

# TerraGreen

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VOLUME 15 | ISSUE 9 | December 2022

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## Climate Actions for Businesses

How Big Should These Be?

### SPECIAL HIGHLIGHTS

Nature-Based Solutions Used by Tribals in India  
E-Rickshaws in Matheran

### IN CONVERSATION

Rehan Haque,  
CEO, metatalent.ai

### TERRA YOUTH

The Art of Bird Conservation



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We are living in a fast changing world. Pollution of natural resources, such as air, water, and land is one of the biggest banes of our times.

Under such precarious circumstances, it is needed that the young generation is not only made aware about the different kinds of pollution but also about the solutions. This is what this book Pollution Solutions – For a Cleaner, Greener Earth is all about.

Filled with eye-opening facts, informative illustrations, and multiple activities, this book is the perfect guide to help the young generation become environmental crusaders.

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# EDITORIAL



“  
Businesses and other organizations  
should now accelerate action to prevent the  
worst threats of climate change.  
”

**W**ith the United Nations Climate Change Conference (COP27) concluding at Sharm El-Sheikh in November 2022, businesses and other organizations should now accelerate action to prevent the worst threats of climate change. The urgency of the climate crisis comes at a time when the role of business in society is shifting from shareholder dominance to stakeholder capitalism.

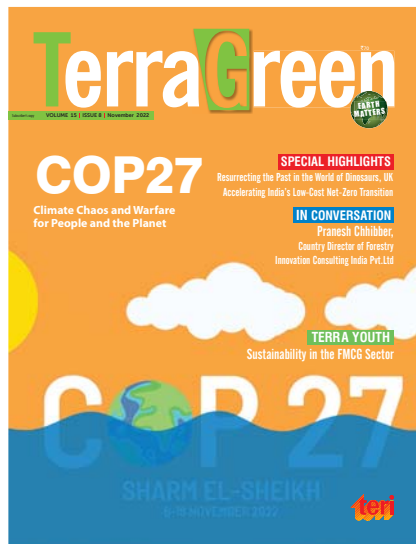
Our cover story in this issue, ‘Climate Action for Businesses’, highlights that on net zero and carbon neutrality, it is important to reflect on whether companies need to realign their purpose to serve a more holistic set of stakeholders, including the environment, and leverage additional channels to demonstrate their commitment to more sustainable activities along the value chain. It stands to reason to ask what companies can—and must—do to progress towards a low-carbon economy. The Intergovernmental Panel on Climate Change (IPCC) policy documents clearly state that climate change will have a direct impact on infrastructure and business investment. As people become more aware and governments respond to the impacts of climate change and the costs of adaptation measures, legislation will become more comprehensive and thorough. The Kyoto Protocol is the best-known attempt, and countries that have ratified it have pledged to reduce their CO<sub>2</sub> emissions within a specified time period. Another recent attempt to reduce carbon emissions is the 2015 Paris Agreement.

Companies need to think about how climate change could impact their business and respond by increasing resource productivity, spurring innovation, and developing new products and services that are less carbon intensive or enable carbon reduction. There is also an urgent need to maintain stability in terms of policy so that businesses can make major investments in low-carbon pathways. Any policy reversals at the national and international levels will jeopardize business action on climate change. Future policy and economic instruments should be designed to support the ambitious targets set out in India’s revised Nationally Determined Contributions (NDCs), and not serve as a disincentive to future climate action by business and industry. Training and empowering people who will shape this environment of the future must be a top priority. We need to start thinking about skills development in this area as there is an active, independent focus on greening jobs, labour markets, and workforce employment.

I sincerely hope that this issue of *TerraGreen* will strike a chord among our readers and that you shall come back with your thoughts and invaluable inputs for this publication to keep growing from strength to strength.

A handwritten signature in black ink that reads 'Vibha Dhawan'.

**Vibha Dhawan**  
Director-General, TERI



I liked reading the online issue of the November 2022 issue of *TerraGreen*. The article on Accelerating India's Low-Cost Net-Zero Transition is very succinct. The authors detail how fostering synergies between actors and timely policy interventions helped to grow the LED industry in India and dramatically improve energy efficiency. As India transitions towards electric mobility, the LED experience opens up the space to examine possibilities for similar holistic approaches to assess wider socio-economic implications for decision-making and greater use of new renewables and green technologies.

**Manish Kumar**  
Kanpur, Uttar Pradesh

The interview with Mr Pranesh Chhibber published in the November 2022 issue of *TerraGreen* is very interesting. His views are noteworthy that India is a

wood fibre deficit nation and thus has to depend on imported wood to meet its needs. It must be noted here that the government had to step in towards the end of the last century to protect India's forests after decades of incessant logging and deforestation resulting in the loss of vital forest cover. It is therefore critical for India, as well as the rest of the world, to use this beautiful natural resource responsibly by sourcing wood only from sustainably managed forests in order to prevent further loss of forest cover, which is necessary to mitigate global warming and leave a healthy environment for future generations.

**Mohd. Irfan**  
Hyderabad, Telangana

The Environment Research article on honeybees published in the November 2022 issue *TerraGreen* of is very informative indeed. A new study by University of Maryland entomologists shows that the lifespan for individual honeybees kept in a controlled, laboratory environment is 50 per cent shorter than it was in the 1970s. When scientists modelled the effect of today's shorter lifespans, the results corresponded with the increased colony loss and reduced honey production trends seen by US beekeepers in recent decades.

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## Merge Millets with Meals to Stay Healthy

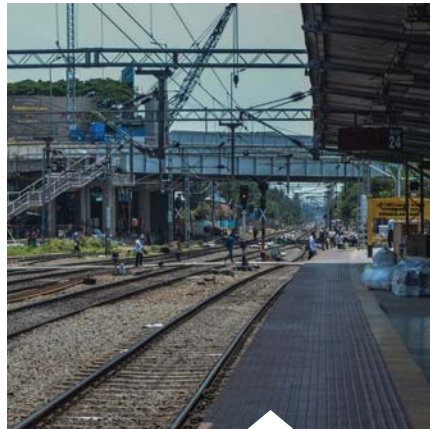
A progressive millet farmer and millet man of Himachal Pradesh Nek Ram Sharma underlined the need of incorporating millets as an integral part of the meals and reap good health. He expressed these views while addressing teachers of Vidya Bharati who were on a one-day exposure visit to the Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan district of Himachal Pradesh recently. Addressing the gathering, Sharma said that the international year of Millets (2023) has brought out the importance of millets to the forefront and has allowed us to increase awareness and incorporate these foods into our daily lifestyle. He also explained the various health benefits of eating different kinds of millets.

Source: <https://www.thestatesman.com/>

## IISER Pune's New Material Removes Pollutants from Water

Access to clean and drinkable water has now not only become a local problem but global as well. Water contamination is one of the world's leading causes of death and the problem is only getting worse. To tackle this, the team at Indian Institute of Science Education and Research (IISER), Pune came up with a custom-designed unique molecular sponge-like material—macro/microporous ionic organic framework—which can swiftly clean polluted water by soaking up sinister contaminants. The results were published recently in the journal, *Angewandte Chemie*.

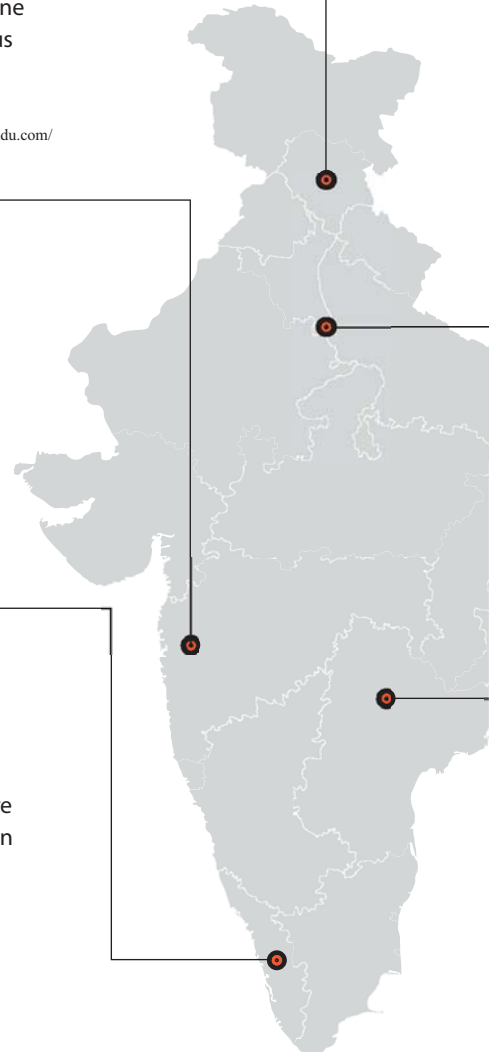
Source: <https://www.thehindu.com/>



## New Town Railway Station to be a Green Building

The Ernakulam Town railway station, which is being redeveloped to offer modern infrastructure and airport-like facilities for the passengers, will be a "green building", in compliance with Green Rating for Integrated Habitat Assessment (GRIHA). According to the railway spokesperson, Ernakulam Town railway station (also known as Ernakulam North Station) is one of the busiest railway junction stations in South India. "Southern Railway has taken up the redevelopment of this station to offer modern infrastructure and airport-like facilities for the passengers. The tender was awarded for the redevelopment work in August 2022 and now the preliminary work has begun and it is progressing at a steady pace," said the spokesperson.

Source: <https://www.newindianexpress.com/>





## Corporate Funding in Global Solar Sector Falls 13 Per Cent to \$24.1 Billion in 2022

Corporate funding in the global solar sector declined 13 per cent year-on-year to USD 24.1 billion in 2022, according to a Mercom Capital report. Corporate funding includes venture capital and private equity (VC and PE), debt financing, and public market financing.

“Total corporate funding in 2022 (first nine months) stood at USD 24.1 billion, 13 per cent lower compared to USD 27.8 billion raised in 2021,” the global clean energy consulting firm said in its report. During 2022, VC funding activity rose 56 per cent to USD 7 billion compared to USD 4.5 billion in 2021. In 2022, debt financing was at USD 12 billion, a 24 per cent decline compared to USD 15.8 billion raised during 2021.

Source: <https://economictimes.indiatimes.com/>

## Green Hydrogen Mission to Help India Meet Net-Zero Targets

The National Green Hydrogen Mission is a ‘significant step’ towards achieving the country’s net-zero targets and will help in reducing input costs of clean energy source, besides generating lakhs of job opportunities in the renewable energy sector, experts say. The Union Cabinet on January 4, 2023 approved the National Green Hydrogen Mission, which aims to make India a global manufacturing hub and a clean source of energy. The objective of the Mission is also development of a production capacity of at least 5 MMT (million metric tonnes) per annum with an associated renewable energy capacity addition of about 125 GW in the country by 2030.

