PVTG (Particularly Vulnerable Tribal Group) and tribal communities.

"OpenText is committed to providing comprehensive development for rural and tribal communities in Telangana," said Manoj Nagpal, MD, OpenText India. "Signing this MoU with Nirmaan Organization signifies our intent to address the developmental needs of rural India. With this initiative, we look

forward to contributing to the larger good of society, creating an inclusive environment, and empowering communities with sustainable solutions for growth and progress. Together, we aim to make a meaningful and lasting impact on lives across the region."

The 'One Corporate - One Village' initiative, launched by Nirmaan Organization in collaboration with the Government of Telangana, seeks to drive grassroots development across rural Telangana. OpenText's partnership marks a significant milestone in transforming these villages into model communities and empowering their residents for long-term prosperity.



HRAWI and Vihaan Outdoors formalize their partnership to skill and employ persons with disabilities

## HRAWI Leads Efforts In Capacity Building & Diversity Through Employment For Persons With Special Needs

The Hotel And Restaurant Association (Western India) – HRAWI and Vihaan Outdoors have entered into a partnership to promote inclusivity within the hospitality industry for persons with special needs. The Memorandum of Understanding (MoU) was signed on November 30, 2024, by Pradeep Shetty, Honorary Secretary, HRAWI and Sudhir Kothare, Proprietor, Vihaan Outdoors.

The social initiative aims to empower individuals with disabilities through skill development and employment opportunities in the hospitality sector. The collaboration seeks to promote capacity building, training and generate job opportunities for persons with disabilities paving the way for mainstream

acceptance and inclusivity within the industry. The partnership represents a vital step towards building a more equitable and inclusive hospitality sector.

“The collaboration between HRAWI and Vihaan Outdoors is a transformative step towards reshaping perceptions within the hospitality industry. The MoU signifies a shared commitment to enhancing skills, creating opportunities and building an inclusive community. It is a beacon of inclusion, breaking barriers and promoting a society that values and respects everyone equally. Together, we aim to celebrate diversity and develop a hospitality sector that truly embraces and empowers persons with disabilities,” says Mr Pradeep Shetty,

Spokesperson, HRAWI. Vihaan Outdoors will act as a catalyst by collaborating with various special schools and institutions to identify students with special needs who are potential candidates for hospitality-related courses. The organization will provide comprehensive support, including end-to-end handholding services for parents, guardians, special schools, and institutions, ensuring a seamless process. Vihaan Outdoors will also coordinate closely with HRAWI to facilitate capacity building and create job opportunities in the hospitality sector for young adults with special needs.

“Inclusion is a fundamental right that reflects a society where everyone is valued and empowered, regardless of their abilities. Diversity





**Introduction of the Vihaan Outdoors brochure**

and Inclusion (D&I) have evolved into strategic imperatives for businesses, driving innovation, creativity and superior performance. The hospitality sector, known for its diverse workforce, is making notable efforts to create inclusive workplaces. By embracing diversity and fostering belonging, hotels and restaurants can boost employee morale, productivity and customer satisfaction. Inclusion is not just the right thing to do, it's a pathway to excellence," says Kothare.

Indian hospitality is taking active participation in the movement, with leading hotel chains including Lemon Tree Hotels, IHCL, and ITC Hotels actively hiring and empowering individuals with disabilities. The F&B sector, in particular, has seen remarkable progress. The hospitality industry, a major segment of the broader travel and tourism sector, is a vital contributor to employment and economic growth, particularly in India.

"Encompassing a range of services from hotels and restaurants to tourism, event management, and other leisure activities, the sector not only drives employment but also



**Mr Jimmy Shaw, President, HRAWI**

it is projected that India's hospitality sector will support around 53 million jobs. Additionally, the direct contribution of travel and tourism to India's GDP is expected to grow at an annual rate of 7 to 9 per cent between 2019 and 2030," adds Mr Jimmy Shaw, President, HRAWI.

Despite these optimistic projections, the sector is grappling with severe workforce shortages. The sector presently faces acute workforce gap with an estimated need for an additional 100,000–150,000 skilled workers annually.

"By adopting more inclusive policies in human resource management, the hospitality organizations can address the challenges in meeting workforce requirements to a larger extent. Here lies the significance of initiatives like Vihaan Outdoors' to address this crucial problem of our industry today. I would like to once again compliment Vihaan Outdoors and HRAWI for their co-dedication and this path-breaking initiative. Let us all take inspiration from this noble mission and work together to create a world where inclusivity is not an exception but the norm," concludes Shetty.



**Mr. Pradeep Shetty speaks on the potential for persons with special needs in the hospitality industry and assures wholehearted support on behalf of HRAWI**

enhances foreign exchange earnings and overall economic development. The hospitality industry is one of the largest global employers, with India's own sector supporting approximately 8 to 9 per cent of the national workforce. By 2029,



Inaugural Conference on the Role of Bamboo - Leaders like Pasha Patel, Ajay Shankar (Chairman, FMC), Mukesh Gulati (Executive Director, FMC), Ms. Rinzi Prem, Assistant Director, SDF

## Bamboo Over Fossil Fuels: Pasha Patel Advocates for a Sustainable Energy Revolution at FMC's International Conference

The Foundation for MSME Clusters (FMC) successfully concluded its international conference on “Just Transition to Net Zero – Role of Bamboo in the SAARC Region” at Deventure Sarovar Portico, Kapas Hera, New Delhi. The event marked a significant step toward promoting bamboo as a sustainable development tool across SAARC countries, bringing together policymakers, industry leaders, financial institutions, and civil society representatives to foster meaningful dialogue.

The inaugural session was graced by Pasha Patel, Chairman, Price Commission, Maharashtra, as the Chief Guest. Other distinguished dignitaries included Shri Ajay Shankar, Chairman, Foundation for MSME Clusters and Former Secretary to the Government of India, and Ms. Rinzi Pem, Assistant Director, Social Window, SAARC Development Fund. Their presence and insights enriched the event, setting the tone for impactful discussions.

Patel shared insights on the potential of bamboo as a sustainable

resource. Citing a study, he said all government thermal power generation units in the country release 5,90,000 MT of carbon per day into the atmosphere, adding bamboo can be an alternative to coal as a fuel for power generation.

Ajay Shankar, Chairman, Foundation for MSME Clusters, and Former Secretary to the Government of India, shared his long-term vision on the integration of bamboo into MSME and development ecosystems. Developed countries have limited scope for change as they

have already followed a carbon-intensive path. In contrast, South Asian developing countries have the opportunity to adopt a more sustainable approach.

Rinzi Pem, Assistant Director, Social Window, SAARC Development Fund, emphasized on developing the collaborative opportunities within the SAARC countries for leveraging bamboo to achieve net-zero targets.

The conference was part of the project "Promoting Integrated Bamboo-Based Enterprise Development among SAARC Countries," supported by the SAARC Development Fund since 2017. The project, implemented across Afghanistan, Bangladesh, Bhutan, India, and Nepal, engages partners such as Women's Economic Empowerment Rural Development Program (Afghanistan), BRIF (Bangladesh), Tarayana (Bhutan), FMC (India), and ABARI (Nepal). During the event, project partners from Bhutan, Nepal, and Bangladesh presented case studies


showcasing challenges, achievements, and innovations, offering valuable insights for advancing bamboo enterprise development.

Three engaging panel discussions were the highlight of the conference. The first discussion, moderated by senior journalist Naghma Sahar, focused on industry integration of bamboo. Prominent speakers like Sanjeev Karpe (Director, KONBAC), Anupam Badola (Deputy CSO, Dalmia Cement), Rajeev Pratap Singh (AGM, Business Development, Rashmi Group), and Sharda Pratap Singh (Subject Matter Expert, Hindalco Industries) shared their expertise on incorporating bamboo into industrial processes.

The second panel, moderated by Mehraj Dube, emphasized innovative financing for bamboo enterprises. Participants included Dr. R.K. Singh (CGM, SIDBI), Ritesh Sinha (Zonal Head and Vertical Head, Projects, HDFC CSR), Sanjay Sharma (Director, SPMN), and Dr. Ajithsen Selvadhas (Microcredit

and Enterprise Development Expert), who highlighted financing models to support growth in the bamboo sector.

The third discussion, moderated by Krunal Negandhi (Director, Jans Bamboo Products Pvt. Ltd.), explored the role of civil society and policy frameworks in bamboo development. Experts such as Dr. Prabhat Kumar (Mission Director, National Bamboo Mission), Dr. Ajay Thakur (Scientist, FRI), Neju George (CEO, Industries), and Anuj Srivastava (Lead-Strategic Partnership, HCL Foundation) shared valuable perspectives on leveraging grassroots involvement and robust policies.

The conference served as a collaborative platform for CSR leaders, researchers, buyers, and artisans, aiming to create a regional strategy for achieving net zero goals through bamboo-based innovations. It underscored the urgency of cross-sectoral partnerships to unlock the full potential of bamboo for sustainable development in the SAARC region. 

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An Indigenous boy in Vietnam lifts a log over his head. Image: ILO Asia-Pacific, CC BY-SA 3.0, via Flickr.

# SOUTHEAST ASIA'S ENVIRONMENTAL DEFENDERS ON THE FRONTLINE

Environmental defenders across Southeast Asia face threats, violence and legal hurdles in their fight for justice. Five share their struggles.

**A**cross Southeast Asia, environmental defenders and journalists are navigating an increasingly hostile landscape: arrest and interrogation, threats of violence, blatant disregard for the law, bureaucratic obstacles and deliberate legal ambiguity. These are not isolated incidents but part of a growing pattern of suppression aimed at silencing those who stand at the intersection of environmental justice and accountability.

The freedom of the press and civil society to investigate, report and act is a fundamental human right.

Beyond its intrinsic value, this freedom is instrumental in holding governments, corporations and other powerful actors accountable, driving transparency and shaping policies that protect both people and the planet. Without these freedoms, the pathway to environmentally and socially just outcomes is obstructed.

Yet, in Southeast Asia, these freedoms are increasingly under fire. From government crackdowns and threats of physical violence, to more insidious and indirect forms of intimidation, like lawsuits, the space for environmental defenders and journalists across the region is shrinking.

According to Global Witness, Asia accounted for the murders of 468 defenders between 2012 and 2023, with the Philippines, Indonesia and Thailand among the most dangerous in the region.

Ironically, this troubling trend is starkly at odds with regional body the Association of Southeast Asian Nations (Asean's) announcement of a draft regional environmental rights declaration in March 2024.

The declaration, which builds on the UN's 2021 formal recognition of "the right to a safe, clean, healthy and sustainable environment", aspires to enshrine this right in the region's legal and political frameworks. But the lived reality for many

environmental defenders tells a far darker story.

Five environmental defenders and journalists from across the region tell their stories.

### **Myanmar: Silencing voices amid military repression**

As a journalist with over a decade of experience in Myanmar, I have witnessed firsthand the dangers environmental defenders face. In 2016, while working for the Associated Press, my team investigated illegal logging in Kawlin and Katha townships in Myanmar's Sagaing region.

We discovered illegal loggers, backed by thugs and organised crime, intimidating local environmental activists. Despite locals knowing the locations of these illegal operations, they were powerless to act due to threats from the illegal loggers, corrupt officials

taining democratic reforms, they are unlikely to ensure environmental sustainability either.

Before the coup, there were glimmers of hope. For example, in 2019, the Clean Yangon Campaign, an environmental NGO, spearheaded by environmentalists, activists and volunteers, focused on public education and hands-on cleanups in the city.

These efforts transformed neglected areas, with alleys turned into parks and graffiti galleries. Public awareness and participation grew, demonstrating the power of education and legal advocacy in promoting environmental sustainability. However, many of the activists involved were forced to flee after the coup, effectively stalling progress.

Similarly, during Myanmar's brief quasi-democracy in 2011, activists mobilised against environmentally destructive projects like

**Beyond its intrinsic value, this freedom is instrumental in holding governments, corporations and other powerful actors accountable, driving transparency and shaping policies that protect both people and the planet. Without these freedoms, the pathway to environmentally and socially just outcomes is obstructed.**

and soldiers. Corruption within law enforcement and the Forestry Department further facilitated this exploitation of natural resources.

Under the current military regime, the situation has deteriorated. Since the 2021 coup, voices opposing the military have been systematically silenced, leaving no space for environmental advocacy. With the military incapable of sus-

the Myitsone Dam and the Sino-Myanmar gas pipeline. These protests successfully halted the dam's construction.

Yet, since the coup, the crackdown on freedom of expression has silenced all opposition, including from Indigenous communities. Environmental defenders and journalists now face severe risks under the dictatorship, including arbitrary arrests,

interrogations by military intelligence officials and imprisonment.

*By a Myanmar journalist reporting from Yangon [name withheld for safety reasons]*

### **Thailand: Legal threats and corporate collusion**

As a journalist in Thailand, I've seen how the threat to environmental defenders often takes the form of a legal warning initiated by private entities, who are frequently either joint investors in projects with the government or the developers and owners of the projects themselves.

In national or regional projects, it's rare for the national government to directly act against the defenders. Instead, their opposition is often deployed through local officials who confront the defenders, or by the government dragging its feet on necessary paperwork.

This creates a tense environment, where defenders can be subject to verbal or physical confrontations that can arise as conflicts develop and intensify.

This also happens with local projects, such as mining concessions. Environmental defenders frequently face threats from both local officials and developers – several in Thailand have been shot and killed due to their opposition to development projects.

Governments and corporations often side with each other, while excluding and marginalising local communities and environmental defenders.

These local communities, particularly when they side with environmental defenders, are often isolated from development processes and subjected to various forms of intimidation, including verbal, physical and legal threats. Environmental defenders, are also often community leaders, thus making them prime targets for threats from both local officials and developers and even members of their own communities.

