

# CSR TODAY

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## SMALL ISLANDS SOUND THE CLIMATE CRISIS ALARM BEFORE THE HIGHEST COURT

Nations hit hard by warming are not asking for the moon,  
just international law to be respected



### CSR IDEA

Unleashing bamboo: A nature-based solution to plastics

### CSR FUTURE

Early warning systems save lives but more funding is critical

### CSR ISSUE

Where are the critical minerals flashpoints in 2025?





# CSR TODAY

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# 800,000 deaths and 4.2 trillion US dollars lost by extreme weather events in 30 years



**Rajesh Tiwari**  
Publisher  
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**Dominica, China, and Honduras have been the countries most affected by floods, storms, and heatwaves since 1993, according to the Climate Risk Index 2025 report, circulated globally.**

**A**lmost 800,000 deaths and 4.2 trillion US dollars have been lost because of 9,400 extreme weather events in 30 years, according to Germanwatch, an environmental organization headquartered in Bonn. This is a major concern and if steps are not taken, the road to the future is full of challenges.

Dominica, China, and Honduras have been the countries most affected by floods, storms, and heatwaves since 1993, according to the Climate Risk Index 2025 report, circulated globally.

The report shows that countries have been particularly affected by the impacts of extreme weather events. The backward-looking index analyses how climate-related extreme weather events affect countries and ranks countries according to economic and human effects on them with the most affected country ranked first.

Between 1993 and 2022, more than 9,400 extreme weather events happened. These killed almost 800,000 people and caused economic damages totaling 4.2 trillion US dollars (inflation-adjusted). While countries like China, India, and the Philippines were primarily affected by recurring extreme events, Dominica, Honduras, Myanmar, and Vanuatu were most affected by exceptional extreme events. With Italy, Spain, and Greece, there are three EU states among the ten most affected countries worldwide over the past 30 years.


Laura Schaefer, co-author of the Climate Risk Index and Head of the International Climate Policy Division at Germanwatch: "The climate crisis is increasingly becoming a global security risk and must be addressed with bold multilateral actions. Leaders at the Munich Security Conference cannot discuss security challenges without addressing climate change. The past three decades show that countries in

the Global South are particularly affected by extreme weather events."

"If the data from these countries were as comprehensive as the data from many Global North countries, an even greater degree of economic and human effects might become visible. There are increasing signs that we are entering a critical and unpredictable phase of the climate crisis, which will also increasingly change social developments and security for mankind all across the globe," added Schaefer.

Travis Brubaker, Senior Policy Advisor on US Climate Foreign Policy at E3G: "In this moment of poly-crisis, decision-makers attending the Munich Security Conference simply have to address climate change. There's war and pressing economic and political matters. Still, it's wrong to ignore climate change, as climate impacts affect all these global problems. In three ways, accelerating ambitious climate action also strengthens global security: mitigating climate change minimizes the cause of threat multipliers, fosters multilateral collaboration, and helps meet expectations of emerging economies."

The next climate summit in Brazil must address the lack of additional climate finance to support the most vulnerable in increasing their adaptive capacities and adequately addressing loss and damage.

Lina Adil, Policy Advisor for Adaptation and Loss & Damage at Germanwatch and co-author of the index, adds: "Most vulnerable countries are disproportionately affected by the impacts of climate change partly due to their limited financial and technical capabilities to adapt and manage losses and damages. Simultaneously, to prevent further loss and damage, countries urgently need to ramp up their mitigation action with new nationally determined contributions to stay below or as close as possible to 1.5°C warming." 

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# CSR NEWS

## Sportz Village Launches PathwayZ36, an Initiative to Strengthen Existing Pool of National and International Athletes for India's Success at 2036 Olympics and beyond



Sportz Village, India's largest school sports organization dedicated to creating champions both on and off the field, announced the launch of its PathwayZ36 initiative. The initiative aims to identify and nurture sporting talent from its PAN India partner school ecosystem as well as national grassroots programs, strengthening the pipe of national and international athletes. The launch event was graced by Anju Bobby George, Padma Shri, Arjuna Award and Khel Ratna awardee, who is an inspiration for aspiring athletes across India.

While speaking about the importance of athlete support structures and the role of corporate India in developing sports, George emphasized the need for early talent identification and consistent support, stating, "It is crucial to identify young talent early and provide them with the right guidance, resources and opportunities. Initiatives like PathwayZ36 ensure

that our youth not only dreams of representing the nation and winning medals but are given a clear pathway to achieve it. I commend Sportz Village for taking this important step to nurture future champions.

Saumil Majmudar, Co-Founder, CEO & Managing Director of Sportz Village, added, "Sportz Village, for past 21 years, has been committedly making sports and physical education accessible, enjoyable and a key part of every child's education and growth journey by collaborating with schools – thus creating champions in life. PathwayZ36 is a major step forward, where we want to ensure talent is identified and nurtured from an early stage to enable building of a larger talent pool for the country."

Parminder Gill, Co-Founder & Head of Foundation, Sportz Village, added, "We feel there is a genuine need to support the athletes coming out of grassroots programs in their pursuit to become elite athletes. PathwayZ36 is

our effort to strengthen existing pipe of national and international athletes and become a feeder to elite programs. The short to mid-term vision of PathwayZ36 is to produce athletes at National level. And 36 in PathwayZ36 embodies our larger mission to create athletes for India's success at 2036 Olympics and beyond."

Speaking on the collaboration, Archana Maini, General Counsel & Company Secretary at Campus Activewear, a leading sportswear brand and first strategic partner for the initiative, said, "We are proud to partner with Sportz Village on PathwayZ36. Our shared vision is to provide opportunities for talented athletes at grassroots level to progress to elite level. This partnership is a significant step towards not just building a healthier, sport-loving generation, but also making India a sporting powerhouse."

Under PathwayZ36, Sportz Village will identify top talent within grassroots outreach and laterally across the country, leveraging its network with schools, academies and sports associations. Subsequently, selected athletes will undergo highest quality of training at high-performance centres, that includes skill and fitness training, nutrition, tournament exposures and sports science interventions. As on date, a first cohort of 20 student-athletes has already been selected as part of this initiative.

# Athletics Kids Cup Grand Mumbai final concludes season 1 with 1,00,000 children engaged across 1,000 schools in three cities

*Celebrating future champions with Neeraj Chopra as ambassador*

The Athletics Kids Cup enabled by UBS successfully concluded its Grand Mumbai Final at Jio Institute's Athletic Center, Ulwe, bringing together 500 of the city's top young athletes for a thrilling showcase of talent and sportsmanship. In its debut season, the initiative engaged 1,00,000 children across 1,000 schools in three cities, promoting physical activity and inspiring the next generation of champions.

The competition followed a triathlon-style format with events in the 60m sprint, long jump, and ball throw. With electronic timing, live commentary, and big screens, young participants experienced a professional sporting environment, mirroring the excitement of elite athletic events.

The event was graced by esteemed dignitaries, including Adille J. Sumariwalla - World Athletics - Vice President, Former-AFI (President); Florin Müller - Head of Swiss Business Hub India; Philippe M. Reich - Chairman President Switzerland, Swiss-Indian Chamber of Commerce; Harald Egger - Head Group Real Estate and Supply Chain & Chairman UBS India; Anand Menezes - Olympian; Sudhir Rane - CHRO NEROLAC; Kashyap Mody - Reliance Treasury; Prasad Kulkarni - Deloitte, Partner; Father Ernest Fernandes - Byculla Church; Santosh Varghese - Head Coach Striders; Amalan Borgohain - Athlete 100m/200m; Moumita



Mondal - Athlete 100mH/Long Jump who celebrated the young athletes' achievements

Neeraj Chopra, Olympic Champion and Athletics Kids Cup Ambassador, highlighted the transformative impact of such competitions, stating: "The experiences young athletes gain from a

competition like this are invaluable. Learning to handle excitement, set goals, and compete will shape them for life."

The Athletics Kids Cup was designed to address the increasing concern of childhood obesity by encouraging children to adopt an active lifestyle through running, jumping,





and throwing—the fundamental movements of sports. Beyond physical fitness, the initiative also fostered discipline, resilience, teamwork, and leadership skills, building confidence among young participants.

UBS played a pivotal role in making the Athletics Kids Cup a reality, reinforcing its commitment to empowering communities and fostering youth development. The initiative aligns with UBS's mission to support the holistic growth of young individuals, ensuring they have the tools to achieve their full potential.

Daniel Schenker, CEO of Dspowerparts shared his enthusiasm

for the initiative: "We are incredibly proud to launch an initiative that not only promotes physical fitness but also instills essential life skills in young athletes. The Athletics Kids Cup is a testament to the power of sports in shaping a healthier, more



confident generation." Matthias Schacke, Head India Service Company at UBS, echoed this sentiment: "We believe in investing in India's future, and the Athletics Kids Cup embodies our commitment to youth development. The passion and determination of these young athletes and the fantastic atmosphere on the field reinforces our belief that sports can be transformative, empowering children to achieve their full potential."

With the successful conclusion of its first season, the UBS Athletics Kids Cup is set to launch its second season in April 2025.





Prof. V. Kamakoti, Director, IIT Madras, presents a prize during 'RTC Impressions' Event at IITM Research Park on 13 Feb 2025.

## IITM Pravartak & Asha for Education, Chennai provide platform for rural Govt School Students to showcase talents

IIT Madras Pravartak Technologies Foundation and Asha for Education, Chennai are providing a platform for Rural Government School students to showcase their talents through events called 'RTC Impressions'. The event highlights the students' confidence, creativity and problem-solving skills through well-researched projects and engaging presentations.

These students are beneficiaries of the Rural Technology Centres (RTCs), which are being run by IITM with Asha Foundation with a focus on providing tech education to high school students in remote and rural areas.

The two organizations plan to expand their operations with three new RTCs were inaugurated in February 2025 in Uthukottai, Thirupatchur and Thirutani of Thiruvallur district. Asha and IITM Pravartak are already



Ms Doyeon Kim, Head (International Partnerships), Code.org, with School Students during 'RTC Impressions' Event at IITM Research Park on 13 Feb.

jointly running 9 Rural Technology Centers (RTCs) during the 2024-25 academic year.

'RTC Impressions' event was held on 13th February 2025 at IIT Madras Research Park in the presence

of Chief Guest Prof V. Kamakoti, Director, IIT Madras, the driving force behind Rural Technology Centres, and Special Guest Ms. Doyeon Kim, Head of International Partnerships, Code.org, an



international non-profit organization and educational website.

Competitions were held for the students in the following areas, which were judged by 12 judges from the industry and academia.

- Basic Digital Literacy
- Basics of Programming
- Web Development
- Physical Programming
- Animation using JavaScript
- Media Editing

Addressing the Prize Distribution Ceremony, Prof. V. Kamakoti, Director of IIT Madras, said, “Our expectation from the RTCs was to provide a platform for students to have opportunity for innovation and out-of-box thinking. There are many social problems, requirements in agriculture, advances in language, which can be overcome by trying out new ideas and we wanted to facilitate this for rural children through the RTCs.”



**School students during 'RTC Impressions' Event conducted by IITM Pravartak and Asha Foundation at IIT Madras Research Park on 13 Feb.**

Having experienced the competition and spending the whole day in seeing the event, Ms. Doyeon Kim, Head (Global Partnerships), Code.org, said, “I was truly inspired by the creativity, problem-solving, and presentation skills of all students. Their diverse projects, covering topics from Indian culture to community applications, highlighted them as creators of technology, not just consumers. The quality

and innovation in their work were remarkable.”

IITM Pravartak Technologies is a Section 8 Company housing the Technology Innovation Hub on Sensors, Networking, Actuators and Control Systems. It is funded by Department of Science and Technology, Government of India, under its National Mission on Interdisciplinary Cyber-Physical Systems and hosted by IIT Madras

## ACC and Adani Foundation's women-led initiative boosts rural welfare, touching 28,000 lives, unlocking Rs 612 Cr value

**A**CC, the cement and building materials company of the diversified Adani Portfolio, along with the Adani Foundation, continues to drive social impact through the 'Meri Sangini Meri Margdarshika' (MSMM) programme. Implemented across 17 ACC locations, the women-led initiative has connected rural community members to more than 20 government welfare, insurance, financial schemes and entitlements, unlocking a total value of Rs. 612 crore. MSMM facilitators are all trained local women volunteers, called 'Sanginis'.

By simplifying bureaucratic processes, MSMM has helped beneficiaries access schemes related to healthcare, education, financial inclusion, and livelihoods — boosting household incomes and social security. So far in FY'25, the programme has linked 28,000 beneficiaries to government schemes across Karnataka, Jharkhand, Chhattisgarh, Madhya Pradesh, Odisha, and others.

MSMM has so far unlocked total value of Rs. 612 crore in government benefits during the fiscal, with Rs. 3.51 crore directly transferred into the beneficiaries' bank

accounts, driving financial inclusion. Communities located around ACC's Kudithini, Wadi, Sindri, and Madukkarai plants have received higher benefits amongst all the covered locations including Bargarh, Chanda, Chaibasa, Damodar, Gagal, Jamul, Kymore, Lakheri, Thondebhavi, Tikaria, Chilhati, and Salaibanwa.

Beneficiaries have gained access to eligible welfare schemes including Ayushman Cards, e-Shram Cards, Crop Insurance, Pradhan Mantri Jan Arogya Yojana, Pradhan Mantri Suraksha Bima Yojana, Pradhan Mantri Jivan Jyoti Bima Yojana, Pradhan Mantri Street Vendors Atmnirbhar Nidhi, and others, significantly improving their financial security and livelihoods. Overall, MSMM has unlocked a value of 885 times the invested amount, underscoring its efficiency in driving social transformation.

ACC and the Adani Foundation's commitment to inclusive growth and empowerment of women as changemakers is reflected through initiatives including MSMM, enabling maximum benefits from government schemes for thousands of underserved families in rural communities.

# Wirepas Accelerates Smart Metering Revolution in India with 5 Million Deployments

*Empowering India's Energy Future with Advanced IoT Connectivity Solutions*

**W**irepas, a global leader in IoT connectivity solutions, announced a major milestone in India's energy sector: the deployment of over 5 million smart electricity meters across the country.

Powered by Wirepas Mesh technology, this achievement underscores Wirepas' ongoing commitment to driving operational efficiency, sustainability, and real-time energy management within India's evolving infrastructure.

As India continues to embrace technological advancements in energy management, Wirepas Mesh is helping utilities manage and monitor electricity consumption more effectively, leading to improved efficiency and cost savings. With this breakthrough, Wirepas is actively supporting India's ambitious smart metering initiatives, which are integral to the country's future energy vision.

## Key Highlights:

**5 Million Smart Meters Deployed:** With over 5 million smart meters now operational across India, Wirepas Mesh technology is empowering utilities and consumers to improve energy management through real-time data collection. This innovative solution is a game-changer in managing energy consumption, improving service delivery, and enabling proactive energy saving.

**99.9% Reliability:** The success of this deployment is supported by a



Service Level Agreement (SLA) of 99.9%, ensuring consistent, uninterrupted service and delivering accurate data that is critical to maintaining energy efficiency.

**Nationwide Coverage:** Wirepas' technology spans multiple Indian states and Union territories, including Assam, Bihar, Gujarat, Jammu & Kashmir, Ladakh, Madhya Pradesh, Maharashtra, Uttar Pradesh, and West Bengal. The broad geographic reach demonstrates the scalability and adaptability of Wirepas Mesh technology to cater to the diverse energy needs across India.