Source: <https://economictimes.indiatimes.com/>



## India’s Lesser Floricans ‘Critically Endangered’

The smallest of the bustard family, Lesser Florican, which is renowned for its spectacular leaping breeding display, is facing a severe threat. The widespread loss of its grassland habitat in South Asia has led to rapid declines of this ‘Critically Endangered’ species, according to UK-based BirdLife International. “Of all the bird conservation crises in India this is the most urgent and yet the most neglected,” says BirdLife’s Nigel Collar, who also serves as co-chair of the Bustard Specialist Group of the International Union for the Conservation of Nature. “We only have a few years to save this astonishing species, and BNHS needs all the support it can get to expand its valiant efforts,” he said in a report published on the BirdLife website.

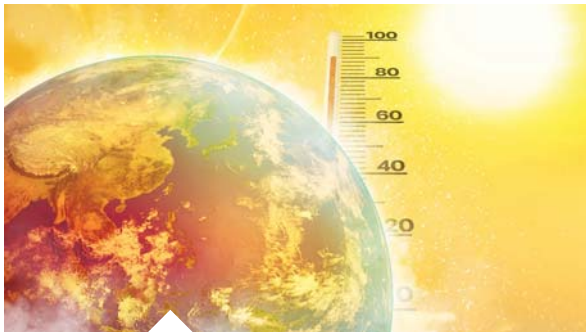
Source: <https://www.deccanherald.com/>



## Global Warming Reaches Central Greenland

A temperature reconstruction from ice cores of the past 1000 years reveals that today's warming in central-north Greenland is surprisingly pronounced. The most recent decade surveyed in a study, the years 2001 to 2011, was the warmest in the past 1000 years, and the region is now 1.5 °C warmer than during the 20th century, as researchers report. Using a set of ice cores unprecedented in length and quality, they reconstructed past temperatures in central-north Greenland and melting rates of the ice sheet. The Greenland Ice Sheet plays a pivotal part in the global climate system. With enormous amounts of water stored in the ice (about 3 million cubic kilometres), melt and resulting sea-level rise is considered a potential tipping point.

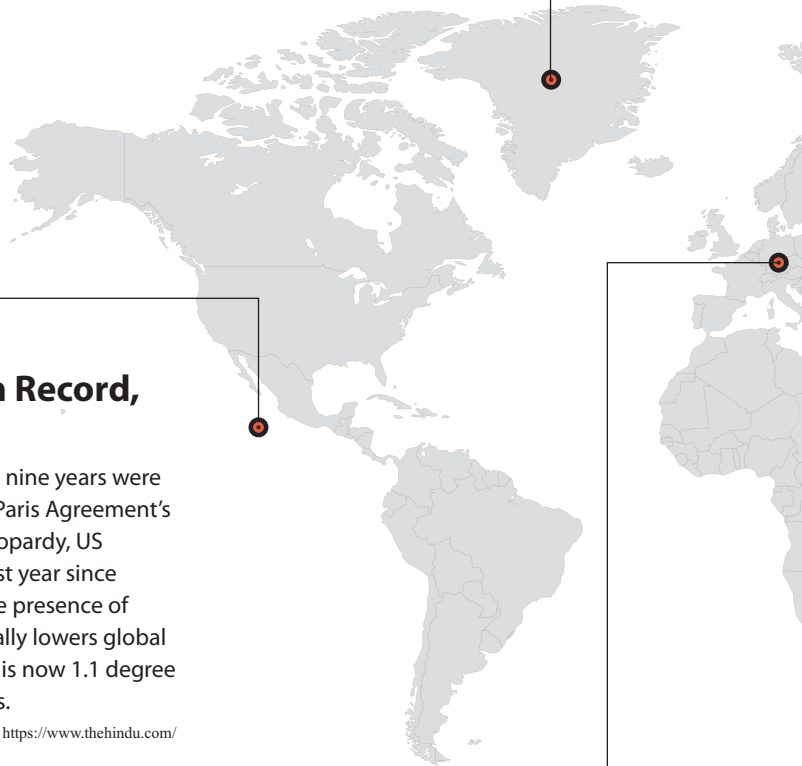
Source: <https://www.sciencedaily.com/>



## 2022 Tied as World's Fifth-Warmest on Record, US Scientists Say

2022 was the world's joint fifth-warmest on record and the last nine years were the nine warmest since pre-industrial times, putting the 2015 Paris Agreement's goal to limit global warming to 1.5 degree Celsius in serious jeopardy, US scientists said recently. 2022 tied with 2015 as the fifth-warmest year since record-keeping began in 1880, NASA said. That was despite the presence of the La Nina weather pattern in the Pacific Ocean, which generally lowers global temperatures slightly. The world's average global temperature is now 1.1 degree Celsius to 1.2 degree Celsius higher than in pre-industrial times.

Source: <https://www.thehindu.com/>



## UN Chief Urges 'Credible' Net-Zero Pledges or Risk Greenwashing

UN secretary general Antonio Guterres recently called on business leaders gathered at the World Economic Forum in Davos to follow the principles outlined by an expert group to make 'credible', accountable net-zero pledges. The United Nations and standard setter the International Organization for Standardization launched the guidelines in November to become a reference text and help organizations come up with solid plans, avoiding slogans, hype and obfuscation. While companies are increasingly pledging to cut greenhouse gas emissions to as close as possible to zero, the benchmarks and criteria they use "are often dubious or murky", the UN chief told the Davos delegates.

Source: <https://www.reuters.com/>







## Global Coal Consumption to Reach All-Time High This Year: IEA

Global coal consumption is set to rise to an all-time high in 2022 and similar levels in the next few years if stronger efforts are not made to move to a low-carbon economy, a report by the International Energy Agency (IEA) said recently. High gas prices following Russia's invasion of Ukraine and consequent disruptions to supply have led some countries to turn to heatwaves and droughts in some regions have also driven up electricity demand and reduced hydropower, while nuclear generation has also been very weak, especially in Europe, where France had to shut down nuclear reactors for maintenance. The IEA's annual report on coal forecasts global coal use is set to rise by 1.2 per cent this year, exceeding 8 billion tonnes in a single year for the first time and a previous record set in 2013.

Source: <https://energy.economicstimes.indiatimes.com/>



## China's COVID-19 Reopening Set to Push 2023 Oil Demand to New High

The lifting of COVID-19 restrictions in China is set to boost global oil demand in 2023 to a new record high, the International Energy Agency (IEA) said recently, while price cap sanctions on Russia could dent supply. "Two wild cards dominate the 2023 oil market outlook: Russia and China," the Paris-based energy watchdog said in its monthly oil report. "Russian supply slows under the full impact of sanctions (while) China will drive nearly half this global demand growth even as the shape and speed of its reopening remains uncertain."

Source: <https://energy.economicstimes.indiatimes.com/>

## Special Drone Collects Environmental DNA from Trees

Ecologists are increasingly using traces of genetic material left behind by living organisms left behind in the environment, called environmental DNA (eDNA), to catalogue and monitor biodiversity. Based on these DNA traces, researchers can determine which species are present in a certain area. Obtaining samples from water or soil is easy, but other habitats—such as the forest canopy—are difficult for researchers to access. As a result, many species remain untracked in poorly explored areas. Researchers at ETH Zurich and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, and the company SPYGEN have partnered to develop a special drone that can autonomously collect samples on tree branches.

Source: <https://www.sciencedaily.com/>



# Sustainable Groundwater Management in Lucknow

## For Sustainable, Equitable, and Resilient Water Use

The study finds that the groundwater exploitation in Lucknow is 17 times more than the rate of recharge and projects a decline in the water table in various areas of the city.

**U**nderground water is a moving and renewable resource, based on annual availability of rainfall. Availability of groundwater depends on geological and climatic conditions. Annual demand of usable groundwater for the country has been estimated to be 4.5 crore hectare metres. Also, as compared to surface water, groundwater is less expensive and more qualitative. However, considering the reduction in infiltration capacity due to urbanization and its excessive withdrawal more than the recharge potential is lowering the water level in the country. Hence, it is necessary to make a thorough

assessment of groundwater resources of a region and take initiatives for the sustainable management of groundwater resources. The objective of this project is to study and understand the different dimensions of groundwater resources of a city. This includes an assessment of its availability, demand, extraction, and uses in different sectors, but also looks for assessment of factors influencing the availability of groundwater. An analysis of rainfall patterns and land-use, land cover changes will help in understanding the changing patterns in recharge potential of the city aquifers. This project also seeks an assessment of groundwater quality

and factors influencing its dynamics. An understanding about the other sources like surface water and its contribution in the overall supply system of the city will help in formulating the long-term sustainable groundwater management plan for the city.

The report on the 'Sustainable Groundwater Management in Lucknow City' was launched at the curtain raiser event of the World Sustainable Development Summit 2022. The event was held on the eve of World Environment Day 2021, on the theme of Sustainable, Equitable and Resilient Water Use.





This study is prepared in collaboration with the Department of Geology, University of Delhi. The study was sponsored by Uttar Pradesh Groundwater Department, Lucknow with the support from The World Bank.

The study finds that groundwater exploitation in Lucknow is 17 times more than recharge and at this rate, by 2031, the groundwater table in the key localities of central Lucknow and those on the city's fringes is projected to further decline by about 20–25 metres and 5–10 metres, respectively.

The study includes a detailed assessment of availability, demand, extraction, and usage of groundwater in different sectors within the urban limits of the city. It also estimates the overall contribution of groundwater to Lucknow's economy and makes key recommendations for improving its management and governance with the involvement of all the stakeholders.

Key findings from the demand survey conducted under the study are as follows:

- 72 per cent households in Lucknow use groundwater.
- Almost 90 per cent of multistorey housing societies and 70 per cent of commercial users comprising hotels,

hospitals, schools, offices and malls are dependent on groundwater.

- Almost all the surveyed societies in central, north and east Lucknow are extracting groundwater through private borewells. Sixty per cent of these borewells are more than 200 feet deep.
- At least 25 per cent of commercial users also reported that since the drilling, they have increased the depth of their borewells by almost 100 m, due to lowering of water table in their area.
- Use of overflow bell to indicate the filling of water storage tank is not popular among the citizens.
- Sixty-four per cent of households reported about the use of water purifier, of which three-fourths are reverse osmosis (RO) systems.

**The study suggests the following strategies for its sustainable management:**

- *Rainwater harvesting:* Create capacity of 1500 ML per annum of rainwater harvesting. This will require a surface area equivalent to 40 million m<sup>2</sup> and an investment of about INR 41 crore.
- *Reduction in groundwater demand:* Use of water saving fixtures can reduce daily per capita water requirement

by one-third of the current demand. This will require installation of atleast 3 water saving fixtures per household for around 200,000 households in these zones. Immediate cost requirement for these fixtures will be about INR 30 crore.