*By Piyaporn Wongruang, founder and editor of the award-winning Bangkok Tribune, which focuses on the environment and development in the Mekong region*

### **Vietnam: Activists behind bars**

As an environmental reporter, I've closely followed the wave of arrests targeting leaders of non-governmental groups and the closure of environmental organisations in Vietnam, which highlights the challenging circumstances faced by activists in the one-party state.

Journalists who hold the government and influential private interests accountable face intense scrutiny. Vietnamese authorities have consistently intimidated and harassed environmental leaders, with several sentenced to prison on tax-related offences – a common tactic used by the government to suppress dissent.

Non-profit groups in Vietnam are particularly susceptible to pressure from both the state and powerful private interests due to their ambiguous legal status.

The concept of civil society is viewed by the government and the Communist Party of Vietnam as a threat to official doctrine and morality, despite the fact that the government acknowledges the importance of NGOs as partners in carrying out social and environmental projects.

Complicating matters further, government economic interests are highly intertwined with the very industries environmental defenders challenge. For example, the state owns all coal reserves in Vietnam; any calls to reduce coal usage are perceived as outright attacks on the interests of influential parties.

Despite these obstacles, the country is poised to receive billions of dollars from foreign governments, including the United States, Canada,

the EU and the United Kingdom, to facilitate a Just Energy Transition Partnership (JET-P) and Vietnam's goal of achieving net-zero emissions by 2050.

*By a Vietnamese environmental reporter working in sustainability, environmental protection and local affairs [name withheld for safety reasons]*

### **Indonesia: Nickel mining's toll on people and planet**

Indonesia is home to the world's largest nickel reserves. Critical to batteries and the EV industry, the government is aggressively expanding nickel production to establish itself as a global player in these sectors. I have witnessed the darker sides of this ambition.

The people of Kabaena, a small but nickel-rich island in South-east Sulawesi, are struggling with ecological destruction and human rights violations caused by mining. The island is inhabited by the Bajau Tribe, the last sea nomadic people in the world, whose survival depends on the sea and customary rules that preserve the marine environment.

Their unique way of life is imperilled by nickel mining. Around 73% of the island has been handed over to mining companies, in clear violation of Indonesia law, which prohibits mining on small islands with an area of less than 2,000 km<sup>2</sup>. There are currently 16 active nickel mining business permits on the island, according to data from the Ministry of Energy and Mineral Resources.

During my visits to Kabaena as a researcher earlier this year, I saw firsthand the struggles of the Kabaena people. Farmers complain that their lands are no longer fertile due to the impact of mining, while fisherpeople struggle to find fish, forcing them to venture farther into the sea.

In some villages, the seawater has become so polluted that it causes

itching and severe skin diseases among fishermen and children. Mining waste has destroyed coral reefs, polluted the sea and driven fish away.

A report published this year by the civil society organisations, Satya Bumi and Walhi Southeast Sulawesi, revealed that many Bajau parents now forbid their children from swimming in the sea.

Once trained as divers from a young age, Bajau children are no longer taught this essential skill on account of the polluted seawater, which makes their skin itchy and sore. Tragically, three Bajau children drowned after falling into murky water. Unable to swim, they did not survive.

While conducting my research on Kabaena, I was repeatedly stopped and asked if I had authorisation. At times, I suspected we were being followed by individuals linked to mining operations. I also met with local people there who have been fighting to expel mining companies from their lands since 2007. One of these individuals has received multiple threats and is even being investigated by the police on account of his activism.

*An environmental defender with focus on Indigenous Peoples based in Indonesia [name withheld for safety reasons]*

### **Cambodia: Riding roughshod over Indigenous land rights**

As an Indigenous environmental defender in Cambodia, I face a complex and often ambiguous situation regarding our communities' rights. A law passed in 2001 officially recognised our land rights, but because many of us live near natural resources, economic and political interests often override those rights.

The government lacks genuine commitment to implementing the laws that respect and protect our rights. Much of the land that has

always belonged to us has been reclassified as state land. When we try to claim our rights, the government uses other laws to challenge us. This is particularly evident when we demand our right to land and natural resources under the 2001 communal land titles. This has also been the case when our people try to protect the forest. When we try to partner

As a result, we turn to social media, or national and international media to raise awareness of issues and to pressure the government to intervene. We also try to use existing mechanisms at the local level, for example applying for community protected areas, communal land titles, or orders to safeguard our forests. We also try our best to protect

**The people of Kabaena, a small but nickel-rich island in Southeast Sulawesi, are struggling with ecological destruction and human rights violations caused by mining. The island is inhabited by the Bajau Tribe, the last sea nomadic people in the world, whose survival depends on the sea and customary rules that preserve the marine environment.**

with the government and Ministry of Environment, we are often told, "No, this does not belong to you. It belongs to this department, to this ministry, or this administration."

This makes it very difficult for us to contribute to conservation efforts. When we identify cases of illegal logging or activities that harm the forest, natural resources or wildlife, we face threats – not just from illegal loggers, but also from local authorities. Our human rights defenders often encounter violence, including death threats.

The government also accuses us of being influenced by the political agendas of foreign agents, often pointing fingers at the involvement of NGOs in our work. This creates additional barriers for us to participate freely in conservation and protection efforts.

forest borders and block opportunities for illegal logging.

While these efforts have allowed us to save some forests, addressing the root causes of these issues remains incredibly challenging. We are given such little space to act, and our legal rights are rarely acknowledged. Our rights need to be respected, and we should not have targets placed on our backs. 📍

*By Lorang Yun, a Bunong Indigenous advocate from the Cambodia Indigenous Peoples Alliance, working with four Indigenous groups, including the Bunong, Stieng, Thmorn and Kroal.*

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*(Source: <https://www.eco-business.com/news/southeast-asias-environmental-defenders-on-the-frontline/>)*

# ONLY FIVE PROPOSALS FOR COAL PLANTS REMAIN ACROSS OECD'S 38 COUNTRIES

The number of new coal plants under development in the Organisation for Economic Co-operation and Development (OECD) region has reached record lows since the signing of the Paris Agreement in 2015, states **Christine Shearer**, Carbon Brief





he OECD is an intergovernmental organisation with 38 member countries, founded in 1961 to stimulate economic growth and global trade. It includes many of the world's wealthiest countries. In all, the number of proposed coal plants in the OECD region has decreased from 142 in 2015 to five today – a 96% fall.

This is according to the latest data from Global Energy Monitor's Global Coal Plant Tracker (GCPT), which includes the third quarter (Q3) of 2024.

The GCPT catalogues all coal-fired power units 30 megawatts (MW) or larger, with the first survey dating back to 2014.

The fall in proposals puts the OECD region well on its way to meeting UN secretary-general Antonio Guterres's 2019 call for "no new coal", defined as the cancelling of all unabated coal proposals not already under construction.

It means that one of the five remaining proposals could be the last new coal-fired power station to ever be built in the OECD.

#### THE OECD AND NO NEW COAL

Of the 13 OECD countries with coal plant proposals in 2015, all but Turkey have since pledged to stop building new coal plants.

Indeed, since 2015, proposed coal-fired capacity in the OECD has fallen from 142 coal proposals totalling 111 gigawatts (GW) to just five proposals totalling 3GW, GCPT data shows.

However, there are exceptions for coal plants that significantly lessen

or "abate" carbon dioxide (CO<sub>2</sub>) emissions through the use of carbon capture and storage (CCS) technology. Four of the five proposals – shown in the map below – include plans for CCS.

Moreover, none of the five proposals currently have the necessary permits for construction. This means it will likely be several years before construction begins – if they are built at all, as most of the proposals in the OECD since 2015 have been abandoned entirely. Of the 111GW of new coal capacity that was proposed in 2015, 82% (91GW) has since been shelved or cancelled, compared to 17% (19GW) commissioned.

This is a large part of the reduction in the coal pipeline in the OECD, shown in the figure below.

The most recent coal plants to enter the construction phase in the OECD broke ground in 2019. Its 1GW of capacity remains under construction today.

The 111GW of proposals in 2015 listed in the GCPT were located across 13 countries: Australia, Canada, Colombia, Germany, Greece, Israel, Italy, Japan, Poland, South Korea, Turkey, the UK and the US.

Since 2015, 12 of the 13 countries have pledged support for no new coal, whether as part of the international Powering Past Coal Alliance or through a domestic moratorium on new coal plant permits. The UK phased out coal power entirely this year. These commitments to no new coal have been aided by the decreasing costs of competing power sources, including gas and – increasingly – solar and wind power.

Additionally, many countries have seen sustained opposition campaigns to new coal plants over the pollution they would cause, their high energy costs and population displacement. As the OECD turns away from new coal, coal power capacity in the region peaked in 2010 at 655GW and has since declined by about one-third to 443GW, as countries shut down ageing coal plants.

#### TURKEY RESISTS NO NEW COAL

To date, the government of Turkey has resisted calls for no new coal, despite repeated rollbacks in its coal plans. The vast majority of the country's proposed coal plants have never materialised, as shown in the figure below.

### Only five coal plant proposals remaining in the OECD

OECD coal plant proposals with status announced, pre-permit, or permitted



Source: Global Coal Plant Tracker, October 2024

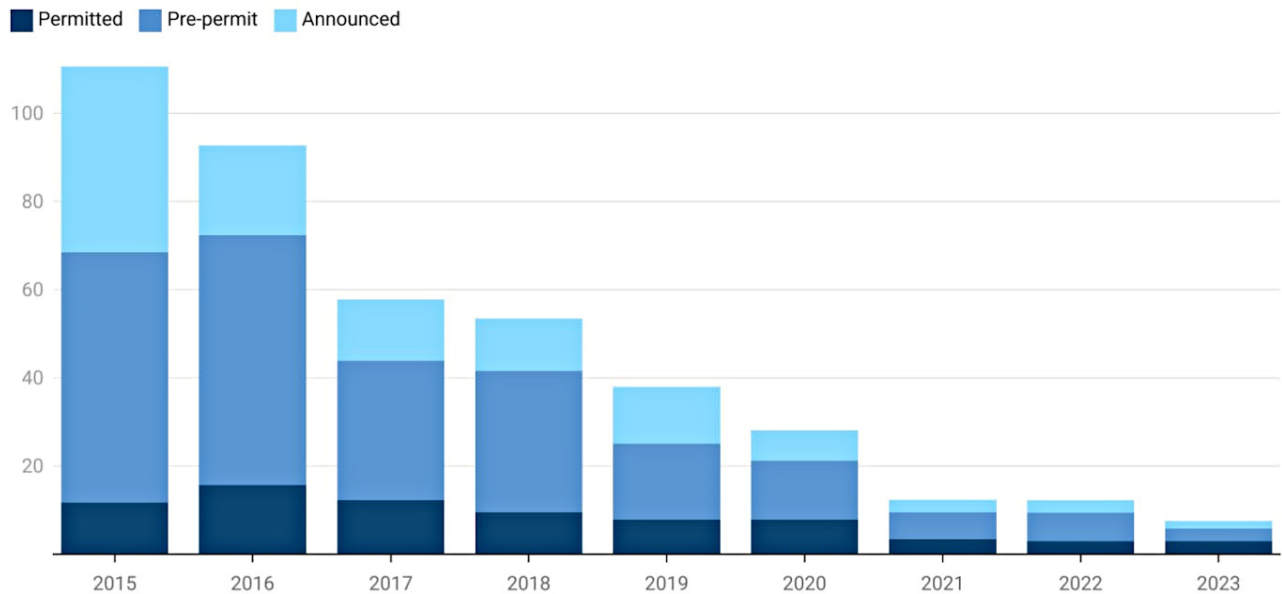


Map showing the five remaining coal plant proposals in OECD countries, in the US, Turkey, Japan and Australia.

Source: Global Coal Plant Tracker, Global Energy Monitor.

### OECD is getting closer to no new coal

Coal-fired power capacity in OECD countries by status, in gigawatts (GW)



Source: Global Coal Plant Tracker, October 2024



Permitted, pre-permit and announced coal capacity in OECD countries in GW. Source: Global Coal Plant Tracker, Global Energy Monitor.

Specifically, since 2015, more than 70GW of planned coal plant capacity in Turkey has been called off, compared to 6GW commissioned, translating into a cancellation rate of 92% since 2015. This is one of the highest cancellation rates in the world, GCPT data shows.

Coal plant proposals in Turkey face a myriad of challenges, including strong public opposition over coal plant pollution and coal industry privatisation. Additionally, domestic lignite coal is low-quality and unreliable, often leading many plants to use higher-cost imported coal instead, weakening the economic case for continued reliance on coal.

In the third quarter of 2024, the licenses for two coal plants – Karaburun and Kirazlıdere – were cancelled

due to irregularities in the environmental permitting process and the loss of interest in the investment by plant sponsors. Another plant, Malkara, was shelved due to a lack of activity, GCPT notes.

The developments have left Turkey with only one coal plant proposal – a remarkable development after being among the top 10 countries with proposed coal-powered capacity for nearly a decade.

Despite this, Turkey has not committed to ending new coal plant proposals. Indeed, its recently updated enhanced climate plan, known as a nationally determined contribution submitted during COP29, makes no mention of coal phaseout.

The country’s remaining proposal is a 688MW two-unit expansion

of the sizable Afşin-Elbistan power station complex in the city of Kahramanmara.

Local residents have opposed the project, saying the increase in pollution in the densely populated city will lead to thousands of premature deaths and cost billions of dollars.