As India embarks on its journey towards a smarter and more sustainable energy future, the demand for advanced smart metering solutions is rapidly growing. The Indian smart meter market is projected to reach an impressive USD 3,179.5 million by 2032, expanding at a CAGR of 34.57% from 2024 to 2032. This accelerated growth is driven by the widespread adoption of IoT-enabled solutions across cities and regions, creating a fertile ground for Wirepas to scale

its impact and expand its footprint in this burgeoning market.

The Indian government has set a bold target to install 250 million smart meters across the country by 2025, reinforcing the national commitment to modernize the energy sector. Wirepas, with its proven, scalable technology, is well-positioned to contribute to this monumental transformation, delivering cost-effective and reliable solutions that are in perfect alignment with the government's vision for a digitally connected energy infrastructure.

Ashish Sahay, Country Manager, Wirepas India, commented on this significant milestone: "We are thrilled to play a key role in India's energy transformation. With over 5 million smart meters deployed and many more to come, Wirepas Mesh technology is driving energy efficiency and cost reduction for both utilities and consumers. Our commitment to advancing India's smart energy infrastructure remains strong, and we're proud to be part of this transformative journey."



# An eye-opening initiative at the Maha Kumbh 2025; Eyebetes Foundation undertakes a large-scale awareness initiative around widespread diabetes-led vision impairment among Indians

Underscoring their commitment to combating diabetes-led vision impairment, the Eyebetes Foundation, led by renowned Mumbai-based eye surgeon Dr. Nishant Kumar, a three-time Guinness Record holder, has launched a large-scale charitable health initiative at the Maha Kumbh 2025. This transformative mission is designed to provide life-changing eye care and diabetes screenings to tens of thousands of devotees and frontline personnel attending this sacred event.

With a dedicated team of 100 professionals, Eyebetes Foundation aims to offer free vision and diabetes screenings to over 20,000-30,000 pilgrims and over 5,000 uniformed personnel, ensuring that preventable blindness and undiagnosed diabetes do not hinder the lives of those who have embarked on this deeply spiritual journey. Founded in 2016, Eyebetes Foundation is

driven by a mission to combat two of India's most pressing health concerns - diabetes and preventable blindness. An estimated 21 million Indians suffer from Diabetes-led vision impairment. To date, the foundation has served over 175,000 people through its free screening and awareness programs, including its widely recognized annual initiative during Mumbai's 10-day Ganpati festival. Now, at the Maha Kumbh, the foundation sees an unparalleled opportunity to extend its reach and serve those who may not otherwise have access to quality healthcare.

The Maha Kumbh is a sacred confluence of faith, tradition, and devotion, drawing millions of seekers in pursuit of spiritual awakening. Eyebetes Foundation recognizes this gathering as an opportunity not just for prayer, but for profound transformation through service. Located at Sector 23, Arail Ghat, the foundation's medical camp offers essential

healthcare services, including free random blood sugar tests, comprehensive vision screening, AI-powered retinal imaging, prescription glasses for uniformed personnel, bifocal glasses, and UV protection sunglasses for frontline officers.

Understanding the critical role of uniformed personnel in ensuring the safety and order of this grand event, Eyebetes Foundation is extending its care beyond pilgrims to the very people who protect them. The foundation is conducting dedicated screenings for diabetes, cholesterol, and vision impairments, ensuring that these frontline officers can continue to serve without health-related hindrances.

Speaking on this initiative, Dr. Nishant Kumar, said "Maha Kumbh is a rare and extraordinary gathering of millions for a spiritual purpose, making it the perfect opportunity to provide life-enhancing medical support. Our mission is simple - to ensure that no one suffers from preventable blindness or undiagnosed diabetes. Through this initiative, we aim to connect healthcare with spirituality, reinforcing the idea that service to humanity is the highest form of devotion."

By integrating medical care into this momentous spiritual gathering, Eyebetes Foundation aims to touch millions of lives, leaving a lasting impact far beyond the banks of the Sangam. With each screening and every pair of prescription glasses provided, the foundation is turning devotion into action, ensuring that the journey of faith is also one of health and well-being.





L-R Herbalife's CSR Team, Prof Ashwin Mahalingam, Mr. Ajay Khanna, Prof Smita Srivastava, and Mr. Uday Prakash

# Herbalife India collaborates with IIT Madras to Launch Plant Cell Fermentation Technology Lab

*This initiative aims to bridge the demand-supply gap in plant-based nutraceuticals, phytochemicals, and phytopharmaceuticals while aligning with Herbalife's broader innovation and sustainability goals.*

**H**erbalife, a premier health and wellness company, community and platform signed an agreement with the Indian Institute of Technology (IIT) Madras to establish the Herbalife-IITM Plant Cell Fermentation Technology Lab at the campus under Herbalife's CSR initiative. The agreement signing ceremony took place at IIT Madras in the presence of Ajay Khanna, Managing Director, Herbalife India, and Prof. Ashwin Mahalingam, Dean - Alumni & Corporate Relations, IIT Madras and other IITM representing members. This partnership aligns

with the Indian government's Bio-E3 policy, aimed at establishing India as a global hub for bio-manufacturing and advancing Prime Minister's vision of Atmanirbhar Bharat. The lab will serve as a catalyst for innovation, capacity building, and industry collaboration in the wellness sector while also fostering entrepreneurship.

The Centre of Excellence – Herbalife Plant Cell Fermentation Technology Lab, is focused on pioneering sustainable solutions for high-quality herbal raw materials and phytochemicals. The facility will

be a center to produce sustainable herbal raw materials using plant cell fermentation technology, ensuring high-quality phytochemicals and drive innovation in nutraceuticals, cosmeceuticals, and Ayush formulations, contributing directly to the UN Sustainable Development Goals (SDG3 - Good Health & Well-Being).

The collaborative effort will leverage plant cell technology to enable vitro cultivation of medicinal plants under controlled conditions, ensuring year-round availability, purity, and bioactive consistency. In addition to this, Advanced bioreactor-based scaling will facilitate large-volume production in minimal space, overcoming land constraints and long harvesting cycles associated with traditional farming and the green extraction technologies will drive sustainability in bioactive compound production.



The Plant Cell Fermentation Technology Lab predominantly has 5 key focus areas, Innovative Research to handle R&D, translational research, and blue-sky projects; Sustainable Biomanufacturing to handle the scalable plant cell fermentation for herbal extracts; Technology-Driven Solutions in the silico screening for phytochemical discovery and repurposing; Conservation Efforts in the production of somatic embryos and plant materials for field cultivation of endangered medicinal species; and Ecosystem Engagement to support hackathons as well as accelerator programs to drive innovation.

Khanna said, “Herbalife is committed to drive innovation that contributes to sustainability. Our partnership with IIT Madras, yet again this year is an effort towards transforming the nutraceutical and

wellness sectors. Herbalife Plant Cell Fermentation Technology Lab at IIT Madras will be a catalyst for innovation, capacity building, and enhance industry collaboration in the wellness sector. Aligned with India’s Bio-E3 Policy (2024) and the National Biotechnology Development

Strategy (2022-25), this initiative will position India as a leader in biomanufacturing while contributing to the Prime Minister’s vision of Atmanirbhar Bharat.”

Prof. Smitha Srivastava, Department of Biotechnology, Bhupat and Jyoti Mehta School of Biosciences, IIT Madras., said, “The Herbalife-IITM Plant Cell Fermentation Technology Lab represents a significant milestone in sustainable innovation. This state-of-the-art facility will drive pioneering research, foster academic training, and enable impactful

technology development for industry applications. I sincerely thank Herbalife for their generous support and unwavering belief in this initiative. Together, we are poised to transform the landscape of plant cell fermentation, creating meaningful outcomes for science, industry, and society”.

Prof Mahalingam said, “It is heartening to see the IITM-Herbalife partnership growing from one milestone to another. Through their support for the establishment of the Plant Cell Fermentation Technology Lab, Herbalife has emerged as a leader in the field of sustainable solutions for high-quality herbal raw materials and phytochemicals. This partnership has indeed come at the right time, not only for IITM and Herbalife but also for our nation’s goals towards a brighter, sustainable future”.

# FORM IV

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I, Rajesh Tiwari, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Dated: March 1, 2025

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## Empowering Girls, Inspiring Change: Celebrating the Ninth Edition of Project Nanhi Kali's Proud Fathers for Daughters

The ninth edition of Proud Fathers For Daughters, an annual fundraising event by Project Nanhi Kali, took place on January 11-12, 2025 at the National Sports Club of India, Worli, Mumbai. The event witnessed an extraordinary turnout of 265 father-daughter duos from across the country, with 527 portraits captured during the two-day event. The proceeds from the event will go towards the

education of 527 underserved girls, empowering them with opportunities for a brighter future.

Proud Fathers For Daughters was founded by Anand Mahindra, Chairperson of the Mahindra Group and K.C. Mahindra Education Trust, and renowned photographer Atul Kasbekar to shift societal mindsets towards the girl child and reinforce the importance of gender equality. The event challenges entrenched

stereotypes, showcasing fathers not just as caregivers, but as active champions of their daughters' dreams, ambitions, and independence. It's a powerful reminder that when fathers support their daughters wholeheartedly, they unlock limitless potential, breaking down barriers for future generations.

Since its inception, Proud Fathers For Daughters has become a symbol of hope and empowerment,



creating 2,397 stunning portraits that celebrate a father's unwavering support for his daughter's dreams. Each portrait tells a powerful story of love, encouragement, and the belief in a brighter future for all girls. Through the funds raised at the event through the years, Project Nanhi Kali has been able to support the education of over 5,597 underserved girls, giving them the tools to break barriers of inequality, pursue their ambitions, and rewrite their stories. This year's theme, "Her First Coach," drew inspiration from Project Nanhi Kali's new curriculum, which focuses on 21st-century skills and sports leadership to foster holistic development in girls. The event highlighted the pivotal role fathers play as their daughters' first guides, mentors, and cheerleaders and encourage fathers to championing their daughters dreams and ambitions.

Renowned photographers Atul Kasbekar, Colston Julian, Jaideep Oberoi, Prasad Naik, Rafique Sayed, Tarun Vishwa, and Tejal Patni generously dedicated their time, talent, and creative expertise to make Proud Fathers For Daughters a truly unforgettable event. These celebrated photographers came together not only to capture tender moments of pride and joy between fathers and daughters but also to champion a transformative cause. By lending their skills to this initiative, they

**The two-day event witnessed priceless father-daughter moments captured by some of India's most renowned photographers.**

**Over 265 father-daughter duos from across the country attended the event, with 527 portraits captured.**

**The proceeds from the event will go towards the education of 527 underserved girls at Project Nanhi Kali.**

turned every portrait into a cherished memory, while underscoring the power of storytelling through photography to inspire change and drive impact. Their commitment to using their art for social good added a profound depth to the event, amplifying its message of empowerment and hope.

Participants contributed INR 10,000 for a professional father-daughter photoshoot, with each contribution funding the education of one underserved girl for an entire year at Project Nanhi Kali. Beyond providing education and skilling, Project Nanhi Kali's updated curriculum emphasises leadership through sports, teamwork, and critical

thinking, preparing girls to thrive in the 21st-century. Sheetal Mehta, Executive Director at Project Nanhi Kali and Senior Vice President, CSR, Mahindra, remarked: "At Project Nanhi Kali, we are committed to creating an ecosystem where girls are empowered to dream big. Through our new curriculum, we equip girls with 21st-century skills and sports leadership skills, enabling them to lead and succeed. The theme of this year's Proud Fathers For Daughters—"Her First Coach"—beautifully underscores the important role fathers play in shaping their daughters into future leaders. We are deeply touched by the overwhelming response and thank the participants for their unwavering support towards our cause through the years. Not to forget, we extend our heartfelt gratitude to the photographers for their creativity and unwavering support. This edition's success reaffirms the belief that when families and communities champion a girl's dreams, the impact is transformative—not just for her, but for society at large."

Over the years, Proud Fathers For Daughters has seen enthusiastic participation from celebrity father-daughter duos such as Vidya Balan and P.R. Balan, Shatrughan Sinha and Sonakshi Sinha, Sachin Tendulkar and Sara Tendulkar, and Leander Paes and Aiyana Paes, among others.

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# CSR INDIA UNITED

## Tata Motors Partners with Government of Maharashtra to Restore 1000 Water Bodies in 20 Districts



**R**einforcing its commitment to safeguard water resources and uplift rural communities, Tata Motors has signed a Memorandum of Understanding (MoU) with Government of Maharashtra to restore 1000 water bodies across 20 districts in the water-stressed regions of the state. In 2024, Tata Motors rejuvenated and restored 356 water bodies in Maharashtra by leveraging the Gal Mukut Dharan Gal Yukt Shivar Yojana, a community-based de-siltation programme, in partnership with the Soil and Water Conservation Department of Government of Maharashtra, NAAM Foundation, and local communities. Strengthening its collaboration, Tata

Motors intends to scale the water conservation initiative to 20 districts in the state, including the water deprived regions of Vidarbha and Marathwada. The proposed collaboration aims to rejuvenate and revive 1000 water bodies in Amravati, Latur, Chandrapur, Nagpur, Nanded, Parbhani, Akola, Gadchiroli, Yavatmal, Dharashiv, Chhatrapati Sambhaji Nagar, Ahilya Nagar, Sangli, Solapur, Pune, Palghar, Thane & other districts of the state. NAAM Foundation will be the implementation partner for the programme.

Speaking on the initiative, Priya Khan, Officer on Special Duty – Chief Minister’s Office, Government of Maharashtra states,

“The Government of Maharashtra launched the ‘Gal Mukut Dharan, Gal Mukut Shivar Yojana’ to increase water capacity of existing dams and water bodies. This programme has evolved into a people’s movement thanks to the invaluable support of our partner organisations like Tata Motors and NAAM Foundation. Together, we are not just restoring water bodies; we are fostering resilience and sustainability to reduce the impact of recurring droughts in the state.”

Ganesh Thorat, CEO – NAAM Foundation, adds, “The NAAM Foundation began addressing Maharashtra’s acute water shortage in 2015. Our partnership with Tata Motors and the Government of Maharashtra is a significant milestone towards these efforts. Last year we collectively expanded our work to ten districts. We are happy to see that the positive impact of the water conservation efforts will now reach more districts.”

In 2024, Tata Motors and NAAM Foundation successfully rejuvenated and revived 356 water bodies, excavating ~ 60 lakh cubic meters of silt across 10 districts of Pune, Palghar, Thane, Satara, Dhule, Solapur, Chandrapur, Ahmednagar, Beed and Latur. This collaborative effort has created a capacity of approximately 7000 million litres of water, benefitting 7,000 farmers and significantly raised the water table and improved access to potable water in rural Maharashtra.

Gal Mukut Dharan Gal Yukt Shivar Yojana provides preapproved funds to the farmer for the silt transportation to their farms, which enhances fertility of the soil. The end-to-end digital monitoring mechanism ensures agility and transparency in project implementation. The success and impact of the rejuvenation of water bodies in Maharashtra is a testament of Tata Motors’ commitment to sustainable development and upliftment of rural communities.