- *Decentralized wastewater recycling:* Installation of 2000 decentralized wastewater treatment plants of 10 KL capacity each in commercial complexes, multi-story complexes, group housing societies, etc., can reduce the water demand of these zones by 20 MLD. This will require an immediate expenditure of around INR 60 crore.
- *Substitution of groundwater with surface water:* To ensure the sustainable management, it is necessary to substitute current groundwater supply with surface water sources like Haidar canal and Moti Jheel. These can be developed practically to provide requisite amount of water. Total cost for the substitution head can be developed based on the detailed project report for the identified source. ■

Article by: Dr Shresth Tayal, Fellow and Area Convener, Centre for Himalayan Ecology, TERI, New Delhi. Article source: <https://www.teriin.org/>

# Harvesting Untapped Source of Freshwater

## Researchers Propose New Structures

An almost limitless supply of freshwater exists in the form of water vapour above Earth's oceans, yet remains untapped, researchers said. A new study suggests an investment in new infrastructure capable of harvesting oceanic water vapour as a solution to limited supplies of freshwater in various locations around the world.

An almost limitless supply of freshwater exists in the form of water vapour above Earth's oceans, yet remains untapped, researchers said. A new study from the University of Illinois Urbana-Champaign is the first to suggest an investment in new infrastructure capable of harvesting oceanic water vapour as a solution to limited supplies of freshwater in various locations around the world.

The study, led by civil and environmental engineering professor and Prairie Research Institute executive

director Praveen Kumar, evaluated 14 water-stressed locations across the globe for the feasibility of a hypothetical structure capable of capturing water vapour from above the ocean and condensing it into freshwater and do so in a manner that will remain feasible in the face of continued climate change.

Kumar, graduate student Afeefa Rahman and atmospheric sciences professor Francina Dominguez published their findings in the journal *Nature Scientific Reports*. "Water scarcity is a global problem and hits close to home

here in the US regarding the sinking water levels in the Colorado River basin, which affects the whole Western US," Kumar said. "However, in subtropical regions, like the Western US, nearby oceans are continuously evaporating water because there is enough solar radiation due to the very little cloud coverage throughout the year."

Previous wastewater recycling, cloud seeding and desalination techniques have met only limited success, the researchers said. Though deployed in some areas across the globe, desalination





plants face sustainability issues because of the brine and heavy metal-laden wastewater produced—so much so that California has recently rejected measures to add new desalination plants.

“Eventually, we will need to find a way to increase the supply of freshwater as conservation and recycled water from existing sources, albeit essential, will not be sufficient to meet human needs. We think our newly proposed method can do that at large scales,” Kumar said.

The researchers performed atmospheric and economic analyses of the placement of hypothetical offshore structures 210 metres in width and 100 metres in height. Through their analyses, the researchers concluded that capturing moisture over ocean surfaces is feasible for many water-stressed regions worldwide. The estimated water yield of the proposed structures could provide freshwater for large population centres in the subtropics. One of the more robust projections of climate change

is that dry regions will get drier, and wet areas will get wetter. “The current regions experiencing water scarcity will likely be even drier in the future, exacerbating the problem,” Dominguez said. “And unfortunately, people continue moving to water-limited areas, like the Southwestern US.”

However, this projection of increasingly arid conditions favours the new ocean vapour-harvesting technology. “The climate projections show that the oceanic vapour flux will only increase over time, providing even more freshwater supply,” Rahman said. “So, the idea we are proposing will be feasible under climate change. This provides a much needed and effective approach for adaptation to climate change, particularly to vulnerable populations living in arid and semi-arid regions of the world.”

The researchers said one of the more elegant features of this proposed solution is that it works like the natural

water cycle. “The difference is that we can guide where the evaporated water from the ocean goes,” Dominguez said. “When Praveen approached me with this idea, we both wondered why nobody had thought about it before because it seemed like such an obvious solution. But it hasn’t been done before, and I think it is because researchers are so focused on land-based solutions—but our study shows other options do, in fact, exist.”

The researchers said this study opens the door for novel infrastructure investments that can effectively address the increasing global scarcity of freshwater. The University of Illinois Urbana-Champaign, the Lovell Professorship in the department of civil and environmental engineering, the University Scholar Program, and the National Science Foundation supported this research. ■

Source: <https://www.sciencedaily.com/>

**ZERO**



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# Enterprise in Waste Management

Saahas Zero Waste



**WASTE**

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Though much has been done by city municipal authorities in recent years in terms of waste segregation and collection at household levels, it remains a burgeoning problem in our urban areas. In this article, **Lata Vishwanath** highlights the work done by Saahas Zero Waste (SZW). From its humble beginnings as a small NGO doing waste collection, SZW has grown, over the last two decades, into a social enterprise, as a leader with best practices in managing Bengaluru's solid waste and thereby reducing its harmful impact to the earth and environment.

---



the much-needed fillip to SZW activities by way of completion of existing projects and initiation of new projects including those in villages in the outskirts of Bengaluru with plastic menace, doorstep disposal facility and collection of waste in slums around two popular lakes.

The programme implemented in two major cities in North Karnataka reduced environmental pollution from burning of waste and resulted in clean water availability. E-waste programme of the organization got further boost with the enforcement of e-waste and plastic-waste management rules.

### Basic Ideologies: Nature, people, and technology

The ideology of giving back to nature what is received, being fundamental to all major decisions, made the organization realize early, that the same was possible only by synergizing the two vastly available resources—people and technology. Hence, their thriving business model is so designed as to put environmental and social impacts ahead of profits, challenging barriers, for building a circular economy. It also means that having a proven track record over the years on ESG (Environmental, Social, and Governance), gives SZW an edge for investors looking for investing in sustainability projects having a positive impact on our planet.

**W**aste generation is an essential part of our existence. An individual worldwide is believed to generate waste on an average between 0.5 kg and 4.5 kg every day. Hence, the total waste generated in a country like India with its staggeringly growing population is very high. Though much has been done by city municipal authorities in recent years in terms of waste segregation and collection at household levels, it remains a burgeoning problem in our urban areas and metropolitan cities.

In our society, keeping homes clean and managing household waste does not figure as a high priority task for an individual, and is usually pushed aside as the responsibility of family's womenfolk. Thus, it is no wonder that the sight of sprawling waste littered around in her city of residence had inspired Ms Wilma Rodrigues to take up the onus of managing the same and Founding the organization Saahas Zero Waste (SZW). From its humble beginnings as a small NGO doing waste collection, SZW has grown, over the last two decades, into a social enterprise, as a leader with best practices in managing a city's solid waste and thereby reducing its harmful impact to the earth and environment.

### Social Enterprise

Having committed itself to building zero waste communities, Saahas Zero Waste continuously strives to find and implement innovative sustainable solutions with maximum resource recovery, bring about behavioural changes in communities, provide job opportunities and livelihood for people at the ground level, with strong monitoring of processes in place for impact measurement, along with government, commercial, and residential stakeholders.

Swachh Bharat Mission, announced by the Indian government in 2014, gave





## Saving the Soil and Environment

Making a positive impact on environment and health of populations being premier to Saahas Zero Waste, segregation at source leads to organic composting and material recovery of solid waste. The segregated solid waste is then made into different waste streams depending on the composition, quality and recyclability of the waste, which further gets value added after recovery and recycling. Paper is turned into a recyclable stationary, recoverable plastics into handicrafts, bottles and T-Shirts and non-recyclable plastics and glass for co-processing with cement and thus 96 per cent of waste is diverted from going into landfills.

## Social Inclusion

Providing livelihood for people from informal sectors—especially women from low socio-economic sections is at the core of their mission. Saahas Zero Waste recruit workforce from the informal sector at various skill levels of the waste management ecosystem. With an inclusive business model of a user fee for collection of waste, they pay salaries



Paper and bales

to the labour force. Through self-help groups, several of recycled products are branded, a market created, and products introduced in the market, which enables to pay the workforce.

## Technology Incorporation

Technology is made use for complete traceability of material from source to recovery with details of transport, dates of collection, etc. Tracking of

materials in supply chain is enabled by digitalization of identity and its history. An IOT integrated weighing scale keeps track of the data of waste collection, an automated sorting system uses artificial intelligence for accurate and better recovery of resources. The decentralized system for an efficient handling of waste includes a Materials Recovery Facility (MRF), which can handle 16T per day of dry waste, with a conveyer and baling machine system for processing waste with high sorting efficiency, and



Saahas Waste Management Private Limited



capability for cashless transactions with SZW vendors.

## Business Verticals

The ideologies have proven strong for a sustainable business growth with three main verticals which helped them sail through COVID times, despite challenges, with increased net profit. Corporate waste produced during COVID-19 pandemic months was less, but there were more of other waste streams. The executive salaries were cut, but of those at ground level were kept the same. Enrollment of informal sector as partner in collection of waste generated employment for 1200 people with revenue of INR 22 crore.

## Zero Waste Management: Consultancy, management, and spreading awareness

To have an unwavering zero waste, SZW has expanded the basic Rs to include and embed altogether 6Rs, reduce, repair, recycle, reuse, refuse, restore in waste management practices across sectors

and stakeholders. Consultancy on ZWM, includes recognition and appreciation for best practices.

With access to data for complete traceability in supply chain, the company adds value to its customers by way of awarding certificates of compliance with government regulations. A true zero waste certificate was awarded to a tech park, for streamlining their waste handling processes, for complete traceability and 96 per cent recovery of resource from their waste.

Also, programmes for mass awareness and behavioural change are regularly conducted for big corporate offices by

participation in events like IPL. Regular symposiums and workshops on circular economy benefit workforce at all levels.

## Extended Producers' Responsibility

After the government rule on mandatory compliance for Extended Producers' Responsibility (EPR), partnerships struck with big brands on EPR have proved good working model for the past many years, with a huge network of collection centres, in collaboration with recyclers and end destinations. The whole cycle is backed by certificates, one by end destination and another by SZW. SZW also offers complete end-to-end service in EPR from applying for registration to designing of action plan and implementation.

Here again, technology plays a big part. Machine learning and robotics help in brand identification and sorting, traceability tools in material movement, data points and traceability for valid EPR claims. Wastes are identified and segregated to different streams of EPRs and sent to baling machine depending on the composition of the waste, especially the plastics.

## Recycled Products and Markets

Different waste streams are routed according to their recyclability value.



Access to data for traceability in supply chain means accountability, to give better quality of plastics, which in turn gets better price in the market for the product recycled. Thus, a better growth in circular economy, and improved livelihood options for people at the bottom of the work pyramid. For complete end-to-end process, there are many professional teams of plastic experts, environmental engineers, and lawyers to assist in framing the entire process and to see that there is compliance with rules.

Out of the total dry waste, 94 per cent of plastic is non-recyclable and 6 per cent is recyclable. The unavailability of the facilities for recovering the low-grade plastic makes co-processing for cement industry a viable option. Collaboration with self-help groups helps to reinvent the recovered material value as in the pandemic time when fabric masks were made with the self-help group Hosabelaku.

## Social Inclusion Programme

Compliance to laws, labour, wages, right infrastructure for waste material handling, responsible waste management practices and a business model with service fee at every stage, make right components of social inclusion programme for the company.