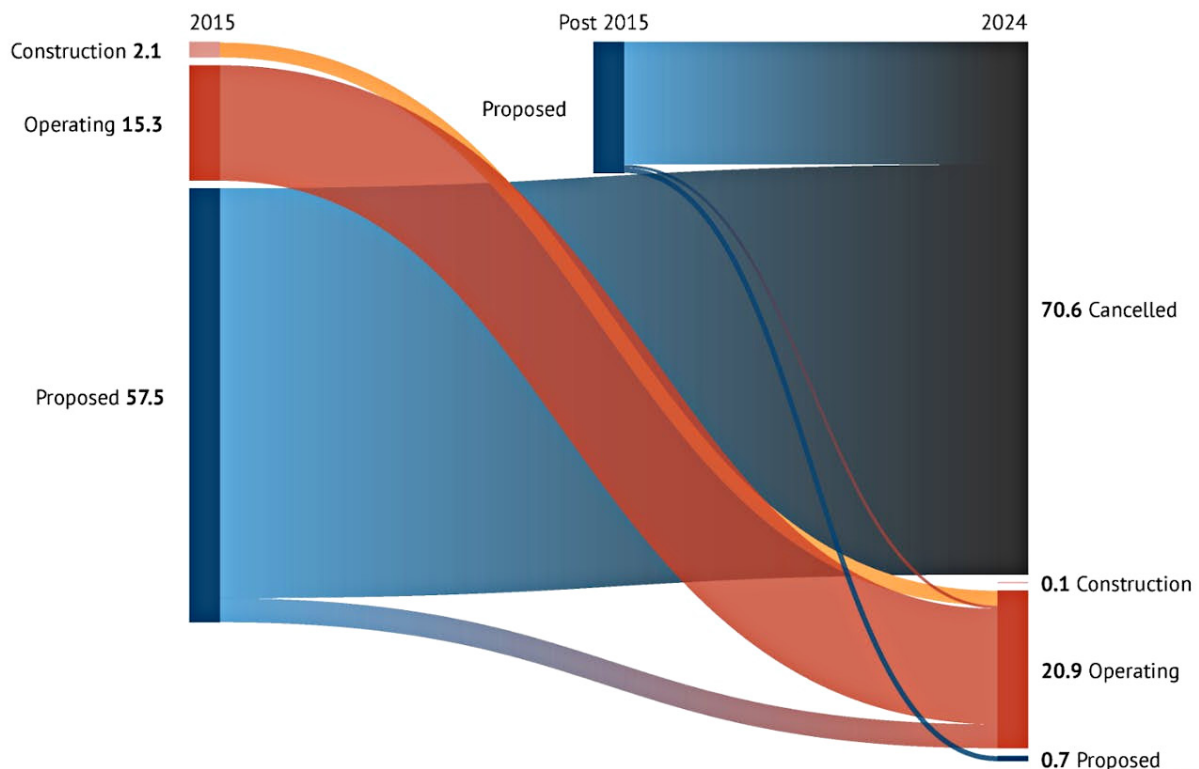
**AUSTRALIA, JAPAN, THE US AND ‘CLEAN COAL’**

The remaining four coal plant proposals in the OECD are located in Australia, Japan and the US.

While the government of Australia recently pledged support for no new coal and the Japanese and US governments were part of the recent G7 commitment to coal phaseout, the three countries also support CCS to lessen or “abate” emissions from

**Most proposed coal plant capacity in Turkey has been cancelled**

Change in coal plant status, 2015-2024 (gigawatts)



Source: Global Coal Plant Tracker, Global Energy Monitor



Coal power plants in Turkey by capacity (GW) based on status, showing what was in construction, operating and proposed before 2015 and what has been cancelled, constructed, is operating and is proposed in 2024. Source: Global Coal Plant Tracker, Global Energy Monitor.

coal plants. Abated coal plants may be considered compatible with no new coal pledges if they “substantially reduce” carbon emissions enough to meet Paris-aligned targets.

Critics argue that coal CCS proposals are more expensive and polluting than cleaner electricity alternatives, often relying heavily on government subsidies in order to be economically viable.

Only a handful of CCS coal plants have ever reached commercial operation – and none have captured as much of the resulting CO2 as they were targeting.

The Japanese government signed on to a G7 agreement earlier this year to phase out unabated coal power by the mid-2030s and continues to promote a suite of “clean coal” technologies, both domestically and abroad.

The country’s single remaining coal plant proposal is a new coal “gasification” unit at J-Power’s Matsushima power station, dubbed

GENESIS. The plant would gasify the coal, then co-fire the resulting gases with biomass, ammonia and hydrogen, before using CCS to abate the resulting emissions.


Under outgoing president Joe Biden, the US also signed on to the G7 agreement and was one of twelve countries that joined the Powering Past Coal Alliance during COP28 in 2023.

The country has two Department of Energy (DOE)-backed coal-fired power plant proposals that include plans for CCS, as required under pending Environmental Protection Agency (EPA) regulations for new coal power plants.

While the future of both the coal pledges and regulations are uncertain, given the recent re-election of Donald Trump, to date the former president has been unable to turn the tide for coal. More coal power capacity was retired under Trump’s first term than either Barack

Obama or Biden, and no new coal plants have been built in the US for over a decade.

Australia’s Labor party voted into power in 2022 recently joined a COP29 call for no new unabated coal. The country has not commissioned a new coal plant since 2012, with over 13GW of proposed coal-fired capacity cancelled since 2010.

The country’s remaining coal proposal, the Collinsville (Shine Energy) power station, has been touted by its sponsors as a “high efficiency, low emissions” (HELE) coal project with plans to include CCS. Despite these sparse plans for the development of further coal projects, therefore, it seems clear that the end is in sight for coal power in the OECD. 

*This story was published with permission from Carbon Brief.*

*(Source: <https://www.eco-business.com/news/analysis-only-five-proposals-for-coal-plants-remain-across-oceds-38-countries/>)*

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# IIM LUCKNOW FACULTY RESEARCH OUTLINES \$1.7 TRILLION INVESTMENT TO ACHIEVE NET-ZERO EMISSIONS FOR INDIA'S INDUSTRY

The research highlights the need for unprecedented collaboration among industries, policymakers, and global financiers to achieve net-zero emissions.

**R**esearchers from Indian Institute of Management Lucknow and Ahmedabad University have conducted a study outlining the necessary steps for India's industrial sector to achieve net-zero emissions by 2070. The study has been published in the prestigious journal *Applied Energy* and emphasises the need for transformative changes in the industrial domain of India to align with the nation's net-zero emissions target. The study presents a comprehensive roadmap focusing on energy efficiency, material recycling, and investments in clean technologies such as carbon capture and hydrogen.

India's industrial sector plays a critical role in the economy, contributing significantly to employment and output. However, it is also a major emitter of greenhouse gases, accounting for 22% of the country's total emissions. While initiatives like "Make in India" are driving rapid growth, the sector's reliance on fossil fuels, including coal, oil, and natural gas, presents a significant challenge for decarbonization.

The research focused on key industries such as steel, cement, aluminium, chemicals, and textiles. It used expert insights and energy-economy models to develop four possible future scenarios -

- Business-As-Usual
- Development First
- Carbon Neutral
- Synchronous

Each scenario explores how varying levels of policies and technologies could influence industrial growth, environmental impact, and the required investments.

Speaking about the research, Prof. Dipti Gupta, Assistant Professor, Business Sustainability, IIM Lucknow, said, "The study is an attempt to understand what the transition looks like in the coming decades as India approaches its target of achieving net zero emissions by 2070. As the Indian economy grows rapidly in future, the speed and scale of India's industry sector transition will be unprecedented.

Developing the manufacturing sector while minimising negative environmental and societal impacts will be the key elements of a low carbon pathway for India. Decarbonizing industry sector will require rapid technology development, international finance for scaling up key technologies, innovative business models and standardized emission reporting."

The researchers found that with the right policies and the rapid adoption of advanced technologies, India could reduce industrial emissions by 63% by 2050. The "SYNCH" scenario shows that strong action to reduce pollution is possible, but it would require an investment of approxi-

mately \$1.7 trillion by 2050. This funding would be directed toward cleaner electricity, enhanced material recycling systems, and technologies that capture and store carbon.

The study identifies three key actions: First, improving energy efficiency should be the immediate priority, as it is the most cost-effective

and fastest way to reduce emissions. Second, improving material efficiency requires a comprehensive approach, including regulations that require businesses to disclose their pollution and resource use. Third, the government should strengthen programs like emission trading and establish

clear rules for carbon tracking and reporting to help businesses adopt sustainable practices.

It also stresses that India will require financial support and technology transfers from other countries to make this transition. Emerging technologies like hydrogen-based systems and carbon capture are still under development, but must be expanded to support sustainable industrial growth. Success will depend on significant investments, faster technology adoption, and policies that balance economic progress with environmental protection. 



Prof. Dipti Gupta, IIM Lucknow



The latest Net Zero Stocktake report reveals a 23 per cent increase in corporate target setting over the last 18 months, with a notable increase in Asia. Image: Oregon Department of Transportation, CC BY-SA 3.0, via Flickr.

# COMPANIES ARE NOT DITCHING NET ZERO – THEY ARE REFINING GOALS

Instead of backtracking on net zero, companies are retracting unsubstantiated carbon neutrality claims – a positive development.

By John Lang

In recent months, major companies have back-pedalled on their climate commitments. Shell's 2035 target is dead and buried.

BP has abandoned a target to cut oil and gas output by 2030, and Norwegian state-owned oil company Equinor is toying with dropping its renewable energy ambitions entirely.

Other companies, including Volvo and Air New Zealand, have weakened their near-term net zero and clean energy ambitions.

Unilever's decision to drop its plastic pollution and biodiversity goals has been widely publicised while Morgan Stanley, one of the world's largest creditors of the fossil fuel sector, pulled back on previous plans to trim financing for fossil fuel projects.

Are we seeing a massive outbreak of socially contagious fatalism amid a net zero recession? Is it truly impossible to eliminate fossil fuels from modern business operations? No, and no. What we're actually seeing is that when you shake this system hard, a bunch of companies are going to fall out of the bottom. And the system is being shaken to its core.

There has been an explosive rise in climate lawsuits against major oil companies, many centred on misleading green claims. Various other types of 'climate-washing' cases are being brought against the world's largest companies.

A substantial proportion of climate-related lawsuits are penalising companies for 'climate washing.' Meanwhile, net zero-related regulations are rapidly proliferating worldwide. It is to be expected perhaps that people are focusing on what has been ditched, rather than on what remains, but the outlook is positive.

The latest Net Zero Stocktake report reveals a 23 per cent increase in corporate target setting over the last 18 months, with a notable increase in Asia.

A report by the MSCI Sustainability Institute shows a steady increase

in corporate emission disclosures, including for full value chain emissions, or so called Scope 3 emissions.

The latest benchmark from the Climate Action 100+, an investor-led initiative to ensure the world's largest corporate emitters take necessary action on climate change, reveals improvements in target-setting, emissions intensity reductions and disclosures, despite a few companies scaling back short-term ambitions.

A NewClimate Institute analysis of more than 70 corporate climate strategies since 2022 shows no indication of 'greenhushing.' Overall, the

ence; and pursuing beyond value chain mitigation to allow companies to take responsibility for their unabated greenhouse gas emissions are welcome developments.

Quiet but meaningful progress is being made. Several companies are shunning offsets in favour of more direct emissions reductions.

A global structural decline of fossil fuels is both inevitable and within sight. Even if no new climate policies were implemented ever again, there is no stopping a downward shift in humans burning coal, oil and gas.

**Climate commitments and goals remain important for identifying which organisations are enabling and accelerating the transition, and which are recklessly attempting to slow it down in the false hope of temporary, short-term gains.**

evidence suggests that, instead of backtracking on net zero, major companies are retracting unsubstantiated carbon neutrality claims - a decidedly positive development.


### Corporate recalibration

Contrary to the narrative of mass retreat, we are witnessing the pattern we'd expect from large-scale recalibration. The innovation-driven 'big tent' phase of net zero was a valuable and necessary surge that propelled climate into the boardrooms and corridors of hundreds of thousands of businesses.

However, all of this is irrelevant if emissions don't plummet soon. The renewed focus on reducing emissions; implementing supply chain and product-use interventions; maximising the clout of companies across their full spheres of influ-

All companies will be caught in this whirlwind, irrespective of the presence or absence of targets. The difference will simply be between those who take advantage of the shift and those who are buffeted by it.

Climate commitments and goals remain important for identifying which organisations are enabling and accelerating the transition, and which are recklessly attempting to slow it down in the false hope of temporary, short-term gains.

As companies recalibrate their net zero ambitions, we need to help them with strong regulations, recognition for positive corporate actions and increased scrutiny of the worst greenwashers and delayers. 

(Source: <https://www.eco-business.com/opinion/companies-are-not-ditching-net-zero-they-are-refining-goals/>)



Civil society groups at COP29 estimated that the impact of inflation would cut the “real” value of the US\$300 billion to US\$175 billion in today’s money by 2035. This is based on an annual inflation rate of 5 per cent.  
Image: UNclimatechange, CC BY-SA 3.0, via Flickr.

# WHY THE US\$300 BILLION CLIMATE-FINANCE GOAL IS EVEN LESS AMBITIOUS THAN IT SEEMS

At COP29 in Baku, developed-country parties such as the EU, the US and Japan agreed to help raise “at least” US\$300 billion a year by 2035 for climate action in developing countries, writes **Josh Gabbatiss**, Carbon Brief



**T**he goal was welcomed by global-north leaders and presented as a “tripling” of the previous target for international climate finance. Yet it faced a strong backlash from many developing countries, with some branding it a “joke” and “betrayal”. Closer analysis of the goal and climate-finance data helps to explain this response.

Analysts have shown that the target is achievable with virtually “no additional budgetary effort” from developed countries, beyond already-committed increases.

A combination of pre-existing national pledges and multilateral development bank (MDB) plans will bring climate finance up to around US\$200 billion a year by the end of this decade.

Counting money already being distributed by emerging economies such as China – as “encouraged” under the new goal – could bring the total to US\$265 billion by 2030. This could mean the target is well on its way to being met by that date, with minimal extra effort.

Moreover, as activists and academics have noted, the US\$300 billion target does not account for inflation. When this is factored in, its “real” value could shrink by around a quarter. The new target

has emerged against a backdrop of financial strain and political uncertainty in developed countries.

At the same time, developing countries have stressed that they need climate finance to reach the “trillions of dollars” needed to cut emissions and protect themselves from climate change.