# NITI Aayog and Nasscom Foundation partner to further India's Aspirational Blocks Programme to Digitally Empower One Lakh lives

**A**ligned with the Pradhan Mantri Digital Saksharta Abhiyan, Nasscom Foundation, in partnership with NITI Aayog, is digitally empowering one lakh lives in India's Aspirational Blocks. The initiative's initial phase focuses on bridging the digital divide by providing digital literacy training and access to essential e-governance services across 60 Particularly Vulnerable Tribal Groups (PVTG) blocks. The program will subsequently expand to include all other aspirational blocks. By promoting digital inclusion, this initiative supports the government's vision of Viksit Bharat, fostering inclusive growth and ensuring that no one is left behind in India's digital transformation journey.

The launch event, graced by distinguished members including B.V.R. Subrahmanyam, Chief Executive Officer, NITI Aayog; other NITI Aayog members; Dr. O.P. Agarwal, Distinguished Fellow; Anand Shekhar, Additional Mission Director, Aspirational Blocks Programme; Dr. Mahendra Kumar, Additional Mission Director, Aspirational Districts Programme and Aspirational Blocks Programme; Jyoti Sharma, CEO, Nasscom Foundation; and Aditya Mishra, Lead, Digital Literacy, Nasscom Foundation, highlighted the government's commitment to digitally empowering the last mile, ensuring that technology becomes a catalyst for inclusive growth and equitable development.

Building on the success of Nasscom Foundation's Aspirational Districts Programme launched in 2022, focusing on bridging the

▶ **Nasscom Foundation to empower 60 PVTG blocks in phase one with a focus on increased digital understanding and awareness on government sponsored schemes**

▶ **Program to expand to all 500 aspirational blocks**

▶ **Initiative to strengthen national commitment of digitally empowering the last mile especially women and tribal communities**

digital divide across 55 aspirational districts across 23 states through Digital Resource Centres, this initiative continues to demonstrate Nasscom Foundation's commitment to leveraging technology for social impact, driving progress and empowerment in marginalized regions across India.

According to the Tribal Development Report 2022, the literacy rate among PVTGs is just 47.7%, far below the national average of 77.3% which makes the scenario of digital growth extremely vital in these communities. To address this disparity, Nasscom Foundation has extended the initiative from aspirational districts to blocks by focusing on communities including women and youth between the ages of 12 and 60, equipping them with essential digital skills and resources to foster holistic growth and inclusion.

Jyoti Sharma, Chief Executive Officer, Nasscom Foundation said, "Technology is the driving force of

progress and empowerment in today's world. To achieve that growth, digital literacy becomes crucial in ensuring that India's remotest communities, especially the marginalized PVTGs, have the power to pave the way for sustainable growth and prosperity. The Aspirational Blocks Programme, in partnership with NITI Aayog, is not just about bridging the digital divide—it's about deepening democracy and ensuring active participation in shaping the vision of Viksit Bharat."

The training encompasses foundational computer skills, cybersecurity, and effective internet usage, enabling participants to confidently navigate the digital world. Community outreach campaigns are also a critical part of the initiative, raising awareness about the benefits of digital literacy and e-governance services while encouraging the adoption of digital tools. To ensure effective implementation, the program enlists local community champions as master trainers and digital ambassadors to lead these efforts along with the support from respective block administration, conducting door-to-door awareness and community mobilization.

Through this strategic collaboration, Nasscom Foundation is committed to meeting the key indicators of Pradhan Mantri Digital Saksharta Abhiyan including increase in use of digital devices, awareness of government sponsored schemes and services, increase community awareness on digital literacy. By addressing critical gaps in digital literacy and access, the Aspirational Blocks Programme is paving the way for a more digitally empowered India.



## SMFG India Credit Strengthens Rural Livelihoods with Largest Cattle Welfare Initiative: 1.9 Lakh Beneficiaries Across 500 Locations

**S** MFG India Credit has made history by achieving a Guinness World Record for the 'Largest Cattle Welfare Lesson (Multiple Venues)' with 517 participants across 6 venues in India. This milestone was accomplished as part of the company's 7th edition of Pashu Vikas Day (PVD), the largest one-day cattle care camps across the country. These camps were simultaneously held in 500 locations across 16 states, benefiting around 1,90,000 beneficiaries (1,50,000 cattle and 40,000 cattle owners).

In India, approximately 65-70% of the rural population relies on agriculture or agriculture-related activities for their livelihood. Hence, cattle and livestock play a crucial role in their livelihood generation activities and financial wellbeing. Recognizing this unbreakable bond, SMFG India



Credit celebrated the 7th edition of Pashu Vikas Day under the theme 'Mera Pashu Mera Parivar,' reinforcing the importance of livestock in the lives of these rural families.

The annual PVD event also saw active participation of more than 6,000

employees, reinforcing the company's commitment to rural welfare.

Shantanu Mitra, Chief Executive Officer and Managing Director of SMFG India Credit, said, "At SMFG India Credit, we remain steadfast in our commitment to championing



social initiatives that create a meaningful impact. With a strong Pan-India presence of 1000+ branches, our primary focus is on Tier-2+ locations, with nearly 90% of our branches strategically positioned in these regions. In fact, over the last two years, we have added around 300 branches, all located in Tier-2+ geographies. Our goal is to drive financial inclusion by providing the right products and financial solutions, enabling us to serve communities at every stage of their life cycle.

I would also like to extend my heartfelt congratulations to each of our dedicated employees for their outstanding commitment and hard work in achieving the Guinness World Record for the Largest Cattle Welfare Lesson across multiple venues. It is truly heartening to see that this year's Pashu Vikas Day not only surpassed expectations in cattle care, but also introduced specialized knowledge sessions across multiple



venues in India, which earned us the Guinness World Record."

Swaminathan Subramanian, Chief Operating Officer of SMFG India Credit, said, "The recognition received from Guinness World Records for holding largest cattle

welfare lesson across multiple venues is a proud and defining moment for each and every one at SMFG India Credit. As a company, we have etched our name in the history books on an international level, and it gives us the belief to continue working towards uplifting the communities we serve at large through innovative and sustainable socio-economic initiatives. Setting a world record on Guinness World Records also reaffirms our dedication to rural welfare and motivates us to continue empowering communities by providing financial access through our financial solutions across their life-cycle."

Building on its rich legacy of achieving world records, Pashu Vikas Day has previously been recognized by the World Records Union, Limca Book of Records, Best of India Records and World Book of Records for hosting the largest cattle care camps organised in a single day.

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## ASDC collaborates with Hero MotoCorp for skilling 20,000 women

The Automotive Skill Development Council (ASDC) has collaborated with Hero MotoCorp, the world's largest manufacturer of motorcycles and scooters, for a pioneering initiative aimed at skilling women and paving the way for greater gender diversity and inclusion in the automotive workforce.

Over the next 15 months, this transformative program will train 20,000 women across eight critical roles in the automotive sales and service - two-wheeler service assistant, two-wheeler service technician, electric vehicle service assistant (2W), electric vehicle service technician (2W), automotive sales consultant, automotive service advisor, automotive tele-caller, and automotive showroom host. The program will be implemented across

multiple locations, ensuring accessibility for women from diverse socio-economic backgrounds.

Hero MotoCorp is dedicated to fostering a diverse and inclusive workplace that provides equal opportunities for all. Through its CSR initiative "Hero WeCare," the company has successfully upskilled over 4,000 women via its flagship program, Hero Saksham. Hero MotoCorp acknowledges the significance of developing future-ready skills and remains committed to building an inclusive workforce.

This joint initiative between ASDC and Hero MotoCorp will establish a new industry benchmark and motivate others to prioritize diversity and inclusion. By creating a skilled and diverse workforce, the initiative demonstrates the potential of shared goals and commitment

to progress. Additionally, the collaboration will address the skill and gender gap in the sector by providing relevant technical knowledge.

The initiative also aligns with ASDC's mission to enhance industry skill levels while promoting a workforce that mirrors the nation's diversity. The training program focuses on practical, hands-on learning, equipping participants with industry-relevant expertise to excel in their roles.

Speaking on the occasion, Mr. F R Singhvi, President of ASDC, emphasized the importance of fostering diversity in the industry. He stated, "The automotive sector has traditionally been male-dominated, but this initiative represents a turning point. By training 20,000 women, we are not only creating equitable opportunities but also building a more inclusive and innovative future for the industry. I commend Hero MotoCorp for their vision and unwavering support in bringing this initiative to life."

Highlighting the importance of this collaboration, Mr. Vinkesh Gulati, Vice-President of ASDC, remarked, "Gender diversity is not just a social imperative; it's an economic necessity. Women bring unique perspectives and capabilities that are crucial for the industry's growth. This partnership with Hero MotoCorp reaffirms our shared commitment to empowering women and creating a skilled workforce that can drive the industry forward."

Mr. Arindam Lahiri, CEO of ASDC, elaborated on the initiative's strategic vision, stating, "This initiative is more than a training program; it's a movement towards a more equitable automotive industry. With Hero MotoCorp as a partner, we are equipped to make a significant impact. Together, we are not only creating job opportunities but also empowering women to become leaders in their own right."



# Samsung C&T Engineering & Construction Employees Build Homes for Warli Families with Habitat for Humanity India in Palghar



**H**abitat for Humanity India, a leading housing non-profit, welcomed 50 employees from Samsung C&T for a volunteer build in Saware village located in Palghar district of Maharashtra. The employees participated in two phases, with the first group of 25 members volunteering on 1st February 2025 and the second group on 15th February 2025. Working alongside three future homeowners, these volunteers played a crucial role in helping construct safe and secure homes for families belonging to the Warli tribal community.

This initiative is part of the ongoing partnership between Habitat for

Humanity India and Samsung C&T, which was announced in December 2024. The collaboration focuses on building new homes for 15 families and improved sanitation facilities in three Zilla Parishad schools benefiting 850 schoolchildren.

Speaking about the initiative, Anand Kumar Bolimera, National Director, Habitat for Humanity India said, “Volunteer builds are at the heart of Habitat for Humanity’s mission to build homes, communities and hope. The dedication and enthusiasm of Samsung C&T volunteers exemplify the power of collaboration in creating a positive impact. By working alongside homeowners,

they are not just constructing homes — they are helping families build a foundation for a better future. This partnership highlights the profound impact the corporate professionals can create in driving meaningful social transformation through volunteering.” Samsung C&T Engineering & Construction Group employees actively participated in key construction activities, learning firsthand the challenges and triumphs of building homes with the marginalised communities. Their efforts highlighted the role of corporate partnerships and volunteering in driving sustainable social change and showcased the importance of improved housing as a cornerstone for empowerment and progress.

This volunteer build underscores Habitat for Humanity India’s ongoing commitment to engage corporate partners in hands-on community development. As more organisations embrace the corporate social responsibility (CSR) as well as the environmental, social and governance (ESG) driven initiatives, Habitat for Humanity India continues to address housing challenges faced by the low-income families through collective action and impact.





# Driving Change at the Grassroots: Milaan Foundation's Girl Icon Program Empowers the Next Generation of Leaders



**M**ilaan Foundation, a nonprofit social impact organisation working to empower adolescent girls nationwide, has released the Impact Assessment Report for its flagship Girl Icon Program. Launched in

2015, the program strives to provide life-skills-based leadership training to adolescent girls aged 12–18 across Uttar Pradesh, Madhya Pradesh, and Karnataka, who in turn mentor groups of 20 Peer Girls from their local communities. To date, the

program has impacted over 1,00,000 girls. Over the years, the communities in which the program functions have demonstrated measurable improvements in education, leadership, digital literacy, health awareness, and financial empowerment.

The study assessed the program's impact on 65 Girl Icons, 403 Peer Girls, and 403 Control Group participants. Girl Icons are adolescent girls selected as program participants and trained as leaders within their communities, while Peer Girls are members of cohorts mobilized by the Girl Icons to expand the program's reach at the grassroots level. The program has significantly improved educational outcomes, with 94% of Girl Icons and 92% of Peer Girls pursuing education, compared to 39% in the Control Group. Moreover, enrollment by Girl Icons (49%) in higher secondary education is nearly double that of the Control Group (25%).

The Girl Icon Program is also working to bridge the digital gender divide, with 97% of Girl Icons having smartphone access and 94% possessing email addresses, compared to only 72% and 40% among Peer Girls and 56% and 19% in the Control Group, respectively. This digital empowerment is opening doors to educational and career opportunities. The program has also driven a reduction in child marriages among Girl Icons, with 100% of Peer Girls remaining unmarried, in contrast to 32% of the Control Group. Additionally, health awareness has improved significantly, with 85% of Girl Icons understanding menstruation as normal, compared to 59% of the Control Group. Awareness





of contraceptives and HIV/AIDS among Girl Icons stands at 76.9% and 90.7%, far exceeding the Control Group's 24.1% and 35.7%.

The report also highlights the program's positive impact on

participant's financial empowerment, with 91% of Girl Icons having savings accounts and 81% saving regularly, compared to 67% and 70% in the Control Group. Alongside individual growth, the program has even driven

community transformation through 1,600 Social Action Projects in the 2023-24 cohort, addressing issues such as education, menstrual health, and child marriage and impacting 239,408 community members.

Rati Misra, Executive Director of Milaan Foundation, said, "The findings of this report reaffirm the life-changing impact of the Girl Icon Program and inspire us to do more. With over 36,000 adolescent girls already empowered, we see this as just the beginning. By incorporating cultural sensitivity into menstrual health education, enhancing reproductive health workshops, and broadening our outreach, we aim to create a future where every girl can realize her full potential and lead her community toward a brighter tomorrow."

## Ambuja Cements empowers rural women entrepreneurs in Bhatapara through 'Lakhpati Didi' initiative

**A**mbuja Cements, the cement and building material company of the diversified Adani Portfolio, is driving economic empowerment among rural women in Bhatapara, through the transformative 'Lakhpati Didi' programme. By fostering micro-enterprises and offering extensive support in training and resources, the Company's CSR initiatives are helping women achieve financial independence and sustainable livelihoods.

The 'Lakhpati Didi' movement, initiated by the Ministry of Rural Development, aims to enable women in self-help groups (SHGs) to earn an annual household income of ₹1 lakh or more. Ambuja Cements' CSR team identified 188 women from Bhatapara for this program and provided them with the necessary tools and training to achieve this milestone. Many women have successfully ventured into



enterprises like tailoring, vegetable cultivation, and retail stores, significantly improving their quality of life and inspiring their communities.

This initiative has enabled women like Kuleshwari Verma, a fancy store owner earning ₹3.75 lakh annually, and



Kusum Patel, who cultivates vegetables and earns ₹1.1 lakh per year, to achieve transformative financial growth. Stories like theirs highlight how access to resources and consistent support can unlock the entrepreneurial potential of rural women.



Participants at the YES SECURITIES Wonga Wits India's Finance & Stock Market Quiz

## YES SECURITIES commits to empowering 1 million students as future-ready investors by FY'28

**Y**ES SECURITIES, a trusted name in financial services, will empower 1 million students as future-ready investors by FY'28.

YES SECURITIES pioneered 'WongaWits Season 1' an on-ground inter-collegiate quiz competition in the BFSI sector, culminating in a thrilling Grand Finale on January 2025 at the headquarters, YES BANK House. The competition saw enthusiastic participation from 300+ teams across 30+ colleges, fostering financial literacy. S. P. Jain Institute of Management and Research (SPJIMR) clinched the championship title, followed by Thakur College and Nagindas Khandwala College.