Inclusion happens in different stages of the project: identification of waste entrepreneur to recruit from informal system, providing infrastructure and building capabilities—from training for mindset shift to formalization into waste management ecosystem. These need consulting many stakeholders to design solutions for an inclusive programme. Capacity building of waste entrepreneurs also includes training in fire safety, occupational health and safety, basic business knowledge, material handling, standard operating procedures, and compliance and regulations. The project leader plays an important role in



identifying the technological needs— machine learning, processing machinery, data analysis, traceability, to train the recruited worker for transitioning to next step of the value chain. At each step, there is increase in the net weight of waste collected and finally recycled with material recovery.

## Impact

SZW operates in 40 locations in India. As a tangible environmental impact, in 2020–21, SZW was able to divert 21,000 MT, of waste from entering landfills. This was equivalent to 61,740 MT of CO<sub>2</sub> saved, 142,941 barrels of oil saved from consumption, removed annual emissions from 13,427 vehicles, 234 million litres of water saved, 16,000 trees saved by recycling, and reduced leakage to water bodies by landfills. 1500 MT of e-waste was collected and channelized to authorized recyclers, supported by 6 brand EPRS.

As a tangible social impact, SZW has impacted 1400 lives, 1218 waste workers, made 65 micro entrepreneurs, 60 transport vendors, and 60 MRF field staff. 157 people from low socio-economic background were employed. Gender equality and equal growth opportunity, social security

with formalizing into the mainstream workforce, providing safe working environment for personnel handling waste with compliance with national and international laws with competent salaries. These individuals—happy with their jobs, can support their families and send kids to schools are thus building happy and healthy communities.

## Vision for Future

With the right reporting framework for impact measurement that keeps sustainability as the central premise, with the social return of investment the company creates for its stakeholders, it has set its target high for the next 3–5 years. As an INR 100-crore company with new products, new markets, moving up the value chain, integrating technology and generating more employment with formalizing the process chain, better material recovery, traceability of waste and promoting circular economy, the company aims to employ 1000+ workforce, handling 500 MT of waste per day across all verticals. ■

*Lata Vishwanath is an Electronics engineer and a Material scientist by training, she took to writing after working many years in test and research labs in India and Singapore. Besides reading and writing, she is interested in gardening, travelling, cooking, music, and movies.*



# Green Skills Workforce Training

Paving the Way to Net Zero

**Rehan Haque**, CEO of metalent.ai, discusses how green skills training via AI-moderated workforce upskilling is important for businesses to adopt to prepare for a greener economy.



**Is the gradual transition to net zero creating new roles and economic opportunities?**

Like the rest of the world, British businesses are suffering from a scarcity of skilled workers in the talent pool. As new workplace technologies emerge, businesses need a constant supply of trained employees able to get to grips with them. Technologies such as artificial intelligence (AI), the metaverse and new forms of automation are increasingly integrated into today's everyday business operations. Yet too many companies lack the skilled talent to use them effectively. In addition to boosting efficiency and productivity, these new and emerging technologies are driving progress in environmentally conscious and sustainable business operations.

As the UK moves towards its net zero goals, the skill shortages across all industries and sectors need to be filled fast. The UK government is putting intense pressure on businesses to decarbonize for the future, and this gradual transition to net zero creates new roles and economic opportunities—so long as workers have the skills to take advantage of them.

**What do we mean by 'green skills'?**

This scarcity additionally includes green skills—the knowledge, abilities, values, and attitudes needed to live in, develop and support a sustainable society. Sectors that require the most pressing emissions reductions by 2030 face the most immediate skills shortages—most notably including housing and transport. By 2030, 80 per cent of the current workforce will still be active, so it is imperative that workers now have access to training and upskilling tool, lest they be left behind completely as we transition towards a greener future.

**Would it be correct to say that businesses must act before it is too late?**

The time for businesses to take responsibility for their workforce is now. Ensuring that their teams have ongoing skills-based training, particularly for green skills training, is key to both



ensuring that workers can cope with the technologies needed by businesses in the transition towards net zero starting in the present and future-proofing them for even more emerging technology sure to arise in the years to come.

Green skills programmes, in tandem with government reform, are key in levelling up business agendas, ensuring workers can cope with the technologies needed for efficient and effective transition, and creating a greener economy in the future.

**Is a greener mindset needed throughout all businesses?**

Across the world, businesses have rapidly adapted to the new normal of hybrid and work-from-anywhere culture necessitated by pandemic health and safety precautions. Post-pandemic, people are ready to throw themselves into work—perhaps because of renewed feelings of freedom or maybe they are in pursuit of a new career path or changes to their lifestyle. The working mindset has evolved; workers now seek employment in places more aligned with their values and will do more to seek that out for a better, happier and more sustainable quality of life overall.

Business leaders not only need to prioritize a flexible culture of constant support, learning and improvement when it comes to creating a working environment for their teams, they should also place a much greater emphasis on developing a greener mindset

when it comes to workforce training programmes. Most current workers aren't going away any time soon, so a focus on transferring skills and retraining for the green economy is key for businesses seeking to support and upskill their operational teams.

**Do you agree that skills are the future, not jobs?**

Where both employers and workers alike used to think primarily in terms of jobs, we now increasingly think in terms of skills. With green skills required across all sectors, a greener mindset is required as well as a technologically adaptable skillset. Decarbonizing the highest contributors to UK greenhouse gas emissions in the UK—namely the transport, housing, and heavy industry sectors—is no easy feat. Yet a workforce with a conscious attitude towards the environment, as well as constantly evolving green skills training, helps make the steps towards a net zero economy that much more possible for our future.

Businesses with a responsible and accountable workforce, armed with technical skills training provided by AI-moderated talent upskilling programmes, are far better prepared for the demands of the future, and not only survive, but thrive as the working environment continues to evolve around emerging technology and the demands of net zero.



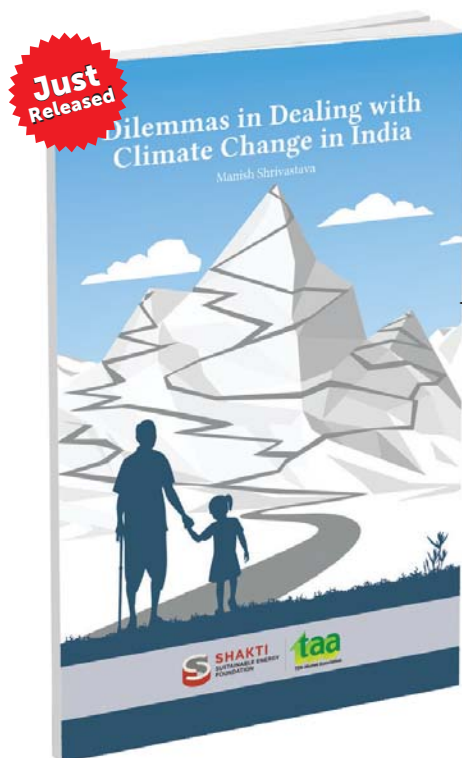
**About metatalent.ai**

metatalent.ai is an AI-powered talent marketplace for the future of work. We aim to enable intelligent reskilling and upskilling of human capital, transforming learners, educators and employers across the world through customisable skills-based training and transformation programmes. metatalent.ai is on a mission to build a future-ready and self-sustaining upskilled workforce, accustomed to functioning amidst and adapting to immersive emerging technologies such as AI, automation and machine learning, as well as equipping workers with green economy skills and employability skills needed for the future of work.

Metatalent.ai is on a mission to help global workers keep up with emerging technological change and evolving employability skills. We empower, transform, and upskill learners with life-changing knowledge and skills that promise their career growth and give them the ability to thrive in the evolving corporate landscape across the globe. We do this through our range of progressive internship and apprenticeship programmes, that combine training, mentoring, coaching, and hands-on work to ensure our interns and apprentices are equipped for the future of work. The programmes are adapted to the 'new normal' of work which means our programmes can be opted for and completed remotely, on-prem, or on a hybrid model through the use of virtual offices in the metaverse. ■



## HIGHLIGHTS THE SOCIAL, ECONOMIC, AND GOVERNANCE ISSUES



### Major topics covered:

- How should India be concerned about climate change?
- The landscape of adaption policy
- Social objectives and climate policy
- A just transition: difficult choices
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Be it an extremely hot day or a day of heavy rains, people jokingly attribute the weather to climate change—and that is the sole extent of public discourse on the topic. Seldom does anyone pause to think of such extreme-weather days becoming threateningly frequent and whether that threat is avoidable.

*Dilemmas in Dealing with Climate Change in India* invites the general public to engage with the issue of climate change, shows how it affects the country and the lives of its citizens, and suggests what should be done to counter climate change. The book sets out themes that its readers can readily relate to and those that will prompt readers to want to know more, challenges them to form informed opinions, but also cautions them about forming them in haste—a must-read for those looking for a source that explains climate change simply, clearly, and concisely.

This book is useful for adults who are concerned about topical issues but lack the understanding to make sense of what they read or watch in the mass media.

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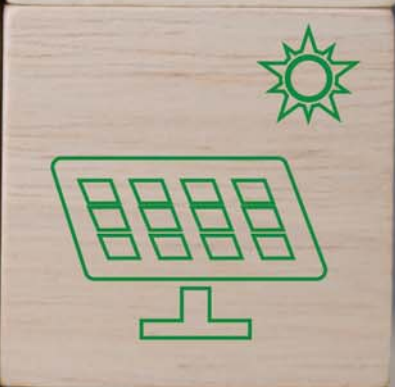
# Climate Actions for Businesses

## How Big Should These Be?

When we talk and act on climate action and the energy transition in emerging economies, the discussion can range from topics such as climate mitigation, adaptation, energy transition, financing, and business model innovation to next generation technologies. In this article, **Biba Jasmine** says that given the current debate and discourse around net zero and carbon neutrality, it is important to pause for a moment and reflect on whether companies need to realign their purpose to serve a more holistic set of stakeholders—including the environment—and leverage additional channels to demonstrate their commitment to more sustainable activities along the value chain. It stands to reason to ask what companies can—and must—do to make progress towards a low-carbon economy.









As the United Nations Climate Change Conference (COP27) concludes, businesses and other organizations should accelerate action to avert the worst threats of climate change. The urgency of the climate crisis comes at a time when the role of business in society is shifting from shareholder dominance to stakeholder capitalism.

The Intergovernmental Panel on Climate Change (IPCC) policy documents clearly state that climate change will have a direct impact on infrastructure and business investment. As people become more aware of this issue and governments respond to the impacts of climate change and the costs of adaptation measures, legislation will become more comprehensive and thorough. The Kyoto Protocol is the best-known attempt, and countries that have ratified it have pledged to reduce their carbon dioxide (CO<sub>2</sub>) emissions within a specified time period. Another more recent attempt to reduce carbon emissions is the 2015 Paris Agreement, but there are other circumstances in which policies are making progress.