This article looks at three ways in which the US\$300 billion goal could be met with little extra financial effort by developed countries – and provide fewer benefits for developing countries than the figure suggests.

### **1. Much of the goal will be met with ‘no additional effort’**

The US\$300 billion climate-finance target agreed at COP29 in Baku will be met with finance from a “wide variety of sources”, largely coming from developed countries.

This part of the “new collective quantified goal” (NCQG) for climate finance is likely to be made up of public finance provided directly by governments, as well as money from MDBs, specialised climate funds and private finance “mobilised” by public investments.

The wording of the US\$300 billion goal frames it as an extension of the US\$100 billion target. This was the amount that developed countries

agreed in 2009 to raise for developing countries annually by 2020 – a goal that was extended through to 2025 by the Paris Agreement.

Beyond the central goal of US\$300 billion, the NCQG also includes a much broader “aspirational” target of US\$1.3 trillion a year in climate finance by 2035.

However, this is harder to assess, as the text of the deal is vague about who will be responsible for raising the funds, which could include various sources that are beyond the jurisdiction of the UN climate process. Developed countries and MDBs had already committed to raising their climate-finance contributions before a deal was struck at COP29, as noted in a joint analysis by the Natural Resources Defense Council (NRDC), ODI, Germanwatch and ECCO.

The collective impact of these pre-existing commitments can be seen below, with climate finance from developed countries set to increase from US\$115.9 billion in 2022 – the most recent year for which data is available – to US\$197 billion in 2030. This can be seen in the chart below, which does not account for inflation.

The expected increase between 2022 and 2030 comes from a few different sources.

The analysts calculated that climate finance distributed “bilaterally” – as grants or loans via overseas aid and other public funding – was already expected to increase US\$6.6 billion annually by 2025, based on existing pledges, bringing the total to US\$50 billion. (The chart below assumes that bilateral finance remains at this level up to 2030.)

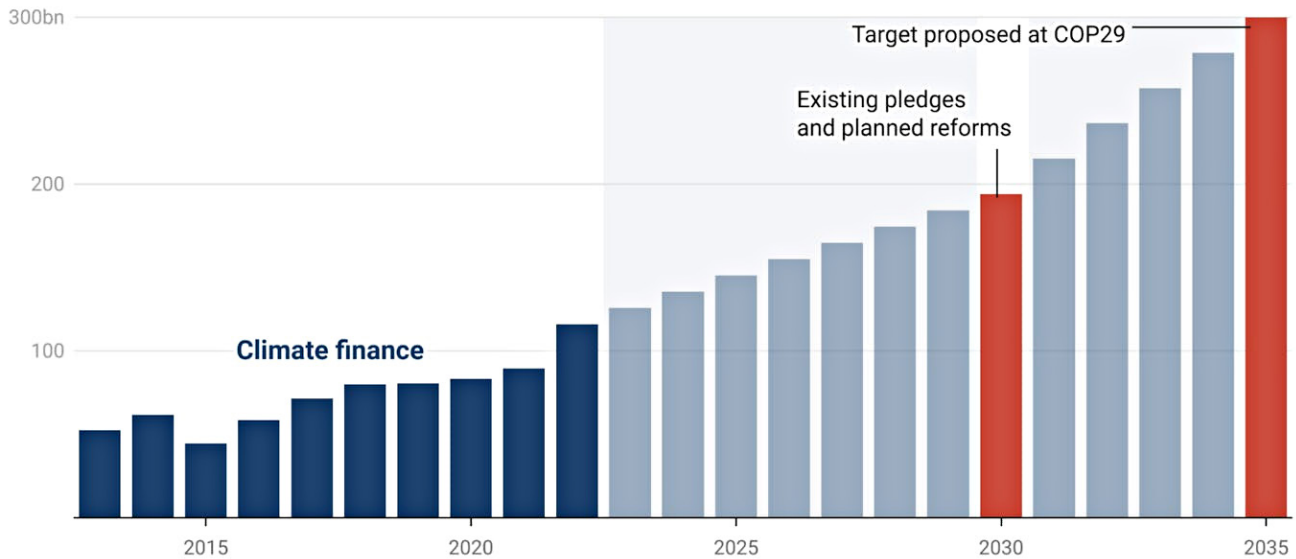
They also estimated that existing pledges and reforms at specialised climate funds, such as the Green Climate Fund and Climate Investment Funds, would add another US\$1.3 billion per year by 2030. This would bring their contribution to US\$5 billion.

The biggest increase that was already locked in before the COP29

**The analysts calculated that climate finance distributed “bilaterally” – as grants or loans via overseas aid and other public funding – was already expected to increase US\$6.6 billion annually by 2025, based on existing pledges, bringing the total to US\$50 billion.**

## Climate finance from developed to developing countries would already reach around \$200bn by 2030 with 'no additional effort'

Historical climate finance and potential future trajectories, \$bn



Source: OECD, NRDC, NCQG text.

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CLEAR ON CLIMATE

**Estimated climate finance in 2030, based on funds that have already been pledged, and target set at COP29 for 2035 (red). Dark blue bars show historical climate finance recorded by the Organisation for Economic Co-operation and Development (OECD), 2013-2022 (grey). The light blue bars indicate an estimated trajectory to reach the 2030 and 2035 levels. These figures do not account for inflation. Source: OECD, NRDC, NCQG text.**

deal was a pledge by MDBs – which provide 40 per cent of existing climate finance – to increase their contributions further.

A joint statement by the World Bank, the Asian Development Bank and others in the first week of COP29 committed to raising US\$120 billion of climate finance per year by 2030 for low- and middle-income countries. Of this, US\$84 billion can be attributed to developed countries, based on their shareholdings in these banks.

On top of this, the climate-finance analysts estimated that US\$58 billion of private finance would be mobilised by these bilateral and multilateral contributions in 2030 – up from US\$21.9 billion in 2022.

The chart below shows the estimated breakdown, by source, of climate finance in 2030, compared to

2022. These expected increases over the course of this decade mean that with “no additional efforts”, beyond what had already been agreed prior to COP29, developed countries would have been on a trajectory to reach around US\$200 billion per year by 2030, and US\$250 billion per year by 2035. (The latter was the first numerical target proposed by developed countries at COP29, which was, ultimately, negotiated upwards to US\$300 billion on the final day.)

NRDC climate-finance expert Joe Thwaites, one of the researchers who undertook the analysis, tells Carbon Brief that bilateral funding directly from governments is the “big constraint” in climate finance. COP29 came just after the re-election in the US of climate-sceptic Donald Trump and many European coun-

tries have cut their aid budgets.

Thwaites says:

“The MDBs are growing and doing all kinds of reforms and getting bigger and better, but the bilaterals are what are politically very stuck.”

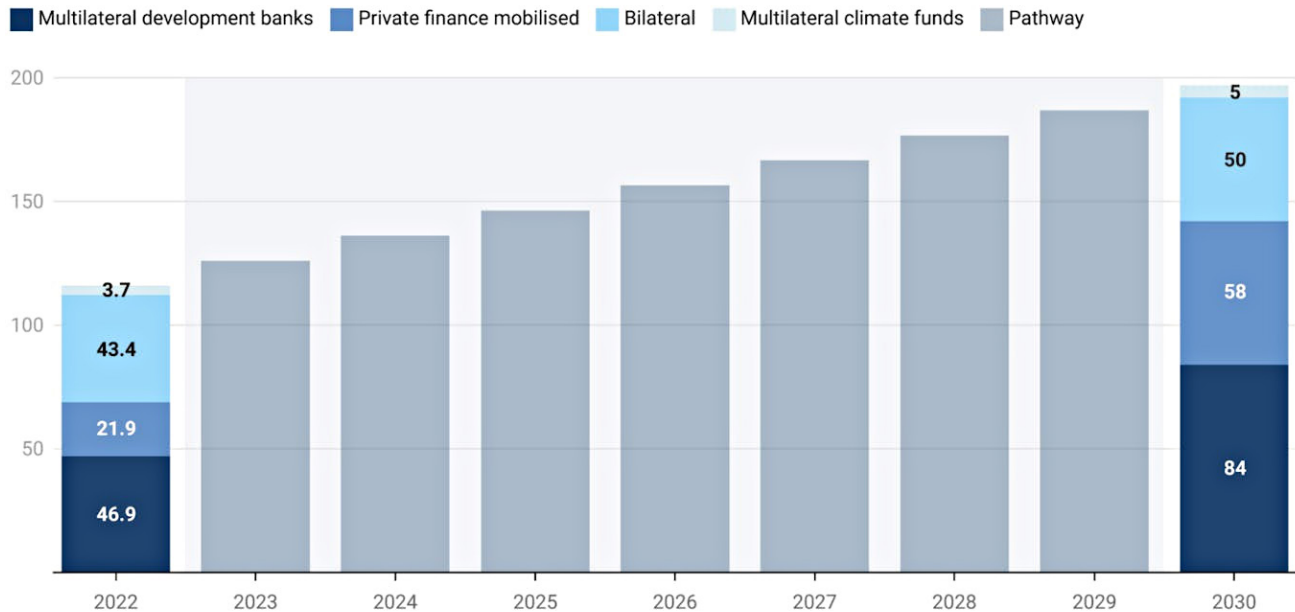
Moreover, the COP29 climate-finance deal contains no pledge by developed countries to provide a set amount of public, bilateral finance, despite strong pressure from developing countries to include such a goal.

Following COP29, Thwaites released updated modelling to calculate different ways of reaching the US\$300 billion target. He wrote:

“What is clear is that US\$300 billion by 2035 is eminently achievable, with little to no additional budgetary effort required from developed countries, let alone other contributors, to meet the goal.”

## Climate finance from development banks and private sources is expected to double by 2030

Climate finance mobilised in 2022 and expected due to existing pledges by 2030, by source, \$



Source: OECD, NRDC, NCQG text.

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Historical climate finance in 2022 and estimated climate finance in 2030, by source. Source: OECD, NRDC, NCQG text.

### 2. Developing-country contributions could cover part of the goal

Unlike the earlier US\$100 billion target, contributions from developing countries could count towards the new climate finance goal.

Only developed countries are obliged to provide climate finance to developing countries under the Paris Agreement. But the NCQG outcome says that developing countries can “voluntarily” declare any climate-related funds they contribute, if they choose to do so. This allowed negotiators at COP29 to skirt the controversial issue of formally expanding the list of official donors that are required to help with financial aid.

Developed countries had previously been pushing to enlist relatively wealthy developing nations, such as China and the Gulf states, to share the financial burden.

Several countries described since the early 1990s as “developing” under the UN’s climate convention are known to already make large, climate-related financial contributions to other developing countries. Examples include China’s Belt and Road initiative supporting clean-energy expansion and South Korea’s contributions to the GCF.

In fact, at COP29 China announced for the first time that it had “provided and mobilised” more than US\$24.5 billion for climate projects in developing countries since 2017 – confirming that its contributions are comparable with those of many developed countries.

This roughly aligns with calculations by research groups that have placed China’s annual climate finance at around US\$4 billion a year.

Both developed and developing countries pay money into MDBs. As

well as “encouraging” developing countries to voluntarily contribute directly to climate finance, the NCQG outcome also specifies that these countries could start counting the share of climate-related money paid out of MDBs that can be traced back to their inputs.

Roughly, 30 per cent of the banks’ “outflows” can be attributed to developing countries in this way.

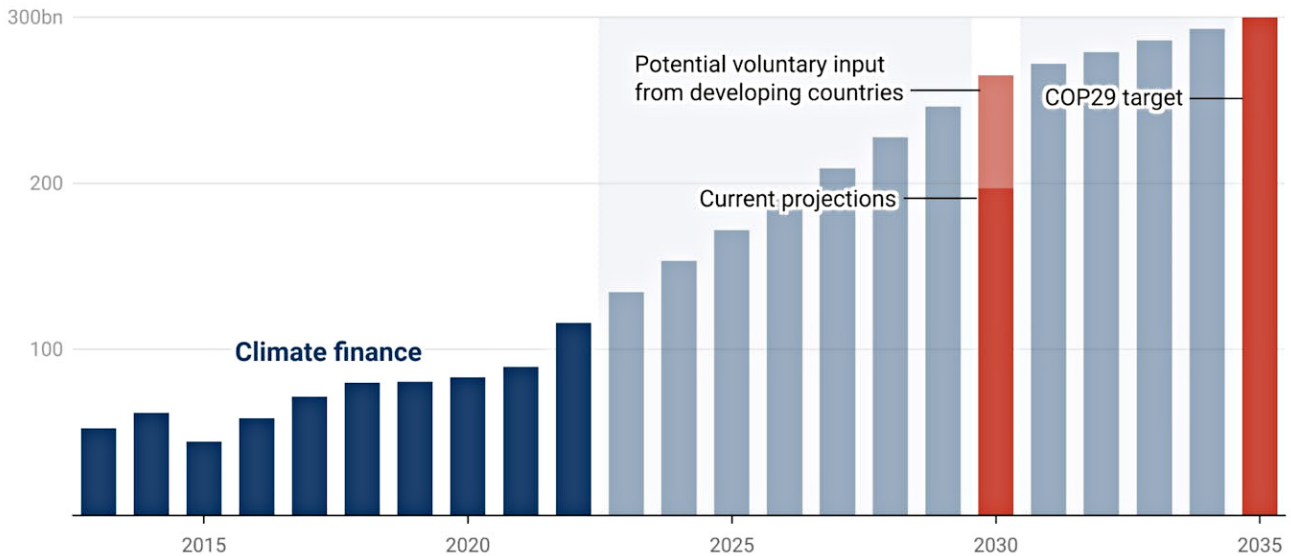
Counting the developing-country share of the projected increase in climate finance from MDBs by 2030 would add an extra US\$36 billion to the global total, plus an extra US\$20 billion of private finance mobilised by the funds.

It is not possible to say for sure how much climate finance new contributors such as China will choose to officially declare.