The company then subsequently launched WongaWits LMS, a comprehensive learning platform offering four financial modules and certifications, empowering students to master financial literacy.

These comprehensive learning modules on WongaWits LMS include:

- Basics of Stock Market

- Investor Journey 101: Mutual Funds
- Inside Forex, Currency & Commodities
- The Best of Both: Fundamental & Technical

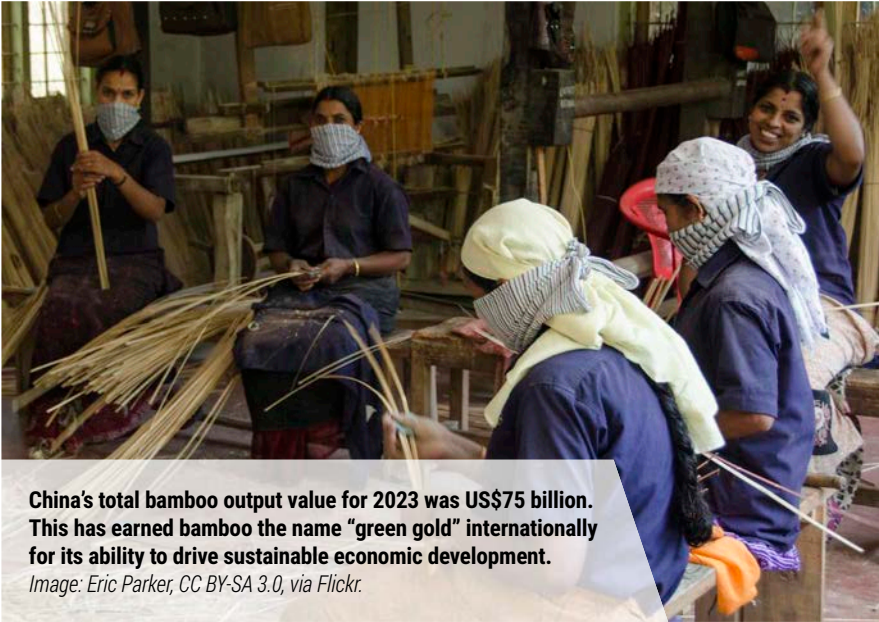
The company also intends to beef up this LMS platform by offering additional courses in financial tools like Bonds, Futures and Options, Exchange Traded Funds, Systematic Investment Plan, Risk Management and Taxation in investments.

Anshul Arzare, MD & CEO, YES SECURITIES said, "At YES SECURITIES, we believe financial literacy is a fundamental life skill that empowers individuals to make informed decisions about their future. Our commitment to educating 1 million students through our various student centric initiatives like WongaWits, The Wize Whispers is a step toward creating a financially aware and responsible generation. We believe in empowering generations to invest wisely, securely and seamlessly. In the today's world, which is deeply coloured by

all sort of unverified social media, it's important for generations to be able to filter. Financial literacy has both the aspects - to be able to manage finances better and most importantly not fall prey to unverified approaches, protecting money is equally important aspect along with making the best out of investments. We are proud of the enthusiastic participation in our recently concluded WongaWits Quiz and look forward to expanding our outreach to more students across the country."

To achieve its goal of reaching 1 million students, YES SECURITIES will deploy a comprehensive marketing strategy encompassing digital engagement, social media campaigns, and student-focused programs. On-campus initiatives, including finance workshops, guest lectures, and interactive events at colleges, will further enhance participation. Additionally, strategic partnerships with universities, student organizations, and digital education platforms will help broaden the initiative's reach and impact. 





China's total bamboo output value for 2023 was US\$75 billion. This has earned bamboo the name "green gold" internationally for its ability to drive sustainable economic development.  
Image: Eric Parker, CC BY-SA 3.0, via Flickr.

# UNLEASHING BAMBOO: A NATURE-BASED SOLUTION TO PLASTICS

The plant has a potential role as a sustainable powerhouse, but challenges remain in scaling up its production and trade, writes **Austin Smith**, Dialogue Earth

**P**lastics are integral to our modern lives, used in everything from packaging and construction to textiles and consumer goods. They are cheap and versatile, but come with significant environmental costs.

Annual global plastic production has surged in the 21st century, increasing between 2000 and 2019 from 234 million tonnes to 460 million tonnes.

As of 2019, only 19 per cent of that was incinerated – and only 9 per cent was recycled. Most is either disposed

of in landfills or released into the environment. Plastics then leach harmful chemicals, contributing to the “triple planetary crisis” of climate change, biodiversity loss and pollution. Plastics also release greenhouse gases throughout their life cycle. These emissions are projected to account for 15 per cent of our total global carbon budget by 2050. Meanwhile, terrestrial and marine ecosystems are being overloaded with mountains of plastic waste. An estimated 19-23 million tonnes entered aquatic ecosystems in 2016 alone.

Efforts are being made to address this crisis. The UN’s Intergovernmental Negotiating Committee on Plastic Pollution is working to develop a legally binding treaty on plastic pollution.

Regional and national measures have also been launched, like the European Union’s 2021 ban on common single-use plastics, as well as plastic bag regulations in at least 127 countries. Researchers are also exploring low-carbon, bio-based materials known as “bioplastics”, to replace plastics derived from fossil fuels. However, challenges remain regarding the durability, non-degradable components and costs associated with bioplastics.

Bamboo is one such bioplastic variant that shows promise. Crucially, bamboo can replace many single-use plastics, including straws, cutlery, cups, bowls and food packaging. These items are among the most emissions-intensive and difficult-to-recycle items. Single-use items also represent between 30 per cent and 50 per cent of all plastic use.

“As a nature-based solution, bamboo offers diversified options for replacing plastics,” says my colleague, Li Yanxia, senior programme officer at the International Bamboo and Rattan Organization (INBAR).

An intergovernmental organisation with 51 member states, INBAR is headquartered in China. It harnesses modern research methods

and cutting-edge technologies to unlock new pathways for innovative value addition.

### 'Green gold'

China has been working with bamboo for 7,000 years. Traditionally, the plant has been used for arrowheads, baskets, pens, paper, scrolls, shoes, food and building materials. Nowadays, with 7.5 million hectares of bamboo forest at its disposal, China's highly advanced manufacturing and processing industries are worth billions: China's total bamboo output value for 2023 was CNY 541 billion (US\$75 billion). This has earned bamboo the name "green gold" internationally for its ability to drive sustainable economic development.

"In China, research and development and industrial applications of bamboo-based plastics have witnessed rapid growth in recent years," says Changhua Fang, a professor at The International Centre for Bamboo and Rattan (INBAR's technical research sister organisation). "Especially in the fields of daily necessities and catering supplies, many new products have been developed and industrialised." These include bamboo bicycles, phone cases, wind turbine blades and structural components.

What sets bamboo apart from other materials is its ability to synergistically tackle global challenges like climate change mitigation, poverty alleviation, the environment's conservation, construction resilience and now, plastic pollution.

In addition to its ability to replace single-use plastics, the plant can potentially act as a powerful carbon sink. And as a proven tool in land restoration, bamboo can flourish on marginal, degraded lands with minimal agricultural inputs.

It also grows rapidly and binds soils thanks to the extensive networks of rhizomes (thick, underground stems) it establishes. Recently,



**In China, research and development and industrial applications of bamboo-based plastics have witnessed rapid growth in recent years. Especially in the fields of daily necessities and catering supplies, many new products have been developed and industrialised.**

**- CHANGHUA FANG**

Professor, International Centre for Bamboo and Rattan

bamboo made the news following flooding in Pakistan and earthquakes in Ecuador, because it is a strong, low-cost and resilient material for post-disaster reconstruction efforts.

### Bamboo as a substitute for plastic

In the past few years, China has established several initiatives and plans to realise bamboo's potential as an alternative to plastic.

In 2022, INBAR collaborated with the Chinese government to launch the Bamboo as a Substitute for Plastic (BASP) Initiative. It aims to leverage bamboo to reduce plastic pollution, address climate change and accelerate achievement of the UN's 2030 Agenda for Sustainable Development. BASP's ultimate objective is to foster new global paradigms and modes across the entire chain of bamboo products, which can replace plastics.

The Chinese government has undertaken several supportive measures to facilitate the implementation of BASP.

In 2023, the National Forestry and Grassland Administration of China and INBAR co-launched the First

International Symposium on Bamboo as a Substitute for Plastic. As part of the event, BASP's global action plan was released. It is the main framework for coordinating and scaling up international BASP action, and is complemented by a domestic action plan for China.

The Chinese plan targets three main plastic-substitution areas: daily necessities, industrial products, and architecture and building materials. By 2025, it also aims to: establish a preliminary bamboo-for-plastic industrial system; increase the comprehensive added value of major bamboo-for-plastic products by more than 20 per cent in relation to 2022 figures; and improve the comprehensive utilisation rate of bamboo materials by 20 per cent.

Meeting this goal will require a high degree of multi-sectoral coordination and robust governmental support. Li believes this ambitious goal is achievable under the right conditions. It requires "joint efforts from all stakeholders and actors based on their capabilities, knowledge and technologies to pursue and fulfil its objectives of beating plastic pollution". One example of this in practice can be seen in eastern China's county of Anji, Zhejiang province. Despite being home to only 1.8 per cent of national bamboo forest resources, Anji is responsible for 10 per cent of total national production value.

The area features a sustainable bamboo production and processing hub, integrating ecotourism, food and biofuel businesses. It highlights how strong industry coordination, government support and public participation can spur the regional development of bamboo over traditional plastics.

With the right enabling policies and business frameworks, similar clusters could emerge in other bamboo-rich regions of the Global South. "The bamboo-based plastic substitute industries of other countries are still in their infancy, and can



learn from China's experience," says Fang. For these countries, establishing a national strategy is a top priority. This will align the sector's stakeholders and ensure cohesive growth. Within their specific contexts, countries should develop national policy that incorporates various tax incentive mechanisms: tax-exemption status for small- and medium-sized enterprises; tax rebates on imported equipment, tools and machinery; and streamlined procedures for importing materials. Such measures will help attract investment and strengthen bamboo's value chains.

### International feasibility of bamboo production chains

In 2023, INBAR spearheaded a key international pilot project to assess bamboo value chains, which is expected to conclude next year. It investigates genes, cultivation, material properties, products and life-cycle assessments across six countries, representing bamboo-rich areas across the tropical and subtropical belts: Vietnam, Malaysia, Ethiopia, Cameroon, Ecuador and Brazil.

Researchers have so far investigated several high-yield bamboo species, including *Oxytenanthera abyssinica*, *Guadua angustifolia* ("Kunth") and *Thyrsostachys oliveri* ("Gamble"), for growth rate, structural characteristics, gene interactions and more.

Additionally, an *Oxytenanthera abyssinica* cultivation manual has been translated into English, to guide training, disseminate knowledge and grow its presence in Africa. And surveys have been conducted to identify which plastic goods are suitable for substitution. In Ethiopia, which has a national bamboo policy framework, they include window blinds, handbags and packaging film.

Global trade plays a vital role in this initiative, supported by resources like UN Comtrade, a comprehensive database for tracking international trade flows. But before 2017, bamboo was misclassified as timber. This was

due to a lack of accurate Harmonised System (HS) codes, which form an international, numerical system for classifying goods and determining tariffs. 2018 marked the first year when the new HS codes were fully implemented, including categories for woven products, building materials and more. This enabled countries to accurately report their bamboo trade.

This new data is highly valuable. It revealed tableware and kitchenware to be the most-traded bamboo commodities, followed by daily use products such as toothpicks. It enables the accurate mapping of international trade flows, which aids decision-makers in identifying the markets they should allocate their resources to for maximum impact.

It also serves as a "proof of concept", with revised figures showing that bamboo commodities were traded at nearly twice the previously estimated dollar amount – jumping from US\$1.7 billion in 2017 to 3.2 billion in 2018. This suggests higher consumer acceptance of bamboo as an eco-friendly product than previously thought, which is critical for shifting public perceptions of the plant.

The large-scale cultivation of bamboo could raise ecological and forestry concerns. The type of management system, selection of species and local biodiversity can all dictate very different outcomes. Generally speaking, bamboo can flourish under agroforestry, silviculture (forest resource management), intercropping and circular economy approaches, which all foster biodiversity and allow for planting other forestry crops. These also deliver extra economic benefits to farmers by diversifying income streams. Since bamboo can grow on suboptimal land, it can preserve local forests and avoid encroaching on native biodiversity. These actions are dependent on selecting non-invasive species and utilising sustainable cultivation techniques.


### Going forward

Serious challenges remain, however. For example, many bamboo products are still traded with HS codes for timber headings, such as bamboo charcoal and bamboo flooring. Additionally, for entry into the European Union's market, which has regulation on deforestation-free imports, bamboo must meet the same requirements and standards as timber. But bamboo is a type of grass and has a completely different growth pattern and management regime to trees. This places an onerous financial burden on bamboo producers.

Reducing tariffs on bamboo products can also make them more competitive with plastic products, which already enjoy lower tariffs.

Actors from public, private and third-sector organisations need to operate in tandem to unlock the financial resources that would help small-to-medium-sized bamboo enterprises. With finance, they could scale up, refine and automate production, design favourable policy frameworks and enabling conditions, and develop product-quality standards.

Furthermore, farmers and rural communities need more convenient and affordable linkages with third-party certification systems and training. Meanwhile, public campaigns (executed between the state, civil society and the media) should raise consumer awareness about bamboo's role in reducing plastic pollution.

Any solution must be trans-boundary and therefore multilateral in nature to harness the potential of bamboo. With the right initiatives and frameworks, the plant can be the powerhouse the world needs to help confront the challenges of our time. 

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*(Source: <https://www.eco-business.com/news/unleashing-bamboo-a-nature-based-solution-to-plastics/>)*



# SMALL ISLANDS SOUND THE CLIMATE CRISIS ALARM BEFORE THE HIGHEST COURT

Nations hit hard by warming are not asking for the moon, just international law to be respected, writes **Charlotte Ruzzica De La Chaussée**, Dialogue Earth



Vanuatu, supported by the small island developing states, achieved a tremendous feat by building consensus among more than 130 states to secure the UN General Assembly's request to refer these questions to the International Court of Justice. *Image: Roderick Eime, CC BY-SA 3.0, via Flickr.*





or the first time, more than 130 states have agreed to collectively seek the opinion of the International Court of Justice (ICJ) regarding the survival of mankind. Led by Vanuatu and a core group of countries, in April 2023 they agreed to consult the ICJ on the obligations of states to protect the climate system. The court, based in The Hague in the Netherlands, is the principal judicial organ of the UN.

The ICJ is now set to deliver an opinion on this matter, and on the legal consequences under international law of causing significant harm to the climate system. This includes issues related to the prevention of significant harm to the environment, and the protection and preservation of the marine environment, among others.

The Commission of Small Island States on Climate Change and International Law (COSIS), which requested the first climate-related advisory opinion from the International Tribunal for the Law of the Sea (ITLOS), participated in the ICJ proceedings. COSIS presented the small islands' perspective, and has drawn on the conclusions of the ITLOS advisory opinion.

The written phase of the ICJ proceedings concluded in 2024, followed by two weeks of hearings involving 107 states and international organisations, which ended on 13 December.

Vanuatu's special envoy for climate, Ralph Regenvanu, captured

the significance of the case at the opening of the hearings: "This may well be the most consequential case in the history of humanity."