Risk is the problem that requires attention. If the projected temperature rise occurs and productivity is affected by adverse working conditions, the International Labour Organization projects significant

losses in employment and the economy by 2030. Nearly every industry is directly or indirectly threatened by climate change. According to a 2019 study, the United States alone could lose USD 520 billion from a global temperature increase in 22 sectors if a higher temperature scenario occurs.

As a result, companies need to think about how climate change could impact their business by increasing resource productivity, spurring innovation, and developing new products and services that are less carbon intensive or enable carbon reduction by others.

## Business Unusual or Business-as-usual?

Climate change should be a strong business argument, business opportunity, and business responsibility for companies. A low-carbon economy is the only path to sustainable economic growth. Therefore, businesses must call on governments to keep climate change high on the political agenda and to use effective policy and economic instruments.

There is also an urgent need to maintain political stability so that businesses can make major investments in low-carbon pathways. Any policy reversals at the

national and international levels will jeopardize business action on climate change. Future policy and economic instruments should be designed to support the ambitious targets set out in India's revised Nationally Determined Contributions (NDCs), and not serve as a disincentive to future climate action by business and industry.

## Can Businesses Be a Gamechanger in Limiting Climate Crisis?

Climate protection is the best strategy for the private sector. Electric vehicles will be the engines of the future. Renewable energy is being installed at a record pace. Major oil companies are putting an internal price on carbon. The green bond market is growing rapidly. Insurance companies are playing a leading role in shaping the future of many industries when warming exceeds 2 degrees and much of the economy will become uninsurable. Innovative technologies are emerging in sectors such as transportation, energy, and agriculture as a major factor in building the resilience of communities and economies by enabling them to adapt to climate impacts. The bottom line, then, is that climate action must make economic as well as business sense. The question that arises is how do we sustain this momentum and accelerate action even further. How can we achieve full transformation? There is not just

one answer to this. Policymakers and the private sector must work together to implement country-level actions that do their part to contribute to the Paris Agreement and achieve the Sustainable Development Goals (SDGs).

## Investment in Sustainable Infrastructure

One of the most striking aspects of the USD 90 trillion investment requirement for the next 15 years in infrastructure is that more than two-thirds of it is in the Global South and at least 60 per cent is in energy and transport. Currently, private investment accounts for 35–40 per cent of infrastructure investment in emerging markets and 60 per cent in developed countries.

Private investment is therefore critical. Investment in climate-resilient infrastructure is necessary to promote sustainable development, job creation, and economic prosperity. Among other employment benefits, building infrastructure adapted to climate change can lead to job growth and prevent job loss. We need to keep this in mind as we pursue complementary policies that will help us build resilient infrastructure plans.

The IPCC asserts that increased global warming will drive up the cost of maintaining and rebuilding urban infrastructure, including buildings, transportation, and energy supplies, leading to service disruptions, particularly for cities, settlements, and infrastructure in cold regions and along coasts.





## Creation of Green Jobs

The good news is that companies now have a great opportunity to fill positions in the age of climate change. Training and empowering people who will shape this environment of the future must be a top priority. We need to start thinking about skills development in this area as there is an active, independent focus on greening jobs, labour markets, and workforce employment. Studies by the Skills Council of Green Jobs show that in India alone, 60 million jobs will be created in these employment opportunities by 2020, 30 per cent each in waste and water management. Other industries include renewable energy, green transportation, and green construction. A lot of green jobs are being created in India due to the rapid implementation of green initiatives in the country.

## Businesses to Move Forward Faster

Businesses should push governments around the world to develop climate policies that provide fiscal and

regulatory support to drive sustainability and manage climate risk, accelerate the flow of affordable green technologies, and provide funding to scale business models—all of which must be focused on mitigating the impacts of climate change and adapting to its negative consequences. To achieve this, companies need policy certainty and market visibility to move forward. Companies can decarbonize the economy if they can work with policymakers to benefit from long-term stable policy frameworks. They also need to cultivate close relationships with policymakers to create frameworks and incentives that help companies engage in climate action. This year's 27th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) also made it clear that there is real momentum on climate action and we need announcements that businesses and investments are changing in line with climate and sustainability goals. All ambitious climate targets and follow-up actions need to be scaled up to show that the momentum for change is real. The world must collectively show that the promise of the Paris Agreement—a stable, secure world where peace and prosperity thrive—is within our reach.

## Strengthening Resilience of Vulnerable Communities

There is also an urgent need to strengthen the resilience of vulnerable populations. We need to connect the dots on how everyone recognizes the importance of moving faster and more intensively to address climate change. The private sector needs government support to create the necessary laws and open up investment opportunities. On the other hand, the government needs to convince the private sector to invest in sustainable technologies and create technologies and solutions for the nation that are viable and sustainable.





Women and local communities must be given the tools they need to implement climate action, reap its benefits, and take ownership of existing projects.

## Balancing Mitigation and Adaptation

Achieving the goal of a carbon-free world will require the efforts of all stakeholders and synergies between adaptation and mitigation technologies and initiatives. It is important to develop approaches that build resilience while reducing emissions. This will require efforts from all sectors. It is time for the private sector to increase its presence and play a key role by presenting and sharing private sector experiences and issues, and upscale best available practices.



## Is it All About Reducing Emissions and Coping with Extreme Weather Events?

With India facing a significant development deficit and a large portion of the population lacking access to electricity, health care, food security, safe drinking water, and sanitation, a low-carbon path should be adopted to meet development needs. A low-carbon path should encourage investment while improving livelihood opportunities and skills, as well as transferring the benefits of a low-carbon economy to the bottom of the pyramid.

India needs to do better on many fronts—air pollution, traffic congestion, sanitation, and flooding—if we are to better reap the benefits of urban development. And for a country like India and others that have a huge development deficit and still lack access to basic needs—water and sanitation—the need for innovative business models is imperative. When we look at these transformative business models, mobilizing funding is critical. We need to look for ways to finance this new infrastructure, much of which is yet to be built in countries like ours. Trillions of dollars in funding will be needed, and we need mechanisms to channel the vast pool of financial resources from public and private sources.

## Lessons from COP27

Financing the energy transition remains a major concern in the climate negotiations just concluded. The Paris Agreement’s ambition mechanism focuses on

the global stocktake that will take place in 2023. At the same time, parties are exploring how robust financing can help drive the energy transition while mobilizing and allocating resources to renewables. But it is still unclear how the discussion will develop and what will happen next.

Parties also need to actively assess the evolution of developed country assistance to developing countries, particularly in the areas of capacity building, technology transfer, and financing. Governments should also consider how to measure success in preventing global temperature rise under the Paris Agreement when they conduct a facilitative dialogue process-based initial project evaluation in 2018. Ultimately, the decision must facilitate faster climate action by companies, increase the visibility of these efforts, and ensure that these efforts are rewarded by consumers and the marketplace. This includes holding relevant companies accountable for their actions, reporting on actual emissions, analysing global data and drawing conclusions, and allocating resources and funding for more effective efforts. Progress must be made in 2023.

To take a meaningful step, India and all other major players in the global economy must work with the private sector to determine what needs to be done for a low-emissions transition and transformation. Our best-case scenario is clear and robust policies. Business needs them, governments need them, other countries

need them to support countries like India, to open access to finance and technology, and to build capacity for action as quickly as possible. COP27 is also emerging to give us something more. Announcements that businesses and investments are changing in line with climate and sustainability goals are needed to build even more confidence in the momentum of climate action. Indeed, India set great examples of this last year at COP26, setting a goal of meeting 50 per cent of its energy needs from renewable sources by 2030, among other climate actions presented, and highlighting that the transfer of climate finance and low-cost climate technologies is increasingly important for developing countries to implement climate actions.

## Businesses to Translate Climate Ambition Into Action

Businesses are concerned about the impact of extreme weather events, which have resulted in higher costs and reduced water supplies. They are concerned about how climate change will affect their businesses and customers in the future. They are concerned about the prospect of worsening climate change impacts and fear its consequences. In addition to strong public policies that support market adjustments to accelerate and expand the commercialization of clean technologies, businesses must reduce their emissions and prepare for the impacts of climate change. This opportunity also opens the door for other small and mid-sized companies to inspire emerging new businesses to integrate sustainability from the ground up, which could significantly mitigate the shock of delayed climate budgeting in their organizations. Large companies are finally putting climate change on their agendas; it is doable. It's also encouraging to increase revenue while protecting the environment.

With two historic climate change agreements and the SDGs adopted in 2015, the amount of funding, technology access, and institution building required to embark on a sustainable development path to which many countries have committed is enormous. We need to work together to make this happen. There is a huge need for financial resources. Climate action cannot be left to governments alone. All stakeholders—governments, businesses, civil society organizations—must decide together to embark on this path.

## Are We All in This Together?

The time has come for all responsible stakeholders to work together to improve the current state of the changing climate. One example of this is for the private





sector to establish standards for valuing social and environmental capital, as these are new concepts. However, much experimentation is needed before an appropriate valuation framework is developed. For example, how do you weigh the social costs of losing jobs when a factory closes against the environmental damage caused by polluting the factory? The private sector should and must consider the ideas of valuing social and natural capital in addition to innovation and accelerated decarbonization. Nonetheless, companies are beginning to embrace the idea of a circular economy, where resources are recycled within a system to reduce waste entering the environment, thereby reducing greenhouse gas (GHG) emissions. This takes the adage of “reduce, reuse and recycle” to new heights. We are also seeing the proliferation of business models focused on the sharing economy. Many private players are currently being influenced by this trend. The difficulties ahead encourage collaboration in the business community. The Montreal Protocol on Substances that Deplete the Ozone Layer is the best and most sustainable example of this. It is the result of a public-private partnership and business collaboration to phase out chlorofluorocarbons used in old air conditioners, refrigerants, and deodorant sprays.

Fostering entrepreneurial innovation and seeking new business prospects are the new issues in dealing with climate change. From electric vehicles to drip irrigation modules and solar energy systems, significant market opportunities are now emerging. With the

Global Reporting Initiative (GRI) and the International Integrated Reporting Council calling for greater compliance, accountability and sustainability in their sustainability practices, companies are also becoming more aware of these requirements.

All of these trends have led the world’s leading companies to place climate change and sustainability at the centre of their business strategies and to incorporate the sustainability agenda as a whole into traditional strategy formulation. Companies that lead the way in addressing climate change over the next 20 years will not only directly reduce emissions, but will also gain the credibility and reputation to invite employees, customers and suppliers to follow them based on their performance, innovative work or the products and services they offer. These companies will influence the new era of trade because they recognize the link between reducing GHG emissions and increasing productivity and revenue.