However, the chart below shows an estimate based on an “illustrative scenario”, by NRDC and others, of

## Voluntary contributions from developing countries could bring climate finance to around \$265bn by 2030

Historical climate finance and potential future trajectories, \$bn



Source: OECD, NRDC, NCQG text.

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**Potential voluntary contributions of climate finance by developing countries, including bilateral finance, contributions to multilateral funds, outflows from MDBs allocated to developing countries and private finance mobilised by developing country contributions to MDBs (lighter red), on top of estimated climate finance from developed countries in 2030 (red). The second red bar indicates the NCQG climate-finance target agreed for 2035 at COP29. The light blue bars indicate an estimated trajectory to reach the 2030 and 2035 levels. These figures do not account for inflation. Source: OECD, NRDC, NCQG text.**

bilateral finance and multilateral climate funds, combined with expected MDB outflows and the associated private finance that this would mobilise. This could bring total annual climate finance up to US\$265 billion by 2030.

Some observers at COP29 said they hoped that officially counting developing-country contributions towards UN “climate finance” targets would enable parties, such as the EU, to set more ambitious goals.

However, Michai Robertson, lead finance negotiator for the Alliance of Small Island States (AOSIS), dismissed this as an “accounting trick”, because these funds are already being provided.

Li Shuo, head of the China climate hub at the Asia Society Policy Institute (ASPI), tells Carbon Brief that the NCQG outcome could bring

more attention to China’s climate-related aid and lead to “stronger and better climate support from Beijing”. However, he notes that this is in the context of a low-ambition global target that is a “far cry” from what is needed:

“I take this as a classic example of geopolitical competition weakening environmental ambition, namely, the geopolitical desire of including China as a donor without corresponding desire of developed countries to contribute more limited the overall scale of climate finance.”

### 3. Inflation wipes out much of the increase in climate finance

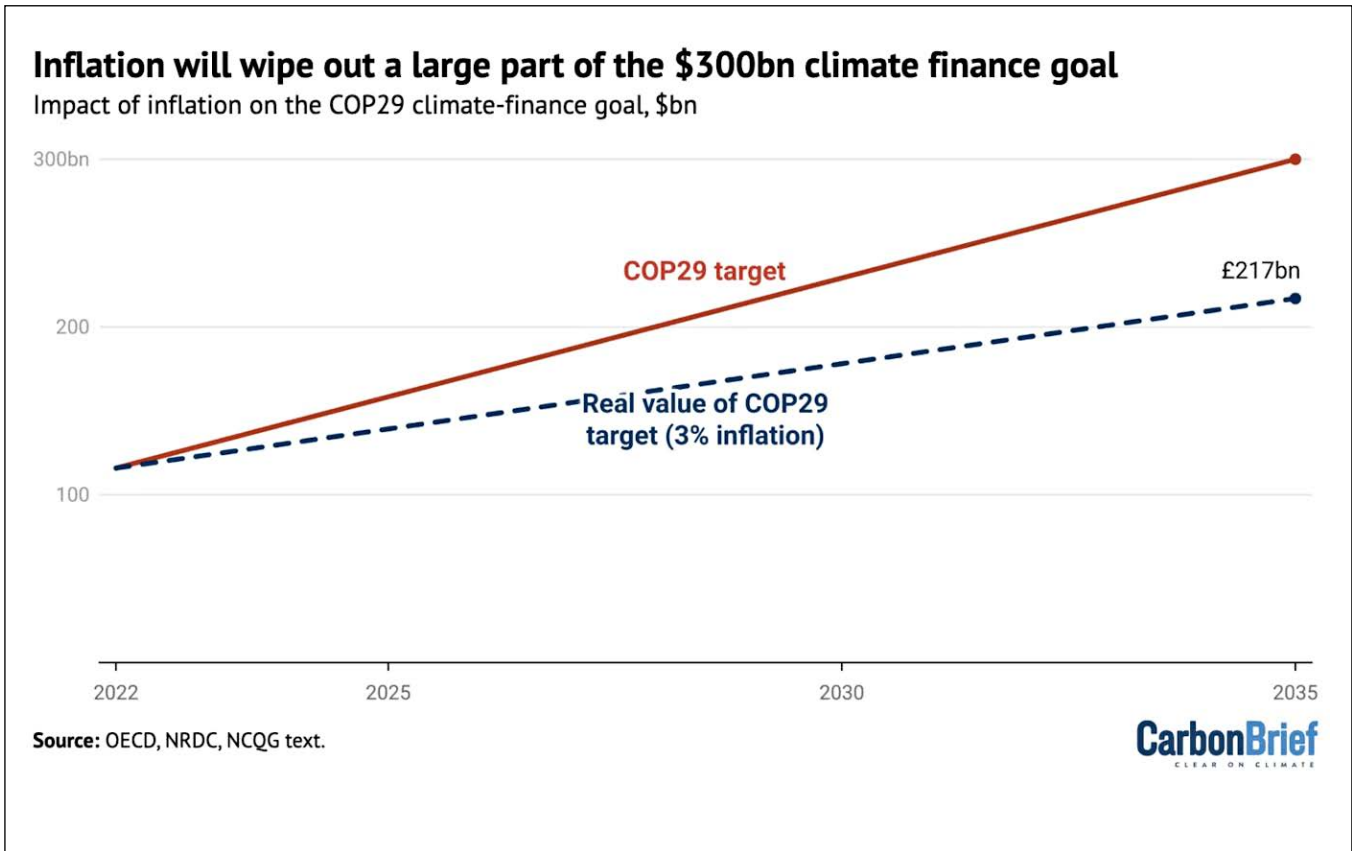
One issue that has surfaced in the wake of COP29 is the impact of inflation. Campaigners have noted that the failure to factor this into the

2035 climate-finance target means that, by the time it is met, the true value of the money pledged will be far lower than it is today.

In an article highlighting this issue, the Guardian reported that the US\$300 billion goal was, therefore, “not the tripling of pledges that has been claimed”.

Researchers had flagged this before COP29, pointing out that the previous US\$100 billion annually by 2020 goal, which was first set in 2009, had also not accounted for inflation.

They noted that merely correcting the US\$100 billion for inflation would bring it to between US\$139 billion and around US\$150 billion a year. (Such calculations depend on the rate of inflation applied to the starting figure, as well as the base year for the calculation.) Civil-society groups at COP29, such as



**Increase in climate finance between 2022 and 2035 under the NCQG commitment in nominal terms (red line), and based on the “real” value of the US\$300 billion climate-finance pledge in 2024 value terms (blue dotted line).** Source: Carbon Brief calculation based on a 3 per cent inflation rate, as used by CGD.

Power Shift Africa, estimated that the impact of inflation would cut the “real” value of the US\$300 billion to US\$175 billion in today’s money by 2035. This is based on an annual inflation rate of 5 per cent.

In its analysis, the Guardian opted for an inflation rate of 2.4 per cent – based on the average rate in the US over the past 15 years. This is taken to reflect the conditions for governments contributing climate finance and the currency much of it would be provided in.

The figure below shows the impact of an inflation rate of 3 per cent. This is based on input from economists and analysis by the Center for Global Development (CGD), which, in turn, is based on the World Bank’s global GDP deflator.

If inflation over the next decade follows this trend, the US\$300 billion pledged in 2024 would only

be worth US\$217 billion in today’s money in 2035 – a 28 per cent reduction in value.

In order to offer climate finance with a real value of US\$300 billion in 2035, countries would have needed to set a goal for that year of around US\$415 billion.

(The figures in the chart above cannot be directly compared with the existing pledges made by governments and MDBs, as those too would need to be adjusted for inflation.)

CGD modelling suggests that if developed countries’ climate-finance contributions simply increase in line with expected inflation and gross national income (GNI) growth, they would reach US\$220 billion by 2035.

The CGD analysts write in a blog post that “by the time the new goal is met, beneficiary countries will find that the purchasing power of these resources has eroded significantly”.

Independent experts, as well as climate-vulnerable countries themselves, emphasised both before and during COP29 that more than US\$1 trillion dollars will be needed each year to help developing countries deal with climate change. Many developing nations said that around US\$600 billion of this should come directly from developed countries’ public coffers.

With such a relatively small amount of finance pledged for the NCQG, some developing countries have already indicated that they may scale back their future climate ambitions. ■

*This story was published with permission from Carbon Brief.*

*(Source: <https://www.eco-business.com/news/analysis-why-the-us300-billion-climate-finance-goal-is-even-less-ambitious-than-it-seems/>)*



A mother cradles her child beside the wreckage of their home after a typhoon in Tacloban, Philippines.

Image: İHH İnsani Yardım, CC BY-SA 3.0, via Flickr.

# HOW EFFECTIVE ARE EARLY WARNING SYSTEMS WHEN DISASTERS STRIKE?

The need for early warning systems has risen as natural disasters become more frequent. But how do they help save lives?

**A**fter more than 200 people were killed in flash floods in eastern Spain, angry residents threw mud at the visiting king and hundreds of people took to the streets to protest poor preparation and warnings that came too late for many.

Artificial intelligence and other tech advances have made weather forecasting more accurate, but experts say effective communication of warnings is still not adequate, especially as life-threatening floods and storms become more common because of the climate emergency. The heavy human and

financial cost of the flooding across Europe, back-to-back hurricanes in the United States and repeated typhoons in Asia have prompted a renewed global focus on the need for, and importance of, early warning systems. But how effective are existing early warning systems or EWS, and what more needs to be

done to prepare for an even more volatile future?

## What are EWS?

EWS are used by governments, local authorities, weather agencies, and emergency services to draw up evacuation plans and play a role in coordinating response efforts during a disaster. They help communities and regions prepare for and respond to natural disasters, pandemics, and other emergencies. The United States and Japan, both with a long history of extreme weather and natural disasters, have emerged as world leaders in deploying effective EWS, reaching millions of people with life-saving alerts in minutes.

In preparation for Hurricane Helene, for example, the United States' Federal Emergency Management Agency (FEMA) sent out mandatory evacuation orders to residents living in areas directly in the hurricane's path.

EWS can take many forms, from sirens to alerts, to vibrations on portable devices, and are generally authorised by national weather organisations or the government.

The UK's emergency alert system was tested for the first time in April 2023. A text message was sent to mobile phones after a 10-second-long siren sounded. Similar to the UK, France's EWS consists of a text, followed by a short and shrill sound.

Australia's early warning system, often deployed in response to bushfires and wildfires, consists of phone calls and voice messages sent to landlines, and texts to mobile devices.

EWS have rapidly developed this century due to advances in modern technology, but also because of the increasing toll of climate change-induced disasters.

From 1970 to 2021, more than two million deaths were attributed to extreme weather events that were amplified by global warming, according to the World Meteorological Organization (WMO).

In 2020 alone, an estimated 30 million people were displaced because of weather-related disasters and campaigners say the need for EWS has never been clearer.

The WMO says improved early warnings and coordinated disaster management have helped mitigate the deadly impact of disasters.

Just 24 hours' notice of incoming danger can reduce subsequent economic damage by 30 per cent, it said.

In October 2020, during severe flooding across central Vietnam, around 1.3 million people were safely evacuated thanks to the government's early warning systems, which involved the use of loudspeakers, SMS texts, and emergency TV broadcast. In 2023, enhanced early warning systems helped mitigate the damage from Cyclone Freddy in Mozambique. The storm's damages were estimated at around US\$500 million, 83 per cent less than the US\$3 billion worth of losses caused by Cyclone Idai in 2019.

## Do all countries have early warning systems?

According to the UN Office for Disaster Risk Reduction, only half of the world is covered by effective early warning systems, with small island states and developing countries left far behind. Developing countries experienced 60 per cent of all economic losses caused by climate shocks and extreme weather between 1970 and 2021, it said.

In Africa, almost 60 per cent of the continent's 1.2 billion people are not protected by early warning systems. This can have fatal consequences. In September last year, a lack of early warning systems and evacuation planning led to the deaths of more than 4,000 people during flash floods in Libya – economic losses were estimated at US\$1.8 billion.

Ghana, Kenya, and South Africa all use urgent SMS messages in the event of emergencies. Governments and NGOs are working to bring early

warning systems to pastoral and nomadic communities across West Africa's Sahel region.

In 2018, the European Union made it mandatory for member states to implement modern public warning systems to alert the public of threats to safety. Italy's public alert system began operating in February earlier this year. Mobile users first hear a unique sound, which is followed by a text. Until the message is opened, other mobile functions are temporarily blocked.

In the event of military emergencies other countries like Greece, Latvia, and Romania regularly test air raid sirens. Sirens are also used for natural disaster warnings.

In 2023, a report by the World Meteorological Organization found that the number of countries with early warning systems had doubled since 2015.

## What is being done to improve EWS?

Japan has shared its expertise with Uzbekistan, Kazakhstan, Kyrgyzstan, and Tajikistan - which have recently seen an increase in flash floods and landslides - and provided millions of dollars in funding to help them develop EWS. In 2022, UN head Antonio Guterres launched the Early Warnings for All initiative, aiming for every person on earth to be protected by early warning systems by 2027.

The initiative called for US\$3.1 billion in investments between 2023 and 2027, which is equivalent to US\$0.50 per person per year.

A UN report on the development of EWS found that although the world is at its "highest levels of reported early warning coverage since 2015," disaster impact continues to have a disproportionate impact on lower-income countries. 

*Thomson Reuters Foundation*

(Source: <https://www.eco-business.com/news/how-effective-are-early-warning-systems-when-disasters-strike/>)



Heatwaves are generally considered the simplest extreme events to attribute, because they are mainly driven by thermodynamic influences. In contrast, storms and droughts are more strongly affected by complex atmospheric dynamics, so can be trickier to simulate in a model. *Image: Peggy Anke, CC BY-SA 3.0, via Unsplash.*

# Q&A: THE EVOLVING SCIENCE OF EXTREME WEATHER ATTRIBUTION

As global temperatures rise, extreme weather events are becoming more intense and more frequent all around the world.