The court's opinion is expected for 2025. It will mark the first time a climate case has been brought before the ICJ since governments acquired, over half a century ago, scientific proof that burning fossil fuel increases atmospheric CO2 concentration and temperatures, which will ultimately jeopardise the ability to sustain human life on the planet.

Small island developing states (SIDS) are both victims of climate change and moral leaders in the fight for environmental justice. They offer the Global North valuable lessons through their ancestral and intimate knowledge of the ocean and natural world, showcasing ways to live in harmony with nature, particularly the ocean.

Despite their minimal historical contribution to greenhouse gas emissions, SIDS have taken on moral leadership by bringing the ICJ into the effort to safeguard humanity.

Vanuatu, supported by the SIDS, achieved a tremendous feat by building consensus among more than 130 states to secure the UN General Assembly's request to refer these questions to the ICJ.

International courts, rooted in Western justice systems, differ significantly from Indigenous systems of justice. Yet, we have witnessed lawyers from island nations – representing formerly colonised states – donning wigs to argue their case before the ICJ judges.

SIDS propose a collective approach to the inaction of major polluters. They recall natural law and appeal to the shared sense of responsibility and wisdom of the international community, urging states to emerge from lethargy and assume their responsibilities as required by law, or else perish.

### **A GLOBAL EMERGENCY, AN EXCEPTIONAL LEGAL ACTION**

As climate impacts multiply and intensify, this ICJ procedure bears witness to the international commu-

nity's overall perception of urgency. It reflects a growing awareness that our collective survival depends on decisive action by states.

The consensus reached by UN member states to request the ICJ's advisory opinion is a testament to the widespread support for finding legal answers to questions that are crucial to humanity's survival. It also demonstrates that the judiciary is recognised as being able to provide answers to the crisis.

This action not only brings the climate issue before the court but also signals a call for a progressive interpretation of international law. A majority of states have shown that they interpret international law as mandating more action to reduce emissions and providing for accountability in the event of violations.

In a context where political and economic solutions have failed to provide fully satisfactory responses to the environmental emergency, this procedure marks a significant milestone in efforts to provide a legal one.

The ICJ case comes at a time when the courts are increasingly being turned to as a tool to respond to the climate crisis. The 2023 Global Climate Litigation Report found a sharp rise in climate-related cases, with filings worldwide growing from 884 in 2017 to 2,180 in 2022, across 65 jurisdictions.

These cases are mostly brought against governments or companies by NGOs, citizens, foreign investors or subnational governments. They might increase further given the damage caused by increasingly frequent extreme weather events, the loss of territory linked to climate change and the resulting migration of populations.

### THREE CASES WITH A SHARED GOAL

Three advisory cases before regional and international courts and tribunals exemplify the in-

ternational dimension of climate litigation, including the current ICJ case. Conducted over the past two years, these cases aim to harmonise international law and clarify states' responsibilities in addressing the global climate emergency.

The second case, initiated by COSIS, was brought before ITLOS and marked the first request for a climate-related advisory opinion from an international tribunal.

In May 2024, ITLOS issued a resounding advisory opinion, concluding that greenhouse gas emissions are pollution of the marine environment under the UN Convention on the Law of the Sea. It therefore sets out the obligations of states to preserve and protect the marine environment, and to prevent, reduce and control its pollution.

The third case, brought by Chile and Colombia, is before the Inter-American Court of Human Rights. It concerns the obligation of states to respond to the climate emergency from the perspective of international human rights law. The opinion is expected in 2025.

The three advisory proceedings have been running in parallel and feeding into and reinforcing each other. One way a case can influence another is when judges look to the

reasoning of other courts when constructing their reasoning in a case.

In the ICJ case, states referred extensively to the ITLOS advisory opinion in their oral statements and written comments. It is therefore hoped by many pushing for stronger action against climate change that the ICJ will give deference to ITLOS jurisprudence, particularly for questions relating to the law of the sea.

### ITLOS AND THE ICJ ADVISORY OPINION

The ITLOS opinion is particularly relevant to the ICJ case on several substantive points of law. Firstly, ITLOS made it clear that greenhouse gas emissions constitute pollution of the marine environment under the UN Convention on the Law of the Sea.

Another key finding of considerable importance to the ICJ proceedings and any subsequent climate cases was that the science is irrefutable. ITLOS considered it an objective factor that must guide courts and tribunals in determining the risk of harm caused by greenhouse gas emissions.

Science must therefore help determine the degree of due diligence necessary for states to meet their climate obligations. The tribunal concluded the Intergovernmental Panel on Climate Change reports to be the source of the best available science.

The tribunal also made clear that the minimum threshold of emission-mitigation measures necessary under the UN Convention on the Law of the Sea must be determined objectively using the best available science, precaution in the absence of scientific certainty, and climate-related treaties and instruments.

Thus, state measures must evolve to comply with existing obligations under international law, becoming more ambitious over time as the climate changes and scientific knowledge advances.

Another central question in the ICJ advisory opinion request is deter-

**The 2023 Global Climate Litigation Report found a sharp rise in climate-related cases, with filings worldwide growing from 884 in 2017 to 2,180 in 2022, across 65 jurisdictions.**



mining which instruments apply to inform states' obligations in relation to climate change.

Most participants in the ICJ case used the tribunal's conclusion that the Paris Agreement does not limit, modify or take precedence over all previous international law instruments regulating marine pollution from anthropogenic emissions. Thus, these participants took the view that the Paris Agreement is not the only text informing states of their obligations to take all necessary measures to prevent, reduce and control such pollution.

The ITLOS conclusion also fed into arguments by COSIS to harmonise a contemporary regime – still being formed – that can achieve the goals of the Paris Agreement to keep global temperatures to 1.5°C above pre-industrial levels.

A harmonious interpretation of states' obligations means considering the UN Convention on the Law

of the Sea in conjunction with other specific obligations of states under the “international climate regime”, not in isolation. Interpreting and applying available legal instruments in a vacuum would contribute to the fragmentation of the regime, which is what historical polluters have attempted to do in their pleadings.

### HOPE FOR THE OCEAN, THE ENVIRONMENT AND THE FUTURE

COSIS and island states are not asking for the moon. They want the existing rules of international law to be understood, applied and respected.

The ICJ opinion could clarify existing rules, enabling all states to read them in the same way and apply them consistently. A clear legal precedent, with a certain level of particularity, would enable island states to determine with certainty which state measures are appropriate, and which are in breach of international law. An opinion on the climate issue that

does not shy away from the realities we face, would help guide the relevant legal and political bodies in negotiations, public policies, and subsequent court decisions, ensuring that states' actions comply with international law.

In the long term, we hope to see a change in the behaviour of states – particularly the biggest polluters – toward greater ambition in meeting scientifically established emissions reduction targets. The goal is to ensure liveable conditions for present and future generations, and prevent further cataclysms. At stake is the survival not just of island and coastal populations but of humanity as a whole. 🌱

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# IIT Madras & CMC Vellore develop affordable indigenous Robot for hand rehabilitation

Commercialized by Thryv Rehab Solutions, this patented technology offers precise therapeutic movements and real-time feedback, ensuring better outcomes for stroke, spinal cord injury patients



**T**he Indian Institute of Technology Madras (IIT Madras) and Christian Medical College, Vellore (CMC Vellore) have developed a cost-effective and portable plug-and-train robot for hand rehabilitation.

Called 'PLUTO' (Plug and Train Robot), this device technology was licensed through Technology Transfer Office-TTO ICSR and commercialized by Thryv Rehab Solutions. It addresses a significant gap in the current rehabilitation market. This innovative device is well-positioned to meet the growing demand for affordable and adaptable rehabilitation solutions in clinical and home settings.

PLUTO is also the first and only indigenous robot to have been tested in Indian homes, demonstrating that PLUTO can deliver intense therapy and make therapy accessible. PLUTO has already benefitted more than 1,000 Patients in the last four years.

This product is a great example of academic research successfully translating into a product that reached the common man and is poised to benefit thousands of patients. The device inventors are Prof. Sujatha Srinivasan (Principal Investigator), Department of Mechanical Engineering, IIT Madras, Dr. Aravind Nehrujee, (PhD Scholar) of Department of Mechanical Engineering, IIT Madras and Dept.

of Bioengineering, CMC Vellore and Prof. Sivakumar Balasubramanian, Department of Bioengineering, CMC Vellore. The Technology Transfer Office TTO-IPM Cell, in the Office of Industrial Consultancy and Sponsored Research (IC&SR), IIT Madras, facilitated the technology transfer and commercialization. This patented technology offers precise therapeutic movements and real-time feedback, ensuring better outcomes for patients with conditions such as stroke, spinal cord injury, multiple sclerosis, Parkinsons' disease and post hand-surgery, among others.

The device is well-suited for use in rehabilitation centres, clinics, hospitals, and even patients' homes, bridging the gap in accessibility to effective, affordable hand rehabilitation solutions. The innovation's cost-effectiveness and portability make it a transformative tool in the healthcare industry.

Elaborating on the need for such affordable devices in assistive technologies, Prof. Sujatha Srinivasan, who is also the Head of TTK Center for Rehabilitation Research and Device Development at IIT Madras, said, "PLUTO revolutionises hand rehabilitation by providing an affordable and accessible solution for patients with post-stroke conditions. Its portability enables timely and consistent therapy at home or bedside, improving recovery outcomes and reducing dependency on caregivers."

Elaborating further, Prof. Sivakumar Balasubramanian, Department of Bioengineering, CMC



Vellore, said, “As part of research and development by CMC Vellore and IIT Madras, PLUTO has been set up for routine clinical use across 11 different clinics across India. Over 1,000 patients with hand impairments have used the device for therapy; at least 15 patients per week use PLUTO for routine hand therapy at CMC Vellore. PLUTO was also the first and only indigenous robot to have been tested in Indian homes, demonstrating that PLUTO can deliver intense therapy and make therapy accessible.”

This cost-effective device minimises production costs while delivering high functionality, making advanced rehabilitation accessible to a broader audience. Its affordability reduces financial strain on healthcare systems and patients, promoting widespread adoption.

The robot’s modular design uses recyclable materials and energy-efficient processes, reducing waste and environmental impact. Its adaptability eliminates the need for multiple devices, supporting sustainable healthcare innovation

Further, the inventor Dr. Aravind Nehrujee, who developed PULTO over the course of his joint PhD with IIT Madras and CMC Vellore, said, “In the present era, conventional rehabilitation robots for hand therapy are either complex and expensive systems capable of training multiple hand functions or simple and singular-function devices requiring multiple units for comprehensive therapy. These systems lack portability and adaptability, making them unsuitable for bedside, wheelchair-based, and home-based use. The high cost, bulkiness, and lack of modularity limit their adoption in most Indian clinical settings and home-based rehabilitation. Hence, there is a need for an efficient and cost-effective solution.”

PLUTO is a modular, portable robot that facilitates advanced hand



A patient undergoing rehabilitation through 'PLUTO' device, developed by IIT Madras and CMC Vellore

rehabilitation therapy with adaptive assistance and therapeutic gaming. The device provides targeted therapy for wrist and hand movements using a single actuator and a set of interchangeable mechanical handles. The modular design ensures versatility, allowing training of various functions such as wrist flexion/extension, forearm pronation/supination, and hand opening-closing.

Welcoming such collaboration, Prof. Manu Santhanam, Dean (ICSR), IIT Madras, said, “The collaboration between IIT Madras and CMC Vellore will pave the way for many more interesting innovations with respect

to assistive devices. With technology commercialization and industry implementation being one of the key directives of IIT Madras, we will aim to work towards more such technology adaptations.”

### The highlights of PLUTO include

- A compact, portable design that allows bedside or wheelchair-based therapy, making it accessible for home or clinical use.
- A plug-and-train mechanism with various therapy tools for diverse hand functions, improving usability and flexibility.
- A gearless DC motor with a plug-in mechanism enables seamless connection and operation of therapy tools.
- High modularity and low-cost fabrication ensure adaptability and affordability for healthcare providers and patients.
- Scalability for mass production, supporting widespread adoption across clinical, rehabilitation, and home settings.
- A design that addresses early rehabilitation stages for conditions like stroke or hand paralysis, promoting faster functional improvement. 📄





# A BREATH OF FRESH AIR IN MUMBAI

MuSo launches Grow Lab to reconnect children with nature

In the midst of Mumbai's bustling urban landscape, a green sanctuary has emerged to reconnect children with the wonders of nature. The Museum of Solutions (MuSo) has unveiled Grow Lab, an immersive, first-of-its-kind green space designed to help children explore

the intricate connections between ecosystems and how they sustain life. Through hands-on experiences, children learn about biodiversity, eco-friendly farming, water conservation, and waste management while understanding the vital role of native flora in supporting local wildlife, including birds, bees, and

other essential species within the web of life.

Located on the terrace of MuSo, Grow Lab is a hands-on space where children explore nature and sustainability through immersive experiences. Continuing MuSo's mission of child-led, purpose-driven learning, the Grow Lab fosters a deep connec-





tion with the environment, empowering young changemakers to make a lasting impact on their communities and the world.

“The launch of Grow Lab is a significant step towards embedding environmental consciousness in children from an early age,” said Tanvi Jindal Shete, Co-founder, Museum of Solutions. “At MuSo, we believe in creating experiences that are innovative, unique, and globally inspired, ensuring that children have access to world class learning opportunities. Our recognition in TIME Magazine’s list of the Top 100 Places to Visit and the Hands On! Children’s Museum Award reaffirms our commitment to bringing the best in experiential education to India. With Grow Lab, we aim to set new benchmarks in sustainability-focused learning, fostering curiosity and responsibility in the next generation of changemakers.”

### Nature’s Classroom: Highlights of Grow Lab

Grow Lab is designed to be a living, breathing space that encourages children to touch, feel, and interact

with nature in ways that are rarely possible in a metropolis like Mumbai. Key features include:

- **Vivarium:** A sanctuary for insects that fosters biodiversity and teaches children about their crucial role in pollination
- **Sustainable Farming & Gardening:** Hands-on activities where kids can dig into soil, plant seeds, and observe plant growth, fostering a deep connection with nature
- **Composting Station:** A practical introduction to waste management, showing how organic waste can be transformed into nutrient-rich compost
- **Seed & Tool station:** An engaging exhibit to understand where the food on your plate comes from and celebrating our farmers and their tools.
- **Sensory pathway:** A playful, immersive experience that reconnects kids with nature—walking barefoot on grass, gravel, and soil, feeling textures, and smelling fresh herbs like mint. A reminder of the simple joys of the natural world.

### Rediscovering Nature’s Magic

The Grow Lab experience is part of MuSo’s broader “Rediscover Nature’s Magic” campaign, designed to reconnect children and adults with the natural world. It revives the simple joys of walking barefoot on grass, feeling the earth beneath our feet, and truly appreciating nature’s beauty. By immersing children in real-world sustainability experiences, Grow Lab nurtures responsibility, empathy, and environmental stewardship.

### Leading the Way in Sustainability & Education

As climate challenges grow, initiatives like Grow Lab play a crucial role in shaping a generation that understands both the problems and the solutions needed for a greener future. MuSo’s commitment to sustainability-driven learning ensures that children engage with nature in meaningful, lasting ways.