And yes, this shows that the private sector can play a critical role in delivering effective climate change development cooperation, if we all work together to address the current challenges of climate change through responsible action. ■

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*Biba Jasmine is a Nehru-Fulbright scholar with a major in sustainable development and conservation biology at the University of Maryland, College Park, USA. She is also a Policy Leader Fellowship recipient at the School of Transnational Governance, European University Institute, Florence, Italy. The fellowship was co-funded by the European Union’s Erasmus programme. The views expressed are personal.*

# E-Rickshaws in Matheran

## Tilting in Favour of Environment

In this article, **Gajanan Khergamker** examines the conundrum that has been surrounding the introduction of e-rickshaws in Matheran, a hill station in Maharashtra. The author feels that whatever is best in the interests of everyone should be done because after all, it's the human whose interest is paramount in any developed society. Read on to know more...

**M**atheran's prized possession, exclusivity, has—over the years—turned into its biggest scourge. The hill station that thrived on exclusivity of reach and access triggered by the inability to use any other motorable transport service other than

horse or hand-pulled rickshaws to retain its fragile ecosystem and an image to boot is now struggling to provide... easy access.

Residents of the hill station have grown and with them have their aspirations. With time being the first

casualty with development, Matheran's locals find themselves deprived of just that and ease in access. With the exclusion of an Ambulance and a Fire Engine in case of casualty, locals and tourists alike are unable to use any vehicle and depend entirely on horses or



*The central marketplace from where tourists can avail a horse ride*





*Aman Lodge station and the shuttle in the background*

hand-pulled rickshaws to reach the hill station from a 2.5 km distance at Dasturi Naka and within the table-top tourist zone.

So, it was inevitable for Matheran to join the all-electric green bandwagon that aims to resolve the issue of transport, access and reach without harming the environment. A much-awaited three-month-long E-Rickshaw trial was kickstarted on December 5, 2022 after an arduous journey. For those driven: it was not an easy one but a fulfilling one at that.

It is not short of a tightrope walk for those keen on maintaining a balance at eco-fragile zones like Matheran whose residents struggle without basic amenities and means solely to continue to qualify for the 'eco-friendly tag' associated with Asia's only non-motorable hill station.

The ban on vehicles in the two-and-half-km stretch from Dasturi Naka to Matheran left visitors with the options to use horses or hand-pulled rickshaws to reach the hill station. The ordeal of the 94 physically hand-pulled rickshaws

moved millions of tourists over the years, who termed it as outrightly inhuman and barbaric, but no solution seemed to be in sight.

That is till retired teacher and resident Sunil Shinde and secretary of Matheran's Shramik Rickshaw Sangathan (Working Rickshaw-pullers' Association) led a campaign to resolve the issue affecting hand-pulled rickshaw owners, elderly citizens in Matheran, resident school children and pressing issues of the infirm and disabled who lived in Matheran and, simply, unable to use horses to commute daily.

Reportedly, Mr Shinde made the first appeal to bring in e-rickshaws in 2012 and filed a petition in the Supreme Court in 2019 seeking permission to allow e-rickshaws in the eco-sensitive zone. In May 2022, the court directed the state to execute a three-month pilot project with a limited number of vehicles.

It was also after a series of derailments and stoppage of service for the famous mini train of Matheran for three years that the train services between Neral and Matheran resumed in October 2022. Daily

two down-services and two up-services between Matheran and Neral are being operated. The mini train is a highlight of Matheran located around 100 km from Mumbai. Neral, located at the base of the Matheran Hill, is connected to Mumbai by the suburban local network of the Central Railways.

It was in August 2019 that the 20-km narrow gauge rail line to Matheran was shut after it suffered heavy damage due to the monsoon. The first service from Neral is from 8:50 am and reaches Matheran at 11:30 am, whereas the second service is scheduled for 2.20 pm and reaches Matheran at 5 pm. Daily shuttle services between Aman Lodge, at a stone's throw from Dasturi Naka (situated at Matheran's entry point), and Matheran station also continue to transport tourists and locals.

The track renewal work was carried out along with replacement of old rails with new ones, replacement of the old steel, iron and wooden sleepers with concrete ones and installation of anti-crash barriers. Now, the Neral–Matheran ride is less bumpy with the

replacement of sleepers and rails. Also, the stretch between Aman Lodge and Matheran was restored in December 2019 and has been functional since then.

Heera and Panna, 40-year-old Matheran resident Rakesh Kokale's two horses, are family for him. "They're just like my 6-year-old daughter Ruhi and 13-year-old son Mehul. We live together and they've literally grown up with my children." Things suddenly went out of hand when restrictions were imposed in Mumbai in April 2021 following the second wave of COVID-19. A majority of Matheran's tourists are from Mumbai and, with their sudden absence, locals were left completely stranded and helpless. "In time, I found myself unable to even provide food for my horses," recalls Rakesh, echoing the sentiments of the horse-owners of Matheran.

"Humans can manage to fend for themselves at such time, what can animals do by themselves," says another 43-year-old horse owner preferring to stay anonymous, reminiscing the time when, the horses in Matheran—Asia's only non-motorable hill station—faced the worst in the wake of the ongoing COVID-19 crisis.

Somewhere in an alternate reality, word was spreading about how the horses in Matheran were starving. And,



Rakesh Kokale with his horses, Heera and Panna

it struck a chord with everyone who had been to Matheran, even taken a horseback ride, some time in life. If they couldn't help directly, they spread the word by 'sharing' and help poured in for the horses of Matheran from across India and helped them through their worst crisis, ever. Now, things are different. With the mini-train service having been resumed from Neral, tourists mostly from Mumbai have begun trickling into the hill station, reaching a peak on weekends.

With the commencement of the e-rickshaw trial in Matheran, there is expected to be a surge in tourists to the hill station auguring better times for the locals. The horse owners are a divided lot though. There are some misgivings within a section of horse-owners about the usage of e-rickshaws 'within' the hill station. "If all tourists are permitted to use e-rickshaws at Matheran, who will use horses to commute?" says Matheran Resident Horse-Owners President Asha Kadam.

"The original reason to bring in e-rickshaws was for the benefit of elderly, children, and disabled. If they are made available to all and sundry, we will be reduced to penury," she says. Yet, horse-owners like Rakesh Kokale are upbeat and positive that the move, aimed to address the travails of commuting for the elderly, disabled and children living in Matheran, will not affect their business directly.

Ashatai's fears, echoed by several other horse-owners, are unfounded, feel most residents who maintain that tourists who want to avail horses on hire to visit points in Matheran will do so while those, unable to climb a horse owing to age or infirmity, who wish to use an e-rickshaw will have the option to do so. As Sunil Shinde puts it, "these are teething problems and are caused mostly due to ignorance or by malicious rumourmongers. They will be dispelled in time."

"With more tourists coming into the hill station as amenities for the elderly, infirm and children too are likely to be

made available, things will only look up for Matheran," says Neral Matheran Taxi Owner-Driver Association President Narendra Karale whose 267 members are looking forward to the arrival of e-rickshaws in Matheran. "Once the trial period ends and e-rickshaws are brought in for good to Matheran, we are sure that there will be more tourists arriving from Mumbai. Particularly so, the elderly and those with children or disabled, and fetch good business," says Association Secretary and Neral resident Mujib Tamboli.

The use of e-rickshaws in Matheran follows the overwhelming support for the non-polluting vehicles as proposed by the Maharashtra Government and permitted by the Supreme Court on a three-month trial in which all or any issues regarding the same can be identified and tackled.

There are a few key ones that, on the face of things, need to be addressed on priority. Like the one regarding the restriction of use of e-rickshaws. Nowhere does the Supreme Court permission for the trial maintain that the service be made available to the selective use of 'a' lot of people like say the elderly, disabled or school children.

That they are directly hit, with the absence of a vehicle in Matheran and forced to commute with acute inconvenience and financial strain, that too on a daily basis, has been the moot point of those vying for the e-rickshaws, which provide a pollution-free solution to the problem.

But, to stretch the interpretation that the service be thrown open only to this lot and exclude any other able-bodied tourist, local or people to use them is an anomaly, does not hold any legal basis and is likely to be quashed, if contested at all. Among the stakeholders who benefit from the introduction of e-rickshaws are locals who look forward to availing more tourists who have, till date, been reluctant to visit Matheran owing to the inconvenience it poses for those unable to walk long distances.



*The fully-cobbled road at Matheran*

Matheran is associated with red sand and laterite rocks that have made an exit from the hill station, which now sports cobbled pathways instead. There are real issues regarding the loosening of earth and sand facilitating the need to employ alternatives to hold together the road even boundaries to 'points' that have become too risky to reach.

Cobbled roads now greet visitors throughout Matheran leaving them perplexed with the change that, locals say, was inevitable. Horses slipping and falling on the cobbled roads some even dying has brought the limelight back on the issue of road development in Matheran.

To reach Matheran from Neral, one has to take a shared taxi or drive in a personal vehicle till Dasturi Naka. From Dasturi Naka, one can either take a shuttle service from Aman Lodge to Matheran, if available; use a horse; a hand-pulled rickshaw or simply trek the 2.5-km stretch to Matheran.

Now, there is the option to go by the mini train from Neral to Matheran that

has been reinstated recently. However, the train service is closed during the monsoons to minimize the risk posed by landslides regular in the zone.

It may be recalled that Matheran Girishthan Municipal Council had decided to build a ropeway in Matheran, 20 years ago, but has been put in cold storage since. The project that had got permission from the Supreme Court, Ministry of Environment and Forests, and finally given by the Public Works Department of the state on December 26, 2012 is yet to see the light of the day.

To develop a zone that is as eco-fragile as Matheran, it needs a judicious approach and the rule of interpretation be the Mischief Rule that aims to stem the mischief that the law was promulgated to address.

One mustn't simply read the letter of the law and force stakeholders to comply by it even if it isn't for public good, has lost context over the years, is a hurdle for holistic development or being used as a ploy by selective commercial interests to prevent competition. Deliberations in the

regard, whether it's for the bold initiation of e-rickshaws in the erstwhile non-motorable hill station or for a ropeway that would boost tourism so badly needed by the hill station, are a must.

Whether the concerns are valid, bona-fide and for the good of the people and place, will need to be examined and in fresh context. Simply because something was done for years on end doesn't mean, it should continue that way. Most importantly, the stakeholders' interest must be kept at the top of issues to be considered. In that, Sunil Shinde's is a valid view that needs to be examined against Asha Kadam's concerns. If her fears, like the lot she represents, are unfounded, the stakeholder needs to be educated and convinced. If not, the e-rickshaws must go. Because after all, it's the human whose interest is paramount in any developed society. ■

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*Gajanan Khergamker is Editor, Solicitor, and Documentary Filmmaker heading think tank DraftCraft International. He is the Founder Editor of The Draft. He writes across borders on Law, Diplomacy, Public Policy, and International Affairs. He tweets @IndiaRighter.*

# Nature-Based Solutions

## Used by Tribals in India

In this article, **Himanshu Kumar** and **Nikita Sethi** discuss the concept of nature-based solutions and how ignored communities and tribals have substantially contributed to nature conservation and sustainable resource management. Documenting and integrating the indigenous technical knowledge systems into modern knowledge systems could be highly beneficial for India to move towards a more resilient and sustainable future.