**Ayesha Tandon** of Carbon Brief gives a perspective:



**O**ver the past two decades, the cutting-edge field of extreme weather attribution has sought to establish the role that human-caused warming has played in these events. There are now hundreds of attribution studies, assessing extremes ranging from heatwaves in China and droughts in Madagascar through to wildfires in Brazil and extreme rainfall in South Africa.

Carbon Brief has mapped every attribution study published to date, revealing that three-quarters of the extremes analysed were made more intense or likely due to climate change. Along with this explosion of new studies, the different types of attribution studies have evolved and expanded over the past two decades.

For example, the World Weather Attribution service was established in 2015 to provide rapid-response studies, streamlining the process of estimating the human contribution to extreme events in a matter of days.

Meanwhile, a growing community of researchers are developing the “storyline approach” to attribution that focuses more on the dynamics of the specific events being studied.

Other researchers are using weather forecasts to attribute events that have not even happened yet. And many studies are now combining these methods to get the best of all worlds in their findings.

In this detailed Q&A, Carbon Brief explores how the field of attribution science has evolved over time and explains the key methods used today.

## What are the origins of ‘extreme weather attribution’?

The Intergovernmental Panel on Climate Change (IPCC) made its first mention of attribution in its first assessment report (pdf), published in 1990. In a section called “Attribution and the fingerprint method”, the report refers to attribution as “linking cause and effect”.

In these early days of attribution science, experts used statistical methods to search for the “fingerprint” of human-caused climate change in global temperature records. However, the 1990 report says that “it is not possible at this time to attribute all or even a large part of the observed global mean warming to the enhanced greenhouse effect on the basis of the observational data currently available”.

As the observational record lengthened and scientists refined their methods, experts became more confident about attributing global temperature rise to human-caused climate change. By the time its third assessment report was published in 2001, the IPCC could state that “detection and attribution studies consistently find evidence for an anthropogenic signal in the climate record of the last 35 to 50 years”.

Just two years later, Prof Myles Allen – professor of geosystem science at the University of Oxford – wrote a Nature commentary from his home in Oxford that would open the door for attributing extreme weather events to climate change. The article begins:

“As I write this article in January 2003, the floodwaters of the River Thames are about 30 centimetres from my kitchen door and slowly rising. On the radio, a representative of the UK Met Office has just explained that although this is the kind of phenomenon that global warming might make more frequent, it is impossible to attribute this particular event (floods in southern England) to past emissions of greenhouse gases. What is less clear is whether the attribution of specific weather events to external drivers of climate change will always be impossible in principle, or whether it is simply impossible at present, given our current state of understanding of the climate system.”

Just months after Oxford’s floodwaters began to recede, a now-

infamous heatwave swept across Europe. The summer of 2003 was the hottest ever recorded for central and western Europe, with average temperatures in many countries reaching 5°C higher than usual.

The unexpected heat resulted in an estimated 20,000 “excess” deaths, making the heatwave one of Europe’s deadliest on record.

In 2004, Allen and two other UK-based climate scientists produced the first formal attribution study, published in Nature, which estimated the impact of human-caused climate change on the heatwave.

To conduct the study, the authors first chose the temperature “threshold” to define their heatwave. They decided on 1.6°C above the 1961-90 average, because the European summer of 2003 was the first on record to exceed this average temperature. They then used a global climate model to simulate two worlds – one mirroring the world as it was in 2003 and the other a fictional world in which the industrial revolution never happened. In the second case, the climate is influenced solely by natural changes, such as solar energy and volcanic activity, and there is no human-caused warming.

The authors ran their models thousands of times in each scenario from 1989 to 2003. As the climate is inherently chaotic, each model “run” – individual simulations of how the climate progresses over many years – produces a slightly different progression of temperatures. This means that some runs simulated a heatwave in the summer of 2003, while others did not.

The authors counted how many times the 1.6°C threshold temperature was crossed in the summer of 2003 in each model run. They then compared the likelihood of crossing the threshold temperature in the world with – and a world without – climate change.

They concluded that “it is very likely that human influence has at

least doubled the risk of a heatwave exceeding this threshold magnitude”.

A Nature commentary linked to the study called the paper a “break-through”, stating that it was the “first successful attempt to detect man-made influence on a specific extreme climatic event”.

In the decade following the heatwave study, more teams from around the world began to use the same methods – known as “probabilistic”, “risk-based” or “unconditional” attribution.

Prof Peter Stott is a science fellow in climate attribution at the UK Met Office and an author on the study. Stott tells Carbon Brief that the basic methods used in this first attribution study are “still used to this day”, but that scientists now use more “up-to-date” climate models than the one used in his seminal study.

### What is ‘probabilistic’ attribution?

As the 2004 Nature study demonstrated, probabilistic attribution involves scientists running climate models thousands of times in scenarios with and without human-caused climate change, then comparing the two.

This allows them to say how much more likely, intense or long-lasting an event was due to climate change.

Many studies since have added a third scenario, in which the planet is warmer than present-day temperatures, to assess how climate change may impact extreme weather events in the future.

The figure below shows three distributions of multiple different simulated extreme events. The x-axis (horizontal) represents the intensity of the climate variable – in this instance temperature – with lower temperatures on the left and higher temperatures on the right. The y-axis (vertical) shows the likelihood of this variable hitting certain values.

Each curve shows how the climate variable behaves in a

different scenario, or “world”. The red-shaded curve shows a pre-industrial world that was not warmed by human influence, the yellow-shaded curve indicates today’s climate, while the dashed line shows a future, warmer world. The curves shift from left to right as the climate warms.

The peak of each curve shows the most likely temperatures, while likelihood is lowest at the far left and far right of each curve, where temperatures are most extreme. The hatched areas show the temperatures that cross a predefined “threshold” temperature. (In the attribution study on the 2003 European heatwave, this threshold was defined as 1.6°C above the 1961-90 average.)

The supplement presented six different attribution studies. It generated significant media interest and the “Explaining Extreme Events” report has been published by Bulletin of the American Meteorological Society almost every year since.

As the research field has grown, so too has the range of different extremes that have been studied.

Heatwaves are generally considered the simplest extreme events to attribute, because they are mainly driven by thermodynamic influences. In contrast, storms and droughts are more strongly affected by complex atmospheric dynamics, so can be trickier to simulate in a model.

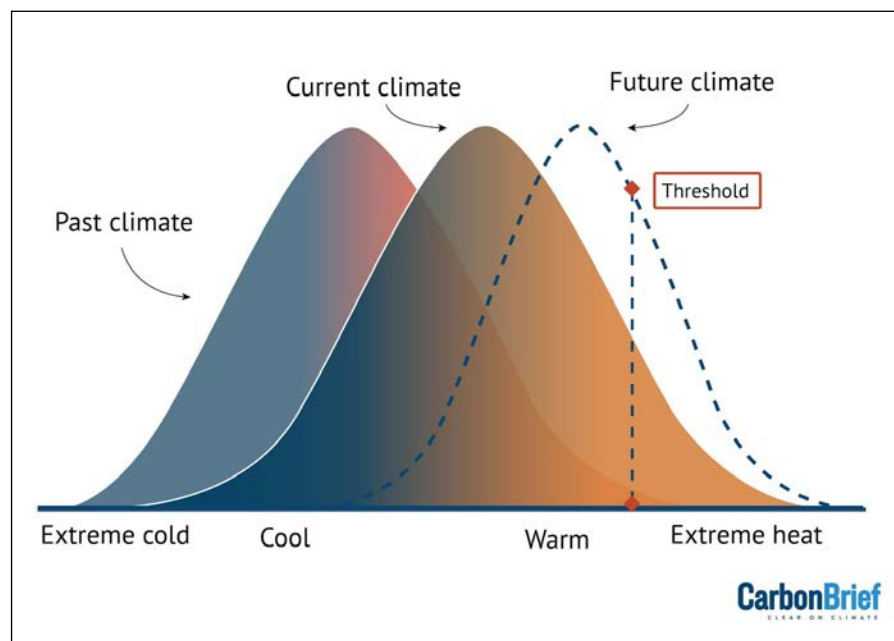


Illustration of the changing probability of crossing a threshold in the past, present and future climates. Source: Carbon Brief

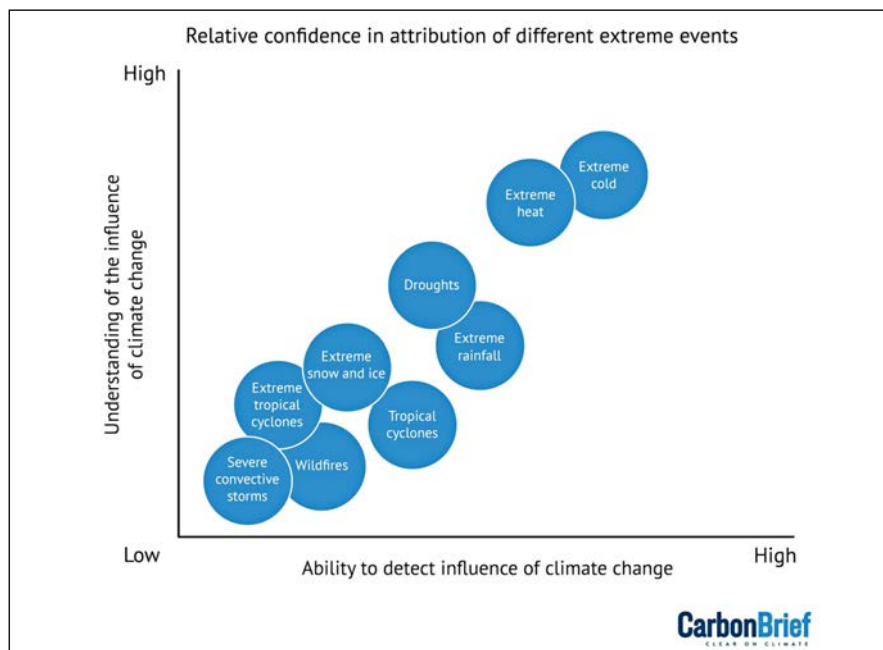
The three curves show how the threshold is more likely to be crossed as the world warms.

### Which weather extremes can scientists link to climate change?

In 2011, the American Meteorological Society decided to include a “special supplement” about attribution research in its annual report.

The graphic below shows the relative confidence of attributing different types of extreme events.

Attribution studies on extreme heat often assess how much hotter, long-lasting or likely an event was due to climate change. For example, one study finds that the summer heatwave that hit France in 2019 was made 1.5-3°C hotter due to climate change and about 100 times



**Relative confidence of attributing different types of extreme events. Adapted from a graphic by National Academy of Sciences**

more likely. Heatwaves are the most-studied extreme event in attribution literature, but are becoming “less and less interesting for researchers”, according to a Bloomberg article from 2020.

Assessing extreme rainfall is more complicated – in part because the Earth’s chaotic weather system means that the size and path of a storm or heavy rainfall event has a large element of chance, which can make it challenging to identify where climate change fits in.

Nevertheless, many teams have published studies attributing extreme rainfall events and storms. For example, one study (pdf) found that climate change doubled the likelihood of the intense rainfall that fell in northern China in September 2021.

Scientists also study more complex events, such as drought, wildfires and floods, which are impacted by factors including land use and disaster preparedness.

For example, there are many different ways to define a drought. Some are linked just to rainfall, while others consider factors

including soil moisture, groundwater and river flow. Some attribution studies investigating the impact of climate change on drought focus only on rainfall deficit, while others (pdf) study temperature or vapour pressure deficit – the difference between the amount of moisture in the air and how much moisture the air can hold when it is saturated.

A scientist’s decision about which type of drought to study sometimes depends on the available data and the type of impacts caused by the drought. In other cases, the choice may come down to what caused the biggest impact on people.

For example, in late 2022, South America was plagued by a severe drought that caused widespread crop failure. An attribution study on the event, therefore, focused on “agricultural” drought, which captures the response of rainfall on soil moisture conditions and is the most relevant for crop health.

Meanwhile, a study on drought in Madagascar over 2019-21 chose to focus on rainfall deficit. The study says “this was because recent research found rainfall deficits

were the primary driver of drought in regions of East Africa with very similar climatic properties to southwest Madagascar”.

Wildfires are affected by conditions including temperature, rainfall, wind speed and land use. While some wildfire attribution studies focus on vapour pressure deficit, others quantify the fire weather index, which looks at the effects of fuel moisture and wind on fire behaviour and spread”.

Tropical cyclones are also complex. There is evidence that climate change can increase the peak “rain rates” and wind speeds of tropical cyclones, and that storm tracks are shifting poleward. There are many aspects of a cyclone that can be analysed, such as rainfall intensity, storm surge height and storm size.

### Why do scientists perform ‘rapid’ attribution studies?

As extreme weather attribution became more mainstream, researchers began to produce studies more quickly. However, challenges in communicating the findings of attribution studies in a timely way soon became evident.

After conducting a study, writing it up and submitting it to a journal, it can still take months or years for research to be published. This means that, by the time an attribution study is published, the extreme event has likely long passed.

The World Weather Attribution (WWA) initiative was founded in 2015 to tackle this issue. The team uses a standard, peer-reviewed methodology for their studies, but does not publish the results in formal journals – instead publishing them directly on their website.

(After publishing these “rapid attribution” studies on their website, the team often write full papers for publication in formal journals, which are then peer-reviewed.)

This means that rather than taking months or years to publish

their research, the team can make their findings public just days or weeks after an extreme weather event occurs.

In 2021, the founders of the initiative – including Carbon Brief contributing editor Dr Friederike Otto, who is a senior lecturer in climate science at Imperial College London’s Grantham Institute – wrote a Carbon Brief guest post explaining why they founded WWA:

“By reacting in a matter of days or weeks, we have been able to inform key audiences with a solid scientific result swiftly after an extreme event has occurred – when the interest is highest and results most relevant.”