Grow Lab is now open at the Museum of Solutions, inviting families, schools, and young explorers to rediscover the magic of nature. 🌱



A fifth of the Philippines' land mass of 300,000 square km (115,830 square miles) is covered in mining projects for nickel, cobalt, copper and other critical minerals. Image: ILO Asia-Pacific, CC BY-SA 3.0, via Flickr.

# WHERE ARE THE CRITICAL MINERALS FLASHPOINTS IN 2025?

M23 rebels' advance in mineral-rich eastern Democratic Republic of Congo puts green minerals rush in the spotlight.

**T**he conflict playing out in eastern Democratic Republic of Congo, where Rwandan-backed M23 rebels have seized vital mines in a lightning advance, spotlights the global race for access to critical minerals and the risk to local populations. The race for minerals needed for renewable technologies -

including coltan, lithium, cobalt and nickel - is set to ramp up this year as Europe and North America compete to secure access and break China's grip on the supply chain.

With demand for 'net zero' minerals set to almost triple by 2030, according to the International Energy Agency, mining of lithium, cobalt and nickel found in countries

like Chile, the Democratic Republic of Congo and the Philippines is gathering pace.

But the environmental and social consequences for local populations are growing as resource-rich countries push to secure a share of the global green rush.

The fighting in eastern DRC, where hundreds have been killed



and thousands injured in recent weeks, highlights the risk of related conflict: the United Nations says the decades-long war has been fuelled in part by the illicit mineral trade.

Here are some of the key countries and conflicts to keep an eye on in 2025.

## Democratic Republic of Congo

The Democratic Republic of Congo has most of the world's reserves of cobalt, a silvery-blue metal used in making rechargeable batteries, according to the World Bank, and the mining sector is largely dominated by Chinese firms.

With mineral wealth estimated at US\$24 trillion, the central African country is one of the world's richest in terms of natural resources but most of the minerals are in the east, where armed groups, including the M23, have seized control of mines.

At the end of January, M23 rebels seized Goma, east Congo's largest city and the capital of North Kivu province, which is home to lucrative gold, coltan and tin mines.

A UN report last December said M23 rebels were making an estimated US\$800,000 in monthly taxes on coltan production and trade. Rwanda has long denied supporting the M23 rebel group. The M23 advance is the latest escalation in decades of fighting over land and natural resources in the region. Millions have been killed, mostly from hunger and disease, and millions more displaced since the 1990s.

Manufacturers are increasingly under scrutiny to ensure that metals they use are not sourced from conflict zones in eastern Congo.

Since the M23 advance, the European Union has come under pressure to put a minerals deal with Rwanda on ice. Last December, the DRC filed criminal complaints against Apple subsidiaries in France and Belgium, accusing the tech firm of using conflict minerals in its

supply chain. Apple strongly disputes the claims.

It is now up to judicial authorities in Belgium and France to decide whether to investigate and bring criminal charges that could set a legal precedent in other conflict minerals cases.

## Chile

Chile holds the world's largest reserves of lithium, also known as "white gold", and is the second largest copper producer. Both metals are used in energy storage and electric vehicles. However, 90 per cent of lithium reserves are in the Atacama desert and current lithium mining processes use vast amounts of water, depleting and contaminating the already limited supplies for nearby businesses and Indigenous communities, while also threatening fragile ecosystems.

For example, a proposed new lithium project in the Ascotan salt flat has raised concerns among residents and environmentalists that water extraction will endanger the extreme environment-adapted "karachi" fish.

The Chilean government said in 2023 it planned to take state control of the lithium industry and wanted to develop more sustainable extraction technologies in consultation with affected Indigenous communities. The government is expected to launch a national minerals strategy in 2025, and plans to invest about US\$83 billion through 2033, state-run agency Cochilco said in December.

## Brazil

With reserves of nickel, lithium, cassiterite and bauxite, Brazil has seen a surge in mining activities as well as conflicts in Amazon areas that are rich in biodiversity and home to Indigenous peoples.

A report released last year by Brazilian NGO Terra de Direitos detected 348 conflicts pitting small-scale farmers, workers, Indigenous

and Afro-descendant peoples against mining enterprises between 2020 and 2023. It said the conflicts affected more than 100,000 people.


As the fifth-largest lithium producer in the world, according to Brazil's Ministry of Mines and Energy, Brazil plans to ramp things up this year with new exploration projects and investments - particularly in the Jequitinhonha Valley in the south-east, focus of the state government's "Lithium Valley" project aimed at attracting investors.

## Philippines

In the Philippines - the world's second largest producer of nickel - the rush for transition minerals fuelled by the electric car industry threatens biodiversity, Indigenous communities' land rights and the safety of environmental defenders, according to a December investigation by environmental protection groups Global Witness and Kalikasan.

The government is planning to incentivise domestic companies to process critical minerals needed for the green transition to meet the country's goal of having an electric vehicle fleet share of at least 50 per cent of all vehicles by 2040.

A fifth of the country's land mass of 300,000 square km (115,830 square miles) is covered in mining projects for nickel, cobalt, copper and other critical minerals, the report said. The report also found that a quarter of the land used for transition mineral mining overlaps with key biodiversity and protected areas, and domestic laws protecting the rights of Indigenous peoples have failed to protect them from losing ancestral land because of mining.

It said that Indigenous Filipinos have lost a fifth of their ancestral territories to mining projects - an area greater than the size of Timor Leste. 

(Source: <https://www.eco-business.com/news/where-are-the-critical-minerals-flash-points-in-2025/>)



Sikkim is a small Himalayan state in north-east India, bordering China in the north, Bhutan in the east, Nepal in the west and the state of West Bengal in the south.

*Image: alcan\_, CC BY-SA 3.0, via Flickr.*

# **‘CATASTROPHIC’ 2023 LAKE OUTBURST IN INDIA DRIVEN BY GLACIAL MELT AND PERMAFROST THAW**

Climate change played a key role in the ‘catastrophic’ 2023 floods in the Himalayan state of Sikkim in India, a new study says.

Aruna Chandrasekhar & Ayesha Tandon of Carbon Brief present the analysis



**T**he breach of one of the “largest, fastest-growing and most hazardous” glacial lakes in Sikkim, the South Lhonak lake, led to cascading floods that killed 55 people and washed away a 1,200 megawatt (MW) hydropower dam.

The event was identified as a glacial lake outburst flood (GLOF), which is a sudden release of water from a lake fed by glacial melt.

The research, published in Science, explores the many drivers of the GLOF, its extensive impacts and policy implications going forward.

“There are many, many factors that came together here,” the study’s lead author tells Carbon Brief, but the “main driver” was the destabilising effect caused by thawing permafrost. The research also finds that the South Lhonak lake has been expanding for decades, due to meltwater from the glacier above, with its area growing 12-fold between 1975 and 2023.

The paper concludes that the GLOF highlights the “complex interactions” between climate change, glacier mass loss and human infrastructure in mountainous regions. It also demonstrates the importance of “robust monitoring systems and proactive measures to minimise devastating consequences and enhance resilience”, the authors add.

## Flood cascade

Sikkim is a small Himalayan state in north-east India, bordering China in the north, Bhutan in the east, Nepal in the west and the state of West Bengal in the south. Part of the eastern Himalaya, Sikkim is host to more than 90 glaciers and Kanchenjunga, the world’s third-highest peak. Sikkim serves as the origin and upper river basin for the Teesta river, one of the largest tributaries of the Brahmaputra river system.

On the night of 3 October 2023, a ridge of frozen rock and other debris on the side of the South Lhonak

glacier – called a “lateral moraine” – collapsed into the glacial lake. This set off a tsunami-like wave nearly 20 metres high that breached the front of the lake, sending 50m cubic metres of water – almost half the lake’s volume – downstream.

According to the study, the GLOF’s peak discharge “vastly exceeds” the magnitude of any meteorological flood in the region’s history, equivalent to a “rare” one-in-200-year event.

Dr Ashim Sattar, a glaciologist at the Indian Institute of Technology, Bhubaneswar and the lead author of the study, tells Carbon Brief the sheer scale of impact is not always evident in satellite images. He explains:

“Here, 270m cubic metres of sediment was eroded, enough to fill 108,000 Olympic swimming pools. The South Lhonak Lake itself is 2.8km long. Just walking around it will make you sweat.”

Two hours later, the GLOF and huge volumes of eroded sediment reached the village of Chungthang 68km away, destroying the 1,200MW Teesta-III hydropower project on impact and damaging four other dams downstream.

As the GLOF travelled, it set off 45 secondary landslides, many of them deep-seated and up to 150 metres in depth, with impacts not just in Sikkim, but also in neighbouring West Bengal and Bangladesh.

In all, the flood cascade damaged 25,900 buildings, 31 major bridges and flooded 276km<sup>2</sup> of agricultural land. The most heavily inundated zone was in Bangladesh 300km away, where intense cyclonic rainfall – initially attributed as a main GLOF driver – exacerbated flooding.

The figure below, taken from the study, shows before-and-after images and illustrations of the moraine collapse and the flood’s path from Sikkim to Bangladesh, where floodwaters finally discharged into the Brahmaputra river.

Dr Jakob Steiner, a geoscientist at the University of Graz and a member of the Himalayan University Consortium, who was not involved in the study, says the assessment captures the “cascading” impacts of GLOFs and their interaction with other complex, climatic factors in great detail. He tells Carbon Brief:

“Even if the glacial lake releases relatively less water, it can trigger other movements downstream and that can have far-reaching consequences, even for hydropower plants miles away from any lakes. So the message [of the study] is that you’re not safe anywhere and, hopefully, that’s a message that policymakers will get. Institutionally, however, we are not yet prepared to receive that kind of message.”

## What caused the flood?

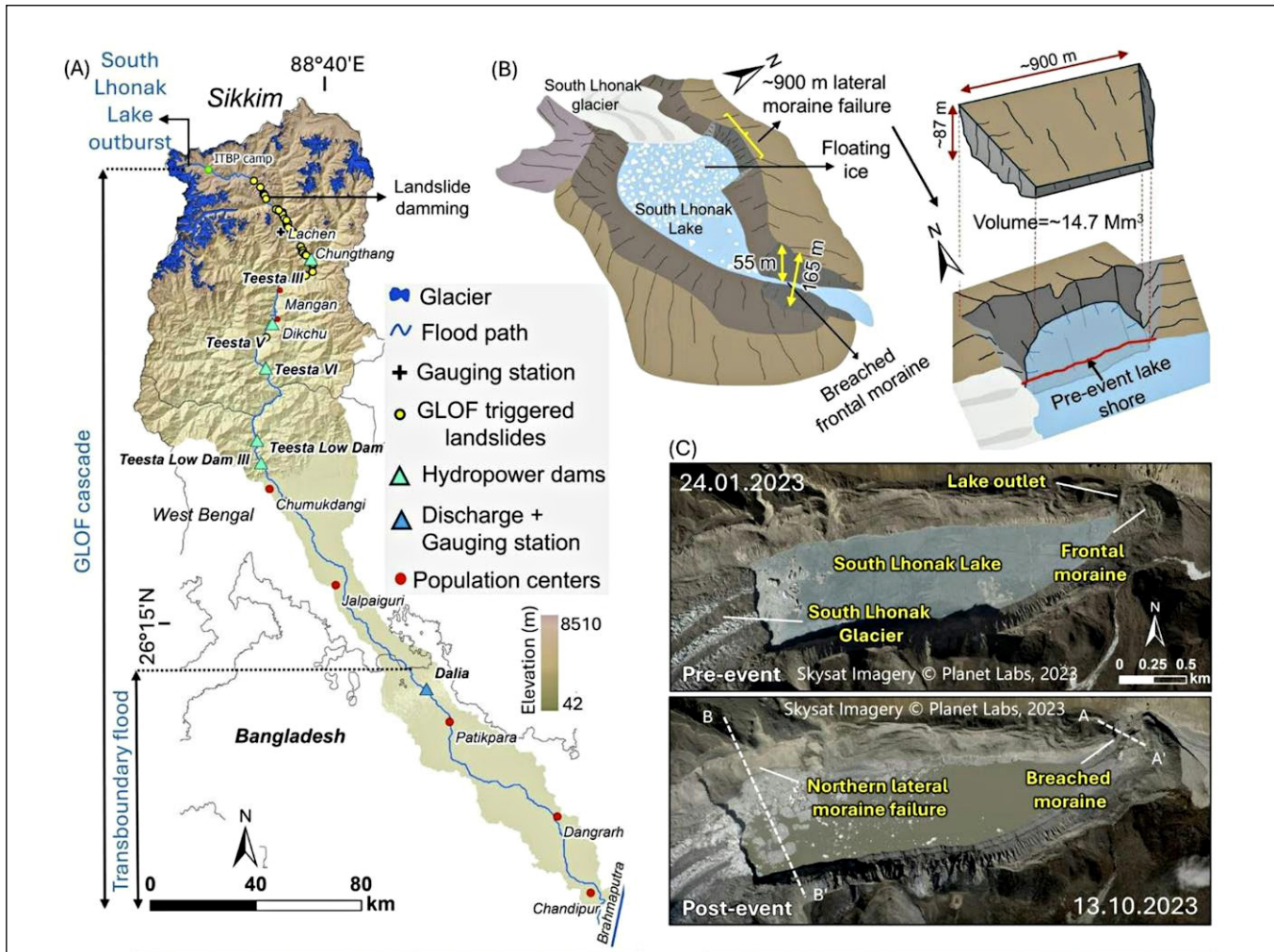
To study such a complex and multifaceted event, researchers combined satellite imagery, meteorological data, field observations and numerical modelling.

Study lead Sattar tells Carbon Brief that “capturing this entire process into one model is very tricky and complex”.

Throughout the paper, the authors emphasise the “multi-hazard” nature of the disaster, explaining that multiple short- and long-term changes in the climate and terrain converged to create the conditions needed for the event.

However, Sattar tells Carbon Brief that the “main driver” of the GLOF was the long-term impact of rising temperatures on permafrost – the perennially frozen ground that makes up much of the mountain’s slope.

According to the authors, decades of rising temperatures have led to permafrost thaw, which caused “extensive, rapid deformation” of the slope for years preceding the collapse. The paper estimates that permafrost warming has reached a depth of 100 metres below the surface of the soil.



An overview of the glacial lake flood cascade over 3-4 October, with (A) depicting the flood-impacted stretch of the Teesta river, landslides, hydropower plants and major settlements, (B) illustrating the moraine collapse and breach and (C) comparing pre- and post-GLOF satellite imagery of the lake. Source: Sattar et al. (2025)

The study also identifies the expansion of the South Lhonak lake as an important driver. The authors find that the South Lhonak glacier, which sits above the lake, has been melting for decades. Meltwater from the glacier flows directly into the lake, which has been gradually filling up.

The charts below show the annual mass balance of the glacier (left) – where a negative number indicates a shrinking glacier – and the increasing area of the lake (right) between 1951 and 2023.

The research finds that the lake has been expanding by 0.32km<sup>2</sup> per year over 1975-2023. It notes there has been a “doubling” in the

rate of expansion over the past two decades. The authors suggest that rising temperatures are responsible for the glacier losing mass, as the annual average temperature in the region has been increasing by 0.08C per decade since the 1950s.

The long-term permafrost thaw and growth of the lake means that, by October 2023, the region was in a state of “increased sensitivity” to a multi-hazard cascade, the paper says.