A term that is dominating the current discourse of environment studies is 'NbS,' that is, Nature-based Solutions; the International Union for Conservation of Nature (IUCN) first coined the term for conservation of nature and it has been looked like a potential answer to address the issue of climate change, ensure food security, and prevent natural disasters. The IUCN has defined NbS as "actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and

adaptively, simultaneously providing human well-being and biodiversity benefits." While the European Commission defines it as "living solutions inspired by, continuously supported by, and using nature, which are designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social, and environmental benefits."

The concept is now gaining popularity, and critical policymakers and institutions started diligently following this during the late 2000s. The world is

now more focused on understanding the nexus of man and nature and how both adaptive capacities can be brought to a consensus to drive the future of human civilizations.

This has marked a shift from the agenda of seeking technology-based solutions, which are equally important, but institutions such as the IUCN and the World Bank over the years shifted their focus on finding solutions through ecosystems rather than conventional engineering. There are two primary techniques to address the climate crisis, and one is mitigation which is essentially technology-centric. The other is adaptation, which essentially focuses on behavioural changes or physical characteristics that help an organism survive in its environment.

Interestingly, eight principles have also been prescribed by the IUCN for effective implementation of the NbS programme, which encompasses the embracing of nature conservation norms, combining NbS with technological solutions, developing and identifying site-specific solutions that are inclusive of indigenous technical knowledge, maintaining biological diversity and could be applied at a broader (landscape level) and form an integral part of the overall design, and





policymaking. Historically, all civilizations have shared a close and intricate relationship with nature and natural resources; from the Greeks to the Indus valley civilization, the forces of nature have been at the fore of human life; animism and naturism formed the most primitive religions, which compelled the human race to worship the forces of nature and live in harmony with it. Numerous tribes across the globe, even today, stringently practice these rituals and live a 'sustainable life,' which ensures judicious resource utilization and respecting the nexus between man and nature.

Now, let us try to understand this from a historical point of view, especially in the Indian context. It is well documented and, in fact, proved that the Indian lifestyle is one of the most environment-friendly, and Indian society has inculcated a system of environment

conservation and living a minimalist lifestyle. Let us understand this with the help of an example. More than half of India's population lives in the villages, this means that people have limited access to the modern resources and technologies and therefore find their solutions within the local environment with the locally available resources.

In Nandurbar, a tribal district in Maharashtra, the Bhil and Kokani tribals use a structure that looks like a storehouse, made of clay and cowdung, a primary storage device that they use to store rice; the locals claim that they do not need refrigerators or cold storage and the rice remains in good condition in that device even after two years of storage, this is something exciting and challenging but if locals are to be believed this is a cost-effective technology. They have also improvised on these storage tanks; previously, these

structures were immovable and took up much space in the already tiny houses, but now, with the help of fellow tribals, who are excellent artisans of bamboo work, a new and advanced version of the structure has been created using bamboo, clay, and cowdung as the structure is easy to move. It stores the same amount of rice in it; the quality/quantity is not compromised. This could be one example of a nature-based solution.

The tribals have also reported a significant dependency on the forests in Nandurbar, and notably the concept of forest protection and conservation through reverence, which could be like the sacred grove concept around the world, still holds a firm place in the lives of the people. This could well relate to the NbS approach. The tribals protect certain species of flora and fauna, with the tiger and snakes being highly sacred

and left unharmed.

Another example from the northeastern part of India is well documented and appreciated; the case of Apatani tribes has been taught in natural resource management classes. The Apatani tribes reside in the Ziro Valley in the Arunachal Pradesh state of India. One of the major ethnic groups in the eastern Himalayas, the Apatanis, have developed a distinctive civilization with orderly land use practices and extensive traditional ecological knowledge of managing and conserving natural resources. These skills were developed over many years through ad-hoc experimentation.

The locals have perfected the art of rice-fish production, wherein fish are also raised on the fields in addition to paddy. High partition bunds between the rice plots are used to raise millet (*Eleusine coracana*), an additional supplement. Nutrient wash-out from the adjacent hill slopes feeds the agroecosystems. In order to maintain soil fertility year after year, nutrients lost with crop harvest are replenished by recycling agricultural residues and using organic waste from the villages.

The Ziro Valley's agro-forestry practices, which designate specific areas as grazing grounds, sacred forests, plantation zones, etc., have helped make the most use of the area's limited

resources while sustaining agriculture with higher yields. In the modern world, such traditional ecological knowledge is precious. Ziro's ability to grow wet rice is made feasible by the availability of irrigation water, which is made possible by practical forest preservation in the valley and serves as an essential watershed for the streamlets that flow through the fields. This is made feasible by the tight customary norms regulating the use of forest resources and hunting customs. Traditional respect for nature has a big part to play. Such techniques are precious in a society where blatant exploitation of the environment is a significant concern.

Watershed management through traditional knowledge systems and resource sharing forms an integral part of the life of the tribal communities in India, from the Gaddis to the Pardis, Bhils, Gonds, the Santhals, or the Nicobarese. Each community forms an intricate relationship with nature and finds solutions for its existence within nature. Food, livelihood, spirituality, and existence is dependent on nature. Thus, the tribal communities present an excellent example of utilizing nature to find solutions for human life's existence. The LiFE mission initiated by India, under the vision of the Honourable Prime Minister Shri Narendra Modi, is also one excellent initiative to focus

on sustainable consumption and circular economy rather than mindless consumption; the idea is to motivate people to work for the planet through various efforts in their daily lives and develop a Pro Planet People (P3) society.

Therefore, a country like India needs to prioritize NbS, which could be done by integrating the concept within the policymaking framework, developing the acceptance and monetization of ecosystem services, and engaging stakeholders from the private sector. For achieving a considerable impact, it is imperative that not just scaling, but indulging and exploring business models and technical solutions are thoroughly explored.

To address the financial aspects, various philanthropies and international donors could be explored, whereas enhancing research and capacity building would form the core of enhancing the NBS system in the country. Already existing schemes of the state and central governments, such as the Compensatory Afforestation Funds and National Clean Energy and Environment fund, could be instrumental. In contrast, local bodies such as Panchayats and urban local bodies could effectively implement and disseminate ideas, plans, and policies.

The way forward, therefore, essentially lies in looking for solutions in the long-ignored communities and societies which have not received their due share of appreciation, but have substantially contributed to nature conservation and sustainable resource management. Documenting and integrating the indigenous technical knowledge systems (ITKS) into modern knowledge systems could be highly beneficial for India to move towards a more resilient and sustainable future. ■

*Himanshu Kumar and Nikita Sethi are associated with the Centre for Rural Development and Technology, IIT Delhi. They would like to acknowledge the support and guidance from Prof. Vivek Kumar (Professor, CRDT, IIT DELHI).*





# Terra Youth



Joining Hands  
for a Greener  
Tomorrow

# The Art of Bird Conservation

## Bird Artist Showcases Her Work

**Rupa Samaria** is a bird artist who aims at creating awareness on the issue of bird conservation through her art works both in India and overseas. The birds on her canvas come alive. Well, their calls can also be listened to. In a chat with **N Kalyani**, the Delhi-based artist shares the kind of art she creates, and the conservation issues that she thus espouses. Samaria also reminisces the house sparrow, a bird rarely seen now in urban settings.

It is the avian world that attracts Rupa Samaria. And she showcases it through her art work. Rupa Samaria was a full-time teacher in Delhi till 2017 when she gave up her job to pursue her passion for painting. Says Samaria, "It was after meeting birder friends and going out birding with them I decided to leave my full-time job at the American Embassy School to devote my time solely to art.





I realized it was time for me to follow my dream. Painting is my passion, and I decided to follow my passion as a bird artist."

Samaria reveals she has been interested in painting since childhood. She is a trained artist having done a three-year diploma in art from the South Delhi Polytechnic.

On birds being the theme of her paintings she says, "Birds fascinate me for their uniqueness and their striking plumage. My penchant for birds and wildlife conservation influences my art. I strive to bring to life on canvas and other mediums the beautiful birds of the Indian subcontinent and the world."

Samaria works with diverse mediums including sculpture and interactive art. What is interactive art? She explains: "Interactive art uses technology to communicate in a direct way to enable participation. So, the artwork responds to the observer. The painting is equipped with touch sensors which takes the input and Arduino microcontroller processes the information and plays the bird sounds via a tiny speaker." Such art works serve a purpose in this day and age. The passionate conservationist points out: "The objective of creating interactive art works on the song and call of birds is to break the boundary between the natural world that these birds inhabit and the urban setting today. I want to create awareness amongst the younger generation, and highlight the uniqueness of these song birds and leave a lasting impression on young minds. Youngsters caught up with technology are often too busy with their phones and laptops, and are unaware of the natural world around them. My interactive art is a reminder on how precious birds are. The next time they hear these song birds outdoor they would realize that a world without the sound of these birds would be truly desolate."

Sparrows are of special interest to Samaria. About the species, which she has also portrayed through an interactive painting, she says, "While we grew up



*The emerald peacock*

listening to the sound of sparrows chirping in our gardens and balconies, the younger generation living in high-rise buildings in big cities perhaps have no idea of what a sparrow's chirping sounds like. To them I seek to introduce, through the interactive painting, the delightful sound of the chirping of a sparrow."

Says Samaria nostalgically, "I grew up listening to the sound of chirping sparrows. This sound is so precious, for one associates with it the comfortable

and happy sound of home, gardens and parks full of flowers and birds, our beautiful Earth, and the fact that all is still good with the world. The house sparrow (chidiya) reminds me of my childhood. And I am very sentimental about sparrows. Today's generation may not be as well-acquainted with the chidiya as the people of Delhi once were. Sadly, with rapid urbanization and lifestyle shifts this tiny house guest has vanished from our daily lives. Sparrows

are also being rendered homeless due to our modern 'matchbox style' architecture that makes it difficult for the bird to build nests. The sparrow is not just a bird, but a sentiment attached to the place we call home. My painting of the sparrow is an attempt to recreate this sentiment."

Adds Samaria, "We should be alarmed at the statistics of the recent State of India's Birds report, which shows a decline in the number of house sparrows in cities. I believe the time to act is now. We have to save these beautiful creatures."

Samaria has used her art to share the message of conservation. She does workshops with children and showcases her art to create awareness. This has taken her beyond the shores of the country. In July 2022, she conducted a

workshop called Birds of Australia with children in New South Wales, Australia. And in India, she has done a variety of workshops around the country over the past few years on birds incorporating stories, games, music, and art. And she has had her art works exhibited as part of various events and also as solo shows. In October 2022, she did a Birds of Delhi event for the *India Week* at the American Embassy school. Coinciding with the World Sparrow Day (March 20) she has done workshops with children in Delhi revolving around art, and also conducted walks and given talks. And on World Sparrow Day this year she did a workshop on sparrows along with conservationist and author, Hema Maira. She has done workshops with children as part of 'Birds of Uttarakhand' at Vikasnagar,

Uttarakhand; 'The Bird Festival' in Ladakh, 'Coringa Bird Festival' at Kakinada, Andhra Pradesh and 'Udaan - Birds of Uttarakhand', on August 15, 2021 at Chaani, Uttarakhand to commemorate India's 75 years of Independence.