The guest post explains that to conduct an attribution study, the WWA team first uses observed data to assess how rare the event is in the current climate – and how much this has changed over the observed record. This is communicated using a “return period” – the expected frequency an event of this magnitude could be expected under a given climate.

For example, the WWA analysed the UK’s record-shattering heatwave of 2022, when the country recorded temperatures above 40°C for the first time. They found that the maximum temperature seen in the UK on 19 July 2022 has a 1,000-year return period in today’s climate – meaning that even in today’s climate, 40°C heat would only be expected, on average, once in a millennium.

The authors then use climate models to carry out the “probabilistic” attribution study, to determine how much more intense, likely or long-lasting the event was as a result of climate change. They conclude by conducting “vulnerability and exposure” analysis, which often highlights other socioeconomic problems.

Sometimes, the authors conclude that climate change did not influence the event. For example, a 2021 rapid attribution study by WWA found that poverty, poor infrastruc-

ture and dependence on rain-fed agriculture were the main drivers of the ongoing food crisis in Madagascar, while climate change played “no more than a small part”.

Other groups are also conducting rapid attribution studies. For example, a group of scientists – including some WWA collaborators – recently launched a “rapid experimental framework” research project called ClimaMeter. The tool provides initial attribution results just hours after an extreme weather event takes place.

ClimaMeter focuses on the atmospheric circulation patterns that cause an extreme event – for example, a low-pressure system in a particular region. Once an event is defined, the scientists search the historical record to find events with similar circulation patterns to calcu-

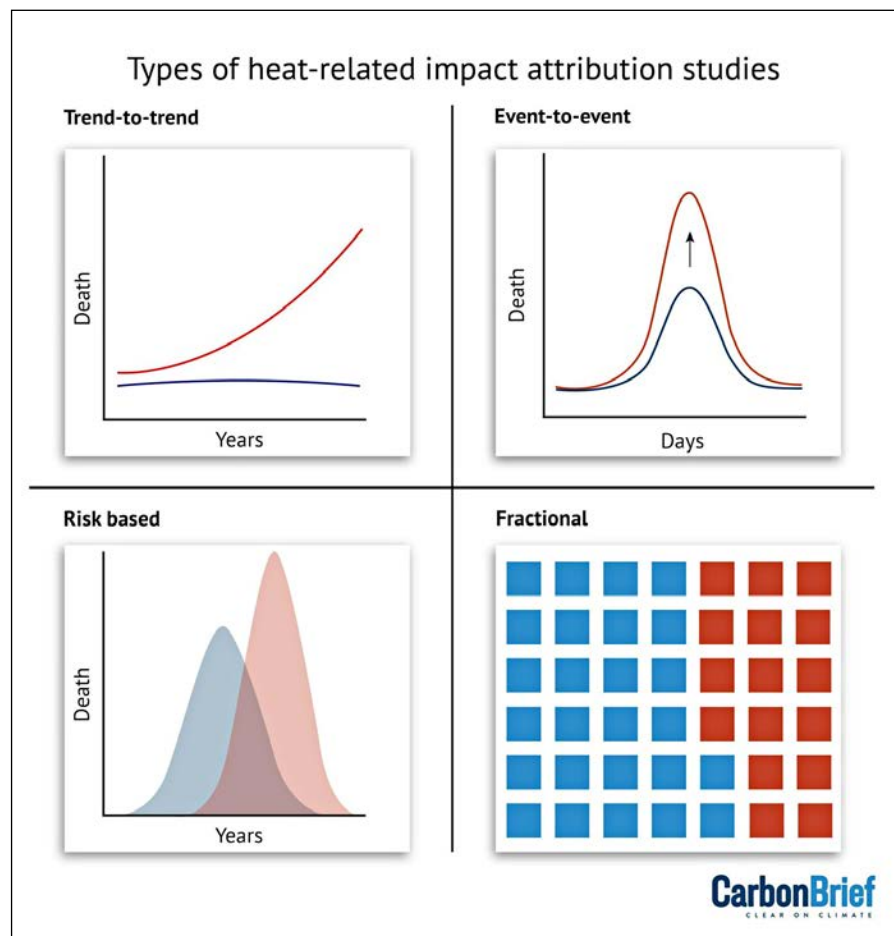
late how the intensity of the events has changed over time.

## Can the impacts of extreme weather be linked to climate change?

A branch of attribution science called “impact attribution” – which aims to quantify the social, economic and/or ecological impacts of climate change on extreme weather events – is also gaining popularity. There are four main types of impact attribution, as shown in the graphic below.

### 1) Trend-to-trend impact attribution

The first method, called “trend-to-trend” impact attribution, assesses long-term trends in both the climate system and in “health outcomes”. This approach was used in a 2021 study on heat-related mortality



Different types of impact attribution study. Adapted from graphic in Carlson et al

around the world, which received extensive media attention.

The authors used data from 732 locations in 43 countries to identify relationships between temperature and mortality in different locations, known as “exposure-response functions”. This allowed them to estimate how many people would die in a given location, if temperatures reach a certain level.

The authors used these relationships to calculate heat-related mortality over 1991-2018 for each location under two scenarios – one with and one without human-caused climate change. The study concluded that 37 per cent of “warm-season heat-related deaths” can be attributed to human-caused climate change.

## 2) Event-to-event attribution

The second type of study is known as “event-to-event” attribution. In one study using this method, the authors used data on observed mortality rates to determine how many people died in Switzerland during the unusually warm summer of 2022.

They calculated how much climate change contributed to warming during that summer. They then ran a model to calculate the “hypothetical heat-related burden” that would have been seen during the summer without the warming influence of climate change.

Using this method, they estimate that 60 per cent of the 623 heat-related deaths “could have been avoided in absence of human-induced climate change”.

## 3) Risk-based event attribution

“Risk-based” event impact attribution – which is demonstrated in a more recent study on the 2003 European heatwave – is the third type of impact attribution. This method combines probabilistic event attribution with resulting health outcomes.

When the paper was published, its lead author, Prof Dann Mitchell –

a professor of climate science at the University of Bristol – explained the method to Carbon Brief:

“We have a statistical relationship between the number of additional deaths per degree of warming. This is specific to a certain city and changes a lot between cities. We use climate simulations to calculate the heat in 2003, and in 2003 without human influences. Then we compare the simulations, along with the observations.”

They find, for example, that in the summer of 2003, anthropogenic climate change increased the risk of heat-related mortality in London by around 20 per cent. This means that out of the estimated 315 deaths in London during the heatwave, 64 were due to climate change.

## 4) Fractional attribution

In the final method, known as “fractional” attribution, the authors combine the results of two independent numbers – an estimation of the total damages caused by an extreme weather event, and a calculation of the proportion of the risk from an extreme weather event for which anthropogenic climate change is responsible, known as the “fraction of attributable risk” (FAR).

The authors of one study used this method to estimate the economic damages linked to Hurricane Harvey.

The authors calculate that “fraction of attributable risk” for the rainfall from Harvey was around three-quarters – meaning that climate change was responsible for three-quarters of the intense rainfall.

Separately, the authors find that according to best estimates, the hurricane caused damages of around US\$90 billion. From this, the authors conclude that US\$67 billion of the damages caused by the Hurricane’s intense rainfall can be attributed to climate change.

A study on the 2010 Russian heatwave also used this method. The authors found that the heat-

wave was responsible for more than 55,000 deaths (pdf), and found an 80 per cent chance that the extreme heat would not have occurred without climate warming. The study concludes that almost 45,000 of the deaths were attributable to human-caused climate change.

However, the fractional attribution method has received criticism. One paper argues that the method “inflates the impacts associated with anthropogenic climate change”, because it “incorrectly assumes” that the event has no impact unless it exceeds the threshold defined by the researchers.

Some of the authors of the Hurricane Harvey paper later wrote a paper advising caution in interpreting the results of FAR studies. They say:

“The fraction of attributable risk (FAR) method, useful in extreme weather attribution research, has a very specific interpretation concerning a class of events, and there is potential to misinterpret results from weather event analyses as being applicable to specific events and their impact outcomes. FAR is not generally appropriate when estimating the magnitude of the anthropogenic signal behind a specific impact.”

## Expanding scope

Impact attribution is continuing to expand in scope. For example, studies are now being conducted to assess the impact of climate change on disease transmission.

In 2020, scientists quantified the influence of climate change on specific episodes of extreme ice loss from glaciers for the first time. They found that human-caused climate change made the extreme “mass loss” seen in glaciers in the Southern Alps, New Zealand, in 2018 at least 10 times more likely.

Scientists have also linked climate change to ecosystem shifts. One study focusing on temperature finds

that the “extremely early cherry tree flowering” seen in Kyoto in 2021 was made 15 times more likely due to climate change.

Others go even further, linking weather extremes to societal impacts. For example, a 2021 study published in *Scientific Reports* says:

“By combining an extreme event attribution analysis with a probabilistic model of food production and prices, we find that climate change increased the likelihood of the 2007 co-occurring drought in South Africa and Lesotho, aggravating the food crisis in Lesotho.”

Meanwhile, Imperial College London’s Grantham Institute is working on an initiative to publish rapid impact attribution studies about extreme weather events around the world. Similar to WWA studies, these rapid studies will not be peer reviewed individually, but will be based on a peer-reviewed methodology.

Dr Emily Theokritoff – a research associate at Grantham, who is working on the initiative, tells *Carbon Brief* that it will be launched “in the near future”. She adds:

“The aim is to recharge the field, start a conversation about climate losses and damages, and help people understand how climate change is making life more dangerous and more expensive.”

### How do scientists attribute ‘unprecedented’ events?

An attribution method known as the “storyline approach” or “conditional attribution” has become increasingly popular over the past decade – despite initially causing controversy in the attribution community.

In this approach, researchers first select an extreme weather event, such as a specific heatwave, storm or drought. They then identify the physical components, such as sea surface temperature, soil moisture and atmospheric dynamics, that led to the event unfolding in the way it

did. This series of events is called a “storyline”.

The authors then use models to simulate this “storyline” in two different worlds – one in the world as we know it and one in a counterfactual world – for example, with a different sea surface temperature or CO<sub>2</sub> level. By comparing the model runs, the researchers can draw conclusions about how much climate change influenced that event.

The storyline approach is useful for explaining the influence of climate change on the physical processes that contributed to the event. It can also be used to explore in detail how this event would have played out in a warmer (future) or cooler (pre-industrial) climate.

One study describes the storyline approach as an “autopsy”, explaining that it “gives an account of the causes of the extreme event”.

Prof Ted Shepherd, a researcher at the University of Reading, was one of the earliest advocates of the storyline attribution approach. At the EGU general assembly in Vienna in April 2024, Shepherd provided the opening talk in a session on storyline attribution. He told the packed conference room that the storyline approach was born out of the need for a “forensic” approach to attribution, rather than a “yes/no” approach. He emphasised that extreme weather events have “multiple causes” and that the storyline approach allows researchers to dissect each of these components.

Dr Linda van Garderen is a post-doctoral researcher at Utrecht University and has carried out multiple studies using the storyline method. She tells *Carbon Brief* that, while traditional attribution typically investigates probability, the storyline approach analyses intensity.

For example, she led an attribution study using the storyline method which concluded that the 2003 European and 2010 Russian heatwaves would have been 2.5-4°C

cooler in a world without climate change. She adds that it can make communication easier, telling *Carbon Brief* that “probabilities can be challenging to interpret in practical daily life, whereas the intensity framing of storyline studies is more intuitive and can make attribution studies easier to understand”.

Dr Nicholas Leach is a researcher at the University of Oxford who has conducted multiple studies using the storyline approach. He tells *Carbon Brief* that probabilistic attribution often produces “false negatives”, wrongly concluding that climate change did not influence an event.

This is because climate models have “biases and uncertainties” which can lead to “noise” – particularly when it comes to dynamical features such as atmospheric circulation patterns. Probabilistic attribution methods often end up losing the signal of climate change in this noise, he explains.

The storyline approach is able to avoid these issues more easily, he says. He explains that by focusing on the dynamics of one specific event, rather than a “broad class of events”, storyline studies can eliminate some of this noise, making it more straightforward to identify a signal, he says.

Conversely, others have critiqued the storyline method for producing false positives, which wrongly claim that climate change influenced an extreme weather event.

The storyline approach has also been praised for its ability to attribute “unprecedented” events. In the EGU session on the storyline method, many presentations explored how the storyline method could be used to attribute “statistically impossible” extremes.

Leach explains that when a completely unprecedented extreme event occurs, statistical models often indicate that the event “shouldn’t have happened”. When running a probabilistic analysis using these

models, Leach explains: “You end up with the present probability being zero and past probability being zero, so you can’t say a lot.”

He points to the Pacific north-west heatwave of 2021 as an example of this. This event was one of the most extreme regional heat events ever recorded globally, breaking some local high temperature records by more than 6°C.

WWA conducted a rapid attribution study on the heatwave, using its probabilistic attribution method. The heatwave was “so extreme” that the observed temperatures “lie far outside the range” of historical observations, the researchers said.

Their assessment suggests that the heatwave was around a one-in-1,000-year event in today’s climate and was made at least 150-times more likely because of climate change.

Leach and his colleagues used the storyline method to attribute the same heatwave. The methods of this study will be discussed more in the following section.

Leach explains that using the storyline approach, he was able to consider the physics of the event, including an atmospheric river that coincided with the “heat dome” that was a key feature of the event. This helped him to represent the event well in his models. The study concluded that the heatwave was 1.3°C hotter and eight times more likely as a result of climate change.

Many experts tell Carbon Brief there was initially tension in the attribution community between probabilistic and storyline advocates when the latter was first introduced. However, as the storyline method has become more mainstream, criticism has abated and many scientists are now publishing research using both techniques.

Van Garderen tells Carbon Brief that storyline attribution is “adding to the attribution toolbox”, rather than attempting to replace existing methods. She emphasises that

probability-based and storyline attribution answer different questions, and that both are important.