The authors say the final “trigger” was the intense rainfall that hit Sikkim on 3-4 October. Though the rainfall was “typical” for the region and season, the authors say that it “saturated the soil and increased the vulnerability of slopes to failure”.

Dr Stephan Harrison – a researcher from the University of Exeter – tells Carbon Brief that the study is “very significant” and is “written by some of the leading scientists in the field”.

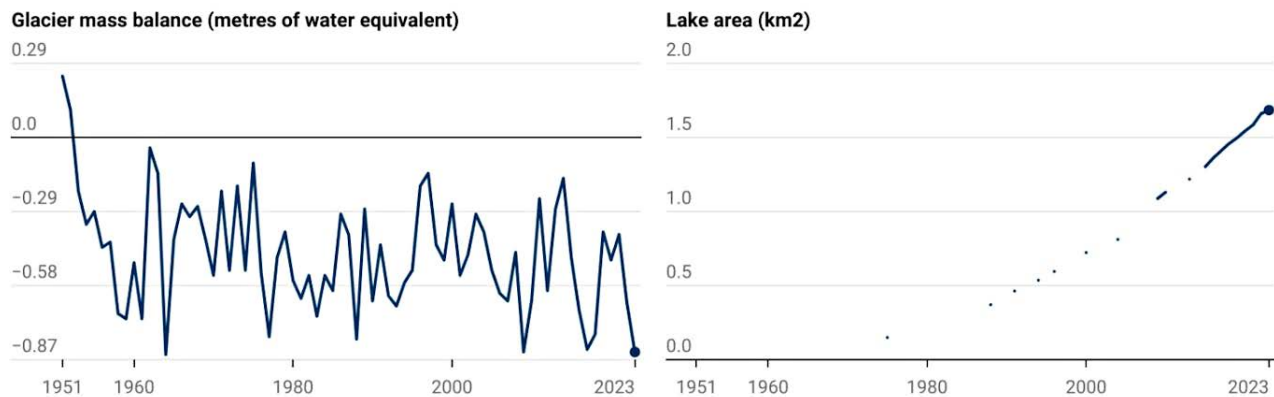
Dr Miriam Jackson is the programme coordinator for the cryosphere initiative at the International Centre for Integrated Mountain Development, and was not involved in the study. She echoes Harrison’s praise, but warns about the “lack of good data” in the region for these sorts of studies. She says:

“We desperately need more data on the status of glaciers and glacial lakes, more meteorology measurements at high elevation and more



## Meltwater from the South Llonhak glacier has been feeding the lake for decades

Changes in South Llonhak glacier and lake



Source: Sattar et al, Science (2025)

**CarbonBrief**  
CLEAR ON CLIMATE

Annual mass balance of South Llonhak glacier (left) and increasing area of South Llonhak lake (right) between 1951 and 2023.

Data source: Sattar et al. (2025)

data on the status of frozen ground in the Hindu Kush Himalaya.”

Harrison and Jackson gave conflicting answers about whether GLOFs are increasing or decreasing globally. However, both pointed to the lack of data on GLOFs, noting that datasets are incomplete or unavailable in many regions and emphasised the need to get better records before definitive answers can be drawn.

### Hydropower rush

The Sikkim GLOF event joins a chain of recent disasters in high-mountain Asia that have destroyed hydropower plants. Given the sheer “physical magnitude” of these events and their impacts, the study highlights “potential limits to adaptation” in the Himalaya, warning that “even the most diligent and comprehensive suite of disaster risk reduction strategies [is] unlikely to entirely prevent” loss and damage.

The study draws attention to a “surge” of hydropower development in the Himalayan region near glacial lakes, which it attributes

to a rising demand for “stable and renewable energy”. With more than 650 projects planned or under construction in high-mountain Asia, it warns that many dams are “moving closer to these hazard-prone areas” and this could “exacerbate” GLOF impacts. The Teesta basin, for instance, hosts the highest density of hydropower projects in the Himalayan region, with 47 dams planned, including the reconstruction of the Teesta-III project.

While dams themselves are “susceptible” to a wide array of high-mountain hazards, they also increase the exposure of communities, workers and infrastructure investments to a “greater likelihood” of GLOFs in the future, according to the paper.

Comprehensive risk assessments, stringent building standards, regulating land use and regional cooperation among river-sharing countries are among the measures suggested by the study to reduce GLOF risks.

Sattar says governments “can make a start” by developing “basin-scale” early-warning systems. However, he cautions that structural

measures such as draining glacial lakes “are easy to say, but difficult to do” in harsh terrain.

Meanwhile, geoscientist Steiner says it is critical that the key role played by infrastructure development in damage caused by GLOFs is not downplayed – noting that a failure to do so risks “absolv[ing] local institutions of their responsibility”. He concludes:

“As scientists, we find it important to show that climate change is involved, but we have to be aware that the science we create is very, very political... [A] big part of the disaster is not climate change; it’s institutional failures, it’s infrastructural failures.

“If nobody takes the responsibility and everyone just says: ‘it’s my neighbour and not me’, then we are truly in deep shit. Maybe we already are.”

This story was published with permission from Carbon Brief.

(Source: <https://www.eco-business.com/news/catastrophic-2023-lake-outburst-in-india-driven-by-glacial-melt-and-permafrost-thaw/>)



In 2021, excessive snowmelt worsened the impact of Nepal's catastrophic flood in Melamchi River, which was triggered by unusually heavy monsoon rains. The disaster wiped out thousands of hectares of agricultural land and left hundreds of thousands of people with no access to water. *Image: Rojan Shrestha*

# MELTDOWN AT THE TOP OF THE WORLD

The UN has declared 2025 the International Year of Glaciers' Preservation as climate change speeds up ice loss not only in the Arctic and Antarctica, but in Asia's Hindu Kush Himalayas, which is warming three times the global average rate, writes **Masatsugu Asakawa**

**T**he United Nations has declared 2025 to be the International Year of Glaciers' Preservation, making it a fitting moment to confront the stark reality that the world's ice sheets are melting. Climate change is accelerating this trend, particularly in the Hindu Kush Himalayas – a region known as the Earth's Third Pole because it contains the largest



volume of ice outside of the Arctic and Antarctica.

This mountain range, which stretches across 3,500 kilometers and spans eight countries, from Afghanistan to Myanmar, is warming roughly three times faster than the global average. If temperatures rise by 3° Celsius above pre-industrial levels by the end of this century, up to 75 per cent of the region's glaciers will melt, reducing water availability, undermining food and energy security, and exacerbating biodiversity loss.

Glacial melt thus threatens irreversible damage to nearby communities and local economies. But it would also fuel instability around the globe by increasing migration, disrupting trade, and causing food prices to rise.

The 2021 flood disaster in Nepal's Melamchi River offers a glimpse of what is to come. Unusually heavy monsoon rains, coupled with excessive snowmelt, triggered a debris flow that wiped out thousands of hectares of agricultural land and destroyed critical infrastructure, leaving hundreds of thousands of people without access to water.

As the glaciers retreat, there will be too little water – a problem that is projected to afflict the Hindu Kush Himalayas by 2050. Dwindling river flows would make it more difficult to irrigate crops in an area that produces around one-third of the world's rice and one-quarter of its wheat. Water-supply and sanitation systems will become difficult to maintain, adding to the one billion people who already lack access to basic sanitation in the region. Food insecurity will almost surely worsen as well, while communities and even entire industries will likely need to migrate in search of fresh water. Asia's poorest and most vulnerable populations will be hit the hardest.

The world must take urgent action to avert the disastrous effects of accelerating glacial melt in this

region. That means deepening our knowledge by investing in multi-hazard risk assessment, because the extent of the damage will largely depend on whether global temperatures rise by 1.5°, 1.8°, 2°, or 3°C. We must also strengthen integrated river-basin management by enhancing data collection, facilitating knowledge sharing, optimizing water management, and coordinating among people and communities living upstream and downstream.

Ensuring that new and existing infrastructure is climate-resilient is essential for maintaining access to safe drinking water and energy security, as well as sanitation, irrigation, and transport systems. It is equally important to protect ecosystems and promote nature-based solutions such as afforestation, reforestation, wetland preservation, and flood-plain restoration.

Every component of this strategy requires more financing. Development institutions must continue to scale up investment in the Hindu Kush Himalayas, and to work together to recast this glacial region and its river basins as a global public good, especially given their impor-

tance for agricultural and industrial activities. Lastly, the international community must advance the equitable use of shared glacial resources through cooperation and diplomacy. This would help defuse potential tensions and promote sustainable development, ensuring that the region's glaciers serve as a force for peace rather than conflict.

The Asian Development Bank (of which I am president) has taken steps to meet some of these goals. Together with the Green Climate Fund and country partners, ADB recently launched the Glaciers to Farms program, which will mobilise US\$3.5 billion to strengthen climate resilience in agriculture in Central and West Asia. Meanwhile, its Building Adaptation and Resilience in the Hindu Kush Himalayas-Bhutan and Nepal initiative is helping plan and design climate-resilient infrastructure and services. And ADB is also piloting new financing instruments, such as eco-compensation mechanisms, carbon markets and water trading, and sustainability-linked bonds.

When UNESCO and the World Meteorological Organization (WMO) launched the International Year of Glaciers' Preservation last month, WMO Secretary-General Celeste Saulo said that it should serve as "a wake-up call to the world." The global community must do everything in its power – from building climate resilience to accelerating the green transition and promoting regional cooperation – to ensure a sustainable future for the billions of people who depend on glaciers and their related ecosystems. Failure to act now would have catastrophic consequences for us all. 

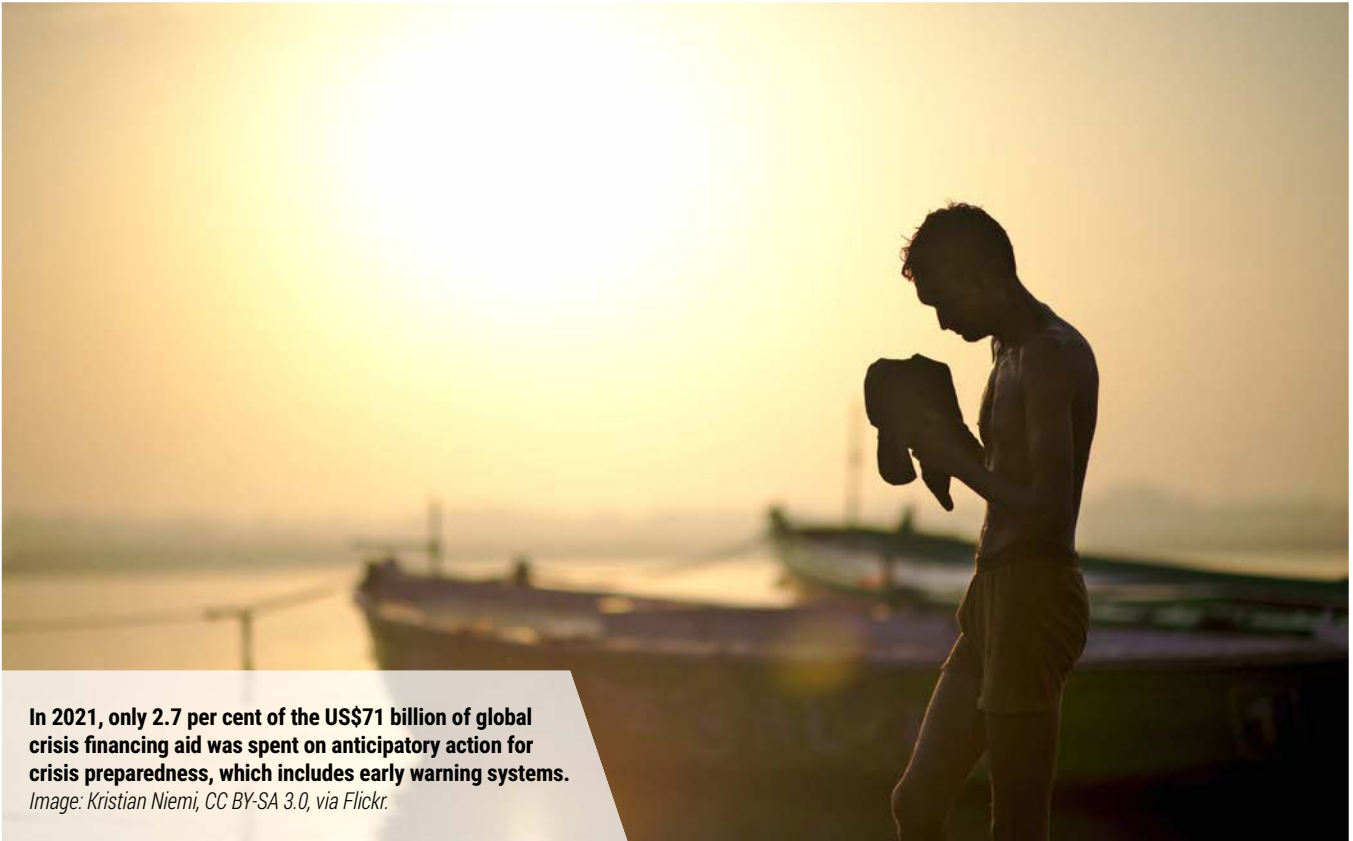
*Masatsugu Asakawa is President of the Asian Development Bank.*

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*(Source: <https://www.eco-business.com/opinion/meltdown-at-the-top-of-the-world/>)*

**Together with the Green Climate Fund and country partners, ADB recently launched the Glaciers to Farms program, which will mobilise US\$3.5 billion to strengthen climate resilience in agriculture in Central and West Asia.**



In 2021, only 2.7 per cent of the US\$71 billion of global crisis financing aid was spent on anticipatory action for crisis preparedness, which includes early warning systems.  
*Image: Kristian Niemi, CC BY-SA 3.0, via Flickr.*

# EARLY WARNING SYSTEMS SAVE LIVES BUT MORE FUNDING IS CRITICAL

With floods, droughts and extreme weather threatening billions of people, investing in early warning systems must be a priority, says **Dr Guyo M Roba**



**P**redicted weather patterns will lead to devastating food shortages in 2025, according to a recent United Nations report on the impact of global weather systems.

With the threat of a La Niña weather pattern - which involves the cooling of ocean surface temperatures - looming over sub-Saharan Africa, already vulnerable food systems may be stretched to breaking point.

If we are to prevent catastrophe, early intervention is vital – and increasing funding for food system resilience is critical to safeguard the livelihoods of millions in vulnerable regions.

Early warning systems use advanced data points and real-world social information to predict droughts and flooding before they occur. Whether looking months or just days ahead, they allow individuals and communities to anticipate the impact on food supplies, plan for how to manage crops and herds, and plan evacuations to prevent loss of life and livelihoods.

Despite this, current levels of investment are woefully inadequate. In 2021, only 2.7 per cent of the US\$71 billion of global crisis financing aid was spent on anticipatory action for crisis preparedness, which includes early warning systems.

## Build resilience

Some crises are obvious; others, such as drought, can be the cumulative result of months or even years of below-average rainfall, and detection is not always straightforward.

By monitoring long-term weather patterns and other markers, such as the cost of staple grains and satellite mapping of vegetation, early warning systems can predict food shortages before they occur, allowing communities to build

resilience – and not just react after disaster strikes.

For example, an estimated 1.7 million people, across arid and semi-arid regions of Kenya were projected to face crisis levels of acute food insecurity between last October and January 2025.