### **How can weather forecasts be used in attribution studies?**

Forecast attribution is the most recent major addition to the attribution toolbox. This method uses weather forecasts instead of climate models to carry out attribution studies. Many experts describe this method as sitting part-way between probabilistic and storyline attribution.

One benefit of using forecasts, rather than climate models, is that their higher resolution allows them to simulate extreme weather events in more detail. By using forecasts, scientists can also attribute events that have not yet happened.

The first use of “advance forecasted” attribution analysis (pdf) quantified the impact of climate change on the size, rainfall and intensity of Hurricane Florence before it made landfall in North Carolina in September 2018.

The authors, in essence, carried out the probabilistic attribution method, using two sets of short-term forecasts for the hurricane rather than large-scale climate models. The analysis received a mixed reaction. Stott told Carbon Brief at the time that it was “quite a cool idea”, but was highly dependent on being able to forecast such events reliably.

Dr Kevin Trenberth, distinguished senior scientist at the National Center for Atmospheric Research, told Carbon Brief in 2019 that the study was “a bit of a disaster”, explaining that the quality of the forecast was questionable for the assessment.

The authors subsequently published a paper in *Science Advances* reviewing their study “with the benefit of hindsight”. The authors acknowledged that the results are quite a way off what they forecasted.

However, they also claimed to have identified what went wrong with their forecasted analysis.

Problems with the “without climate change” model runs created a larger contrast against their real-world simulations, meaning the analysis overestimated the impact of climate change on the event, they said.

Nonetheless, the study did identify a quantifiable impact of climate change on Hurricane Florence, adding to the evidence from studies by other author groups.

This research team has since published more forecast-based attribution studies on hurricanes. One study used hindcasts – forecasts that start from the past and then run forward into the present – to analyse the 2020 hurricane season. The team then ran a series of “counterfactual” hindcasts over the same period, without the influence of human warming from sea surface temperatures.

They found that warmer waters increased three-hour rainfall rates and three-day accumulated rainfall for tropical storms by 10 per cent and 5 per cent, respectively, over the 2020 season.

Meanwhile, a 2021 study by a different team showed how it was possible to use traditional weather forecasts for attribution. The researchers, who penned a Carbon Brief guest post about their work, found that the European heatwave of February 2019 was 42 per cent more likely for the British Isles and at least 100 per cent more likely for France.

To conduct their study, the authors used a weather forecast model – also known as a “numerical weather prediction” model (NWP).

They explain that a NWP typically runs at a higher resolution than a climate model, meaning that it has more, smaller grid cells. This allows it to simulate processes that a climate model cannot and makes them “more suitable for studying the most

extreme events than conventional climate models,” the authors argue.

More recently, Leach and his team carried out a forecast attribution study on the record-breaking Pacific north-west heatwave of 2021, years after the event took place.

The authors defined 29 June 2021 as the start of the event, as this is when the maximum temperature of the heatwave was recorded. They then ran their forecasts using a range of “lead times” – the number of days before the event starts that the model simulation is initialised.

The shortest lead time in this study was three days, meaning the scientists began running the model using the weather conditions recorded on 26 June 2021. The short lead time meant that they could tailor the model very closely to the weather conditions at this time and simulated the event itself very accurately.

By comparison, the longest lead times used in this study were 2-4 months. This means that the models were initialised in spring and, by the time they simulated the June heatwave, their simulation did not closely resemble the events that actually unfolded.

Leach tells Carbon Brief that by lengthening the lead time of the weather forecast, they can effectively “shift the dial” from storyline to probabilistic attribution. He explains:

“If you’re using a forecast that’s initialised really near to your event, then you’re kind of going down that storyline approach, by saying, ‘I want what my model is stimulating to look really similar to the event I’m interested in’

“The further back [in time] you go, the closer you get to the more probabilistic style of statements that are more unconditioned.”

This combination of storyline and probabilistic attribution allows the authors to draw conclusions both about how climate change affected

the intensity and the likelihood of the heatwave. The authors estimate that the heatwave was 1.3°C more intense and eight times more likely as a result of climate change.

More recently, Climate Central has produced a tool that uses temperature forecasts over the US over the coming days to calculate a “climate shift index”. This index gives the ratio of how common the forecasted temperature is in today’s climate, compared to how likely it would be in a world without climate change.

The index runs from five to minus five. A result of zero indicates that climate change has no detectable influence, an index of five means that climate change made the temperature at least five times more likely and an index of minus five means that climate change made the temperature at least five times less likely.

The tool can be used for attribution. For example, recent analysis by the group used the index to quantify how climate change has influenced the number of uncomfortably hot nights. It concluded:

“Due to human-caused climate change, 2.4 billion people experienced an average of at least two additional weeks per year where nighttime temperatures exceeded 25°C. Over one billion people experienced an average of at least two additional weeks per year of nights above 20°C and 18°C.”

### **What are the applications of attribution science?**

One often-touted application of attribution studies is to raise awareness about the role of climate change in extreme weather events. However, there are limited studies about how effective this is.

One study presents the results of focus group interviews with UK scientists, who were not working on climate change, in which participants were given attribution statements. The study concludes:

“Extreme event attribution shows significant promise for climate change communication because of its ability to connect novel, attention-grabbing and event-specific scientific information to personal experiences and observations of extreme events.”

However, the study identified a range of challenges, including “adequately capturing nuances”, “expressing scientific uncertainty without undermining accessibility of key findings” and difficulties interpreting mathematical aspects of the results.

In another experiment, researchers informed nearly 4,000 adults in the US that climate change had made the July 2023 heatwave in the US at least five times more likely. The team also shared information from Climate Central’s climate shift index. According to the study, both approaches “increased the belief that climate change made the July 2023 heatwave more likely and is making heatwaves in general more likely as well”.

Meanwhile, as the science of extreme weather attribution becomes more established, lawyers, governments and civil society are finding more uses for this evolving field.

For example, attribution is starting to play an important role in courts. In 2017, two lawyers wrote a Carbon Brief guest post stating “we expect that attribution science will provide crucial evidence that will help courts determine liability for climate change related harm”.

Four years later, the authors of a study on “climate litigation” wrote a Carbon Brief guest post explaining how attribution science can be “translated into legal causality”. They wrote:

“Attribution can bridge the gap identified by judges between a general understanding that human-induced climate change has many negative impacts and providing con-



crete evidence of the role of climate change at a specific location for a specific extreme event that already has led or will lead to damages.”

In 2024, around 2,000 Swiss women used an attribution study, alongside other evidence, to win a landmark case in the European Court of Human Rights. The women, mostly in their 70s, said that their age and gender made them particularly vulnerable to heatwaves linked to climate change. The court ruled that Switzerland’s efforts to meet its emissions targets had been “woefully inadequate”.

The 2024 European Geosciences Union conference in Vienna dedicated an entire session to climate change and litigation. Prof Wim Thiery – a scientist who was involved in many conference sessions on climate change and litigation – tells Carbon Brief that attribution science is particularly important for supporting “reparation cases”, in which vulnerable countries or communities seek compensation for the damages caused by climate change.

He adds Carbon Brief that seeing the “direct and tangible impact” of an attribution study in a court case “motivates climate scientists in engaging in this community”.

(Other types of science are also important in court cases related to climate change, he added. For example, “source attribution” identifies the relative contribution of different sectors and entities – such as companies or governments – to climate change.)

Dr Rupert Stuart-Smith, a research associate in climate science and the law at the University of Oxford’s Sustainable Law Programme, adds:

“We’re seeing a new evolution whereby communities are increasingly looking at impact-relevant variables. Think about inundated areas, lake levels, heatwave mortalities. These are the new target

variables of attribution science. This is a new frontier and we are seeing that those studies are directly usable in court cases.”

He tells Carbon Brief that some cases “have sought to hold high-emitting corporations – such as fossil fuel or agricultural companies – liable for the costs of climate change impacts”. He continues:

“In cases like these, claimants typically need to show that climate change is causing specific harms affecting them and courts may leverage attribution or climate projections to adjudicate these claims. Impact attribution is particularly relevant in this context.”

Dr Delta Merner is a lead scientist at the science hub for climate litigation. She tells Carbon Brief that “enhanced source attribution for companies and countries” will be “critical” for holding major emitters accountable. She adds:

“This is an urgent time for the field of attribution science, which is uniquely capable of providing robust, actionable evidence to inform decision-making and drive accountability.”

Meanwhile, many countries’ national weather services are working on “operational attribution” – the regular production of rapid attribution assessments.

Stott tells Carbon Brief that the UK Met Office is operationalising attribution studies. For example, on 2 January 2024, it announced that 2023 was the second-warmest year on record for the UK, with an average temperature of 9.97°C.

New methods are also being developed. For example, groups, such as the “eXtreme events: Artificial Intelligence for Detection and Attribution” (XAIDA) team, are researching the use of machine learning and artificial intelligence for attribution studies.

One recent attribution study uses a machine-learning approach to create “dynamically consistent

counterfactual versions of historical extreme events under different levels of global mean temperature”. The authors estimate that the south-central North American heatwave of 2023 was 1.18-1.42°C warmer because of global warming.

The authors conclude:

“Our results broadly agree with other attribution techniques, suggesting that machine learning can be used to perform rapid, low-cost attribution of extreme events.”

Other scientists are using a method called UNSEEN, which involves running models thousands of times to increase the size of the datasets used to make it easier to derive accurate probabilities from highly variable extremes.

## What are the next steps for attribution research?

The experts that Carbon Brief spoke to for this article have high hopes for the future of attribution science. For example, Stott says:

“Attribution science has great potential to improve the resilience of societies to future climate change, can help monitor progress towards the Paris goals of keeping global warming to well below 2°C and can motivate progress in driving down emissions towards net-zero by the middle of this century.”

However, despite the progress made over the past two decades, there are still challenges to overcome. One of the key barriers in attribution science is a lack of high-quality observational data in low-income countries.

To carry out an attribution study, researchers need a long, high-quality dataset of observations from the area being studied. However, inadequate funding or political instability means that many developing countries do not have sufficient weather station data.

In a 2016 interview with Carbon Brief, Allen said that “right now there is obviously a bias towards our

own backyards – north-west Europe, Australia and New Zealand.”

Many WWA studies in global-south countries mention the challenge of finding adequate data and sometimes this affects the results. A WWA study of the 2022 drought in west Africa’s Sahel region was unable to find the signal of climate change in the region’s rainfall pattern – in part, due to widespread uncertainties in the observational data.

Otto, who was an author on the study, explained at the time:

“It could either be because the data is quite poor or because we have found the wrong indices. Or it could be because there really is no climate change signal. We have no way of identifying which of these three options it is.”

Developing better observational datasets is an ongoing challenge. It is highlighted in much of the literature on attribution as an important next step for attribution science – and for climate science more widely. Merner tells Carbon Brief that scientists also need to work on developing “novel approaches for regions without baseline data”.

Meanwhile, many scientists expect the methods used in attribution science to continue evolving. The Detection and Attribution Model Intercomparison Project is currently collecting simulations, which will support improved attribution of climate change in the next set of assessment reports from the Intergovernmental Panel on Climate Change.

Mitchell says that, over the next decade, he thinks that “we will move away from the more generic attribution methods that have served us well to this point, and start developing and applying more targeted – and even more defensible – methods”.

In particular, he highlights the need for more specific methods for impact attribution – for example, studying the impacts of weather

events on health outcomes, biodiversity changes or financial losses.

He continues:

“The interplay of different socioeconomic states and interventions with that of climate change can make these particularly difficult to study – but we are getting there with our more advanced, albeit computationally expensive methods, such as using weather forecast models as the foundation of our attribution statements.”

Stott tells Carbon Brief that incorporating impacts into attribution assessments is a “crucial area for development” in attribution science. He explains that impact attribution is “very relevant to the loss-and-damage agenda and further developments in attribution science are likely to include the ability to attribute the financial costs of storms”.

Stuart-Smith tells Carbon Brief that, “in the coming years, growing numbers of studies will quantify the economic burden of climate change and its effects on a broader range of health impacts, including from vector and water-borne diseases”.

Leach also tells Carbon Brief that it is “important for attribution to move their focus beyond physical studies and into quantitative impact studies to increase their relevance and utility in policy and the media”.

He adds:

“Utilising weather forecasts for attribution would fit neatly with this aim as those same models are already widely used by emergency managers and built into impact modelling frameworks.”

Similarly, Stott tells Carbon Brief that “forecast attribution shows great potential”. He explains that by “progressing that science” will allow this method to be used to attribute more types of extreme weather with greater confidence.

Leach advocates for greater use of weather forecast models for all types of attribution. He says:

“Weather forecast models have demonstrated repeatedly over the past few years that they are capable of accurately representing even unprecedented weather extremes. Using these validated state-of-the-art models for attribution could bring an increase in confidence in the results.”


Many scientists also tell Carbon Brief about the importance of operationalising attribution. The weather services in many countries already have this in place. Stott tells Carbon Brief that groups in Japan, South Korea, Australia and the US are also “at various stages of developing operational attribution services”.

Meanwhile, Otto tells Carbon Brief that “the most important next step for attribution in my view is to really integrate the assessment of vulnerability and exposure into the attribution studies”. She adds:

“In order for attribution to truly inform adaptation it is essential though to go from attributing hazards, as we do now mainly, to disentangling drivers of disasters.”

Mitchell adds that he thinks attribution statements “are absolutely essential for [countries to make] national adaptation plans”.

Meanwhile, another study suggests that extreme event attribution studies could be used by engineers, along with climate projections, to assist climate adaptation for civil infrastructure.

Leach tells Carbon Brief that attribution could be useful in the insurance sector for similar reasons. He adds that many insurance sectors use the same forecasts in their catastrophe models that climate scientists use for forecast attribution, meaning that it should be straightforward to add attribution studies into their pipelines. 

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*(Source: <https://www.eco-business.com/news/qa-the-evolving-science-of-extreme-weather-attribution/>)*

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