Some 80 per cent of communities in these areas rely on livestock for subsistence and so providing early warning systems to increase the resilience of pastoralist communities must be a priority.

Research shows that effective early warning systems can reduce damage by 30 per cent if activated as little as 24 hours before an event.

Continued investment in weather pattern modelling has also proved effective. These data models enable communities in northern Kenya to prepare for crises – by gathering feed and medical supplies prior to a supply shock or by travelling to Nairobi to sell livestock.

These measures can be the difference between life and death in rural communities.

## Timely preparation

Early warnings can also be used by humanitarian organisations to mobilise crisis support ahead of time. Early warning systems also allow health authorities to predict when to pre-emptively evacuate areas or distribute medical products and devices, such as cholera kits, mosquito nets and other disease-prevention resources to limit the impact of potential outbreaks.

Generally, aid flows increase significantly during emergencies, when philanthropists and donors are touched by scenes of death and destruction, but such reactive support is less effective in reducing loss of life than anticipatory action.

Convincing would-be funders of the value of early warning systems versus crisis response is an important part of the puzzle if we are to lift investment to satisfactory levels.

But funding is not the only hurdle. Despite the technological marvel of early warning tools – which can predict ocean conditions up to eight months before they occur – warnings do not systematically reach intended towns and villages.

In December 2023, the failure to heed flood warnings resulted in 300 deaths and over a million people displaced across Kenya and Somalia.


Although widely valued at a country level, early warnings are often not passed on effectively and fail to take into account local and traditional methods of communication, reducing their effectiveness.

Implementing a more horizontal approach that integrates local traditions and superstition into high-tech tools for accurate decision-making helps protect communities.

Only with these measures will policymakers and organisations, like the Jameel Observatory for Food Security Early Action, bridge the gap between early warning system providers and the pastoral communities they benefit, which would also help address difficulties presented by funding delays.

With changing weather patterns presenting a profound threat to billions of people worldwide, investing in early warning systems must become a priority.

The United Nations wants to support all vulnerable regions with early warning systems by 2027.

For this to become a reality, urgent and effective channelling of capital to this under-valued but essential area is key. 

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*(Source: <https://www.eco-business.com/opinion/early-warning-systems-save-lives-but-more-funding-is-critical/>)*



As forests become increasingly degraded, they lose their functional characteristics, as soft-wood, fast-growing trees have less ability to store carbon, are less resistant to fire and drought, and generally die younger.

Image: Tristan Schmurr, CC BY-SA 3.0, via Flickr.

# DEGRADATION CHANGES FOREST'S CARBON STORAGE, TREE PROFILE: STUDY

In highly deforested landscapes and degraded forests, large-seeded big trees are losing out to opportunistic, fast-growing species, a recent study has found, writes **Peter Speetjens**, Mongabay.com

**A**s forests continue to be cleared and forested landscapes degraded by human activity, their loss can significantly affect the trees left standing, potentially changing the structure of forests, a recent study has found. In this case, faster-growing trees, with softer wood, tend to prevail over denser

species with a higher carbon-storage capacity.

In 2023, about 3.7 million hectares (8.14 million acres) of primary tropical forest were lost, according to the World Resources Institute. Although forest loss was 9 per cent lower compared to 2022, that's still an area nearly the size of Switzerland — the equivalent of losing almost 10 foot-

ball fields of tropical primary forest per minute. Despite a 2024 decrease in deforestation in the Amazon Basin, the tropics continue to lose forest cover at an alarming rate.

“It is well known and widely accepted that forest loss threatens biodiversity worldwide, yet the effect of landscape fragmentation is much less [known],” study lead



author Bruno Pinho, a researcher at Switzerland's University of Bern, told Mongabay in a video call.

"Research so far has mostly centred on changes in the number of species, without considering the traits that make them winners or losers. In our research, we looked at the functional composition of forests, and disentangled the causal effects of forest loss, fragmentation and local degradation, three interrelated processes in human-modified landscapes."

The study, published in *Nature Ecology & Evolution*, analyzed 1,207 tree species across 271 forest plots in six Brazilian regions, ranging from the Amazon Rainforest to the Atlantic Forest, all containing significantly degraded landscapes.

"We found that many species are not responsive to changes in terms of forest loss or fragmentation," Pinho said. "However, the tree species normally dominating landscapes with a high forest cover, which tend to have dense wood and large seeds that are primarily dispersed by medium to large-sized animals, seem to be in decline due to forest loss, landscape modification and human disturbances, such as fires, hunting and logging at a local scale."

According to Pinho, in highly deforested landscapes and degraded forests, those trees lose out to opportunistic, fast-growing species with softer wood. The latter prevail as their seeds are smaller and can thus be ingested and spread by small birds and bats, which adapt more easily to environmental disturbances than larger animals, whose populations tend to decline in human-modified landscapes.

"As large to medium-sized vertebrates are affected by forest loss, fragmentation and hunting, they help explain why large-seeded trees such as the Brazil nut [*Bertholletia excelsa*] are suffering in human-modified forests," Pinho said.

The agouti (*Dasyprocta leporina*), a large rodent native to Central and



**What our research shows is that remaining tropical forests, protected or not, are losing all-important traits as a result of landscape modification and local degradation. Policies should focus on preserving and enhancing forest cover and preventing degradation.**

—BRUNO PINHO

Researcher, University of Bern

South America, is one of the species that plays a key role in dispersing large tree seeds, and one of the few animals that can open the tough shell of the Brazil nut tree.

The agouti will gnaw the shell, eat some of the large seeds and store the rest. However, it doesn't get back to all of the buried seeds, and after 12 to 18 months of germination, these might sprout into the beginnings of a new Brazil nut tree, a species that can grow to a height of 50 meters (164 feet).

However, the rather shy agouti needs wide forest cover to thrive.

Across its range in South America, the Brazil nut tree is listed as a vulnerable species on the IUCN Red List; in Brazil, it's listed as threatened by Brazil's Ministry of Environment and Climate Change, with deforestation the main driver of its loss.

Brazil's Forest Code requires rural landowners in the Amazon region to maintain 35-80 per cent of the natural vegetation on their properties, what's known as the legal reserve. But landowners often fail to comply, said Jos Barlow, professor of conservation science at Lancaster

University, UK, and a co-author of the study; even if they do, the remaining forests on their lands are often of poor quality.

"Paragominas, south of Belém, was one of the six regions we studied," Barlow told Mongabay. "It is characterised by severe degradation. Although many landowners may meet their requirements in terms of forest cover, these forests have almost all had their valuable timber species removed, and many have been burnt. They are in bad shape. In other words, just having a forest doesn't mean it's a forest of great quality."

Pinho said the problem isn't just about losing a few tree species but shifting some of the forest's critical qualities. For example, fast-growing trees with soft wood lose their capacity to store carbon, are less resistant to fire and drought, and generally die younger. Previous research has indicated that the Amazon Rainforest absorbed 30 per cent less carbon in the 2000s compared to the 1990s.

"We urgently need action," Barlow said. "In heavily degraded areas we need additional measures to increase forest cover and improve the quality of the forest, for example, by controlling logging and fires. And, as some of the big trees need seed dispersal communities to reproduce, we need additional measures to protect the fauna."

"What our research shows is that remaining tropical forests, protected or not, are losing all-important traits as a result of landscape modification and local degradation," Pinho said. "Policies should focus on preserving and enhancing forest cover and preventing degradation, and worry less about the configuration of remaining forests". 📍

*This story was published with permission from Mongabay.com.*

*(Source: <https://www.eco-business.com/news/degradation-changes-forests-carbon-storage-tree-profile-study/>)*



Delhi generates over 14,000 tonnes of municipal solid waste daily, according to a central government affidavit filed in the Supreme Court. Only 10,700 tonnes are processed, with most of the remaining 3,000 tonnes ending up in the city's landfills.  
*Image: Hugh Mitton, CC BY-SA 3.0, via Flickr.*

# DELHI'S NEW GOVERNMENT FACES VILLAGERS' FIGHT AGAINST WASTE-TO-ENERGY PLANT

Neglected in the elections, the issues of clean air and villagers' protests against a proposed plant expose failures in waste management and air pollution control, writes **Shalinee Kumari**, Dialogue Earth



**A**s India's capital ushers in a new government, residents of Sanoth, a village in north-west Delhi, are demanding urgent action against a proposed waste-to-energy plant that could further poison their already toxic air. With air pollution emerging as an election issue late in the campaign, the protests highlight the persistent neglect of environmental concerns in city governance.

"For the first time in my life, I am forced to fight for clean air," says Mange Ram, a 72-year-old farmer. He fears he may not live long enough to see the next five years if the pollution worsens. Delhi is the world's most polluted capital city. Sanoth has been at the forefront of protests against the proposed 30-megawatt waste-to-energy plant in the adjacent Bawana Industrial Area, already home to around 30,000 industrial facilities.

Delhi currently operates four waste-to-energy plants, one of which, built in 2012, is already in Bawana. The new plant aims to process 3,000 tonnes of municipal solid waste daily, reducing the amount sent to the landfill by converting waste into renewable energy. But residents fear it will bring more pollution instead.

### **Election promises versus reality**

After Delhi's legislative assembly elections, held on 5 February, the city's newly elected government, led by the Bharatiya Janata Party (BJP) – which returned to power in the capital after almost three decades – faces immediate scrutiny over its stance on environmental issues.

Air pollution barely featured in early election campaigns, overshadowed by cash transfer and subsidy promises. However, in the final days of campaigning, BJP leaders, including central government minister Nitin Gadkari, pledged to

“  
**Article 21 [of the Indian Constitution] gives us the right to life; this plant violates that. The landfill here is already 50 metres high, and it could soon rival Bhalswa and Ghazipur.**

– RAJPAL SAINI

Retired Sanitation Superintendent,  
Sanoth

clear Delhi's landfills and combat air pollution – the only party to include it in their manifesto.

In the constituencies of Bawana and Narela, where the BJP also won, many residents cast their votes based on a single issue: cancelling the waste-to-energy project. "What's more critical than clean air? You can live without food or water for a while, but not without air," says Ram.

Villagers remain cautious. In 2012, they boycotted municipal elections to protest a new landfill, without success. This time, however, they sought political allies.

Protestors told Dialogue Earth that they received visits from BJP candidate Raj Karan Khatri and North West Delhi Member of Parliament Yogender Chandolia, who promised to halt the project. In a letter dated 27 January that was seen by Dialogue Earth, Chandolia formally requested that government ministries cancel the plant project.

But assurances aren't enough. "We will only believe them when the cancellation is official," says Sanoth resident Kaanta Devi, noting that politicians often visit, make promises, then disappear.

### **Kept in the dark**

Villagers first learned about the project from a newspaper article, says Devi. Their fears stem from firsthand experience – years of exposure to pollution from a nearby landfill and the existing waste-to-energy plant have taken a toll on their health.

The new facility will be built on 15 acres of land – just one kilometre away from Sanoth. There is also a hazardous waste treatment facility in the area.

"Article 21 [of the Indian Constitution] gives us the right to life; this plant violates that," says Rajpal Saini, a local resident and retired sanitation superintendent. He fears the plant will create yet another landfill in the area despite the size of the existing one: "The landfill here is already 50 metres high, and it could soon rival Bhalswa and Ghazipur," he notes. The two landfills he refers to frequently catch fire and release toxic smoke.

According to locals, the consequences have been devastating. Residents report skin infections, kidney issues, respiratory diseases and weakened immunity. "We cough all day. We survive on medicines," says Devi, whose family has been chronically ill since the first waste-to-energy plant was built in 2012.

"Waste-related air pollution is a major contributor to Delhi's air crisis, from the towering garbage hills to the emission from existing waste-to-energy plants," says Swati Singh Sambyal, an independent expert on waste and the circular economy.

A 2021 report by the Central Pollution Control Board found that Delhi's waste-to-energy plants failed to comply with air quality

standards. The plant in Bawana exceeded permissible levels of PM2.5 and PM10, which are tiny inhalable particles that can cause severe respiratory and cardiovascular diseases.

### Following in the footprints of a preceding plant

Although the project is spearheaded by the Municipal Corporation of Delhi, it will be executed by Jindal Urban Waste Management (Bawana) Limited, part of the same group that built the controversial Okhla waste-to-energy plant.

In 2024, an investigation by The New York Times revealed that the Okhla plant emits toxins like cadmium, lead, and arsenic into the atmosphere. The report exposed major health and safety violations, including toxic ash being dumped

Moms, a coalition of women fighting for their children's right to clean air. Commenting on both Okhla and Bawana, Kandhari questions the logic of placing a landfill in a residential area.

Both Sambyal and Kandhari highlight Delhi's failure to segregate waste. Ideally, these plants need non-recyclable waste, with high calorific value and low moisture content to function, explains Sambyal. These include plastic, rubber and cloth. But in Indian cities, municipal solid waste usually has high moisture content and low calorific value," such as food and agricultural waste, "making combustion inefficient and hazardous," he adds.

During a public hearing organised by the Delhi Pollution Control Committee in December 2024, a representative of Jindal Urban Waste

Environmental Impact Assessment draft, despite their proximity. "They conveniently omitted these areas to fast-track the clearance process," alleges Saini.


### Delhi's systemic waste management failures

"Our children need schools, hospitals and dispensaries, but all they get is the city's rubbish," says Devi, pointing to the landfill. Saini asks why waste is dumped in areas like Bawana and Okhla, but not in central Delhi. "It's an equity issue. Nobody should accept anything less than clean air," says Kandhari.

Delhi generates over 14,000 tonnes of municipal solid waste daily, according to a central government affidavit filed in the Supreme Court. Only 10,700 tonnes are processed, with most of the remaining 3,000 tonnes ending up in the city's landfills.

Kandhari describes this as a "complete failure" of Delhi's waste management. Without proper segregation, they end up burning mixed waste. Instead of reducing landfill dependence, they worsen air quality and produce harmful ash, making them more of a pollution source than a solution.

Despite Delhi's worsening air quality, Kandhari says that successive governments have all failed to address the issue. "There's no political will to solve all these crises, whether it's Yamuna River's pollution, or air pollution," she says.

If the plant moves forward, villagers plan to take their fight to court. For them, migration is not an option. "How can we leave our village? We would rather stay and fight – even if it kills us," says Devi. 

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*(Source: <https://www.eco-business.com/news/delhis-new-government-faces-villagers-fight-against-waste-to-energy-plant/>)*

**Both Sambyal and Kandhari highlight Delhi's failure to segregate waste. Ideally, these plants need non-recyclable waste, with high calorific value and low moisture content to function.**

near residential areas and dioxin emissions exceeding legal limits by up to ten times. Residents of Sukhdev Vihar, an area adjacent to the Okhla plant, reported high incidences of respiratory illnesses and cancer following construction of the plant.

People in Bawana are all too familiar with the health implications that will come with another waste-to-energy plant. "They are aware of what a waste-to-energy plant can do. They have read about the Okhla plant," says Bhavreen Kandhari, founder of Warrior

Management (Bawana) Limited insisted that the plant would have the "necessary pollution control systems", and that no dumpsite would be created. However, no details were provided. Jindal did not respond to Dialogue Earth's request for comment.

Villagers also questioned why Bawana, along with JJ Colony, a resettlement colony for residents evicted from different parts of Delhi, and the CRPF Camp – a government-owned facility for the Central Reserve Police Force (CRPF) – were excluded from the



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