Her solo art shows include 'A Bird Came Down the Walk' in Dehradun; 'A Tale of Two Tuntuni Birds' in Delhi; and 'A Bird Came Down the Walk... An Ode to the Birds of Mussoorie' in Mussoorie. It is her solo art show 'A Bird Call' held in Delhi this year which she wants to take across India and around the world. Samaria has also created a sculpture titled 'The Bird and the Elephant' for the Wildlife Trust of India featuring a four and one half-foot tall sculpture of an elephant and a cattle egret atop it.

On the message of conservation that Samaria tries to convey through her art, she elucidates: "The aim of my art is to re-discover a world inhabited by one of the most familiar, and yet unique and precious creatures of our planet—birds. It is a reminder of our connection to the natural world. My art showcases myriad birds from India and from other parts of the world. My works, in vibrant and vivid colours, depict these sprightly creatures, and also create awareness about the dangers they face today in their habitats. It is an endeavour to give a voice to birds that are fast disappearing today. This issue is very close to my heart. It is my hope that humans will appreciate the issue of these beautiful, precious creatures, they take for granted, becoming endangered." And she points out: "When a bird species declines in numbers or goes extinct, it is not just about a pretty bird disappearing thousands of miles away; it is the loss of a vital component in a complex web of interactions. Without it a whole ecosystem may fall." ■

*Besides painting, Rupa Samaria loves to travel and to engage in bird watching. In the future, she plans to open a bird call gallery dedicated to birds where artists can showcase their work. N Kalyani is a Delhi-based author who loves writing on environmental issues.*



Indian Scops Owl

# Giving to Amplify Earth Action

## New Initiative to Unlock \$3 Trillion Needed a Year for Climate and Nature

The IKEA Foundation has joined a new initiative, Giving to Amplify Earth Action (GAEA), by the World Economic Forum. The initiative will leverage philanthropic capital to generate the \$3 trillion needed each year from public and private sources to tackle climate change and nature loss.

On January 17, 2023, The World Economic Forum, supported by more than 45 partners launched the Giving to Amplify Earth Action (GAEA), a global initiative to fund and grow new and existing public, private and philanthropic partnerships (PPPPs) to unlock the \$3 trillion of financing needed each year to reach net zero, reverse nature loss, and restore biodiversity by 2050. The launch was done at Davos, Switzerland.

With the energy and cost of living crises, the ambition of steering the planet towards a 1.5-degree Celsius warming pathway hangs in the balance. Meanwhile, the recent agreement at UN Biodiversity Conference (CBD COP15) in Montreal to conserve 30 per cent of all earth and sea looks bold but fragile in the

face of a rising biodiversity crisis. Current funding is slow and inadequate, and a new approach is needed to get capital flowing. Philanthropic giving can address this, with unique qualities not found in other financing: it is nimble, more tolerant of risks and is driven by values and long-term outcomes rather than quarterly returns.

"We are at a tipping point in our efforts to put the planet back on track to meet our climate ambitions. To reach the speed and scale required to heal the Earth's systems, we need to unlock not only private capital and government funds, but also the philanthropy sector as a truly catalytic force to achieve the necessary acceleration," said Klaus Schwab, Founder and Executive Chairman, World Economic Forum.

GAEA's growing body of philanthropic partners includes: Active Philanthropy, the African Climate Foundation, Andre Hoffman Family Office, the Arab Foundations Forum, Bezos Earth Fund, Children's Investment Fund Foundation, the Clean Air Fund, Climate Leadership Initiative, ClimateWorks Foundation, Eleven Eleven Foundation, the Gordon and Betty Moore Foundation, Groward Climate Fund, IKEA Foundation, Laudes Foundation, the Patrick J McGovern Foundation, Philanthropy Asia Alliance (by Temasek Trust), Philea, The Rockefeller Foundation, Trottier Family Foundation, United Nations Foundation, the Wellcome Trust, WINGS, Workday Foundation.

Philanthropic financing for climate mitigation has risen in recent years, but still represents less than 2 per cent of total philanthropic giving, estimated at \$810 billion in 2021. Greater philanthropic funding for climate and nature will support, not detract from, existing social priorities. As recently noted by Rajiv Shah, President, The Rockefeller Foundation: "A warming planet can undo all the organization has done for more than 100 years to aid vulnerable communities in the realms of health, energy, food, and equity."

Over the next 12 months, supported by McKinsey Sustainability as a knowledge partner, GAEA will work with founding members to build momentum around three clear objectives:



- Convene leaders from the public, private and philanthropic sectors to identify and target climate and nature solutions where they are best positioned to play a catalytic role
- Pilot and refine funding models that can support PPPP interventions
- Scale up and replicate successful approaches to new sectors, regions, and actors.

GAEA will build on existing examples of success. For example, the Clean Cooling Collaborative, founded with the help of an initial \$10 million of philanthropic funding in 2016, has mobilized \$600 million in public and private finance to improve equitable access to low-carbon cooling and support 9.4 Gigatonnes of avoided CO<sub>2</sub> emissions by 2050.

Similarly, the Government of the Seychelles has leveraged philanthropic funding, public loan guarantees and private investment to raise \$15 million through a blue bond and convert \$22 million of government debt into conservation funding to protect 13 marine areas, covering an area larger than Germany.

Wendy Abrams, Chief Executive of the Eleven Eleven Foundation, said: “We need more companies, family offices, individuals and the new generation of philanthropists to get involved in the climate and nature conversation. If we do not solve this together, there will be nothing to pass on to the next generation. GAEA can be a good platform to get all the right stakeholders and amplify action at scale.”

Rania Al-Mashat, Minister for International Cooperation, Government of Egypt said: “This call to action is extremely timely, as it builds on the directions set during COP27 in Sharm El-Sheikh, ‘the COP of implementation’ under the Egyptian presidency. We need more philanthropies to join us at the table and help scale up multilateral development bank finance to unlock private investments to accelerate the green transition. Egypt will work closely with the World Economic Forum to build



effective and impactful philanthropic public private partnerships, and promote the role of the prominent ‘P’ – Philanthropy.”

Per Heggnes, Chief Executive Officer of the IKEA Foundation, said: “We are proud to support the launch of the GAEA initiative. The global figure of philanthropic capital for climate mitigation currently stands under 2 per cent—and that is just not acceptable. But this is also a massive opportunity to leverage philanthropic giving for climate action. Philanthropies can play a unique role in encouraging urgent, radical and unprecedented collaboration between the public and private sectors. It is only by working together at scale that we can unlock the investment required to achieve our ambitious climate goals and protect the planet.”

Badr Jafar, Chief Executive Officer, Crescent Enterprises, said: “There is a historic opportunity to harness the full potential of philanthropic organizations, family offices and other innovative capital players, in unity with government and business to address our climate and nature goals. COP28 in the UAE will raise the bar in terms of ambition and the creation of a global architecture for all capital actors to act together at speed and at scale. The World Economic Forum and GAEA is a powerful platform and amplifier to enhance these efforts.”

Helen Mountford, Chief Executive Officer, ClimateWorks, said: “By unleashing the small but mighty ‘P’ of philanthropy, we can create truly catalytic partnerships that unlock ambitious and collaborative public, private and philanthropic action to improve people’s lives.”

Lim Seok Hui, Chief Executive Officer, Philanthropy Asia Alliance (by Temasek Trust), said: “There is a true opportunity this decade to tap into catalytic capital from philanthropy and family offices in emerging economies. These actors are willing to help the public and private sectors to go faster. By partnering with GAEA and the World Economic Forum, Philanthropy Asia Alliance will unlock, coordinate and aggregate innovative Asian solutions to global challenges that help both people and planet.”

Bob Sternfels, Chief Executive Officer, McKinsey & Company, said: “We are very excited to support GAEA’s aim to better connect philanthropic capital with public and private sector efforts to strengthen climate and nature solutions. Our collective hope is to accelerate thinking and action towards tipping points in these arenas, and to assure economic growth is increasingly sustainable and inclusive.” ■

For more information, visit [www.weforum.org](http://www.weforum.org); share on social media using the hashtag #wef23

# Bizarre Facts



1. Rabbits can't be sick.
2. Oranges are naturally green.
3. Space has a smell.
4. There are 421 words for snow in Scotland!
5. Octopuses have three hearts.
6. The Empire State Building has its own ZIP code.
7. The shortest war in history lasted 38 minutes.
8. The world's largest waterfall is underwater.
9. Some sea cucumbers fight with their guts (literally).
10. Strawberries aren't berries.



# Did You Know?

- Humans are the only animals that blush.
- Dog's noses are unique.
- The Eiffel Tower grows 6 inches in the summer.
- It's illegal to own only one guinea pig in Switzerland.
- Flamingos bend their legs at the ankle, not the knee.
- Supermarket apples can be a year old.
- People used to say "prunes" instead of "cheese" when having their pictures taken.
- Dunce caps used to be signs of intelligence.
- The British royal family is named after Windsor.
- Before toilet paper was invented, Americans used to use corn cobs.





## Hand Washing Fabrics Reduces Microplastic Release

From tiny plankton to massive whales, microplastics have been found throughout the ocean food chain. One major source of this pollution are fibres shed while laundering synthetic fabrics. Although many studies show microfibrils are released during machine washing, it has been less clear how hand washing contributes. Now, researchers reporting in *ACS Environmental Science & Technology Water* report that hand washing can drastically cut the amount of fibres shed compared with using a washing machine. The team cleaned two types of fabric swatches made from 100 per cent polyester and a 95 per cent polyester—5 per cent spandex blend with hand washing methods and a washing machine. The researchers found that: Manual methods released far fewer fibres. For example, the 100 per cent polyester fabric shed an average of 1853 microplastic pieces during hand washing compared with an average of 23,723 pieces from the same fabric that was machine laundered.

Source: [www.sciencedaily.com](http://www.sciencedaily.com)

## Significant Reductions in Global Greenhouse Gas Emissions Still Possible

About a quarter of the world's electricity currently comes from power plants fired by natural gas. These contribute significantly to global greenhouse gas emissions (amounting to 10 per cent of energy-related emissions according to the most recent figures from 2017) and climate change. By gathering data from 108 countries around the world and quantifying the emissions by country, a team has estimated that total global carbon dioxide (CO<sub>2</sub>) emissions from the life cycle of gas-fired power is 3.6 billion tonnes each year. They found that this amount could be reduced by as much as 71 per cent if a variety of mitigation options were used around the world. The McGill-led team includes researchers from Carnegie Mellon, Johns Hopkins, University of Texas (Austin) and the University of Maryland.

Source: [www.sciencedaily.com](http://www.sciencedaily.com)



## To know more... Read



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## POLLUTION SOLUTIONS FOR A CLEANER, GREENER EARTH

**Urmi A Goswami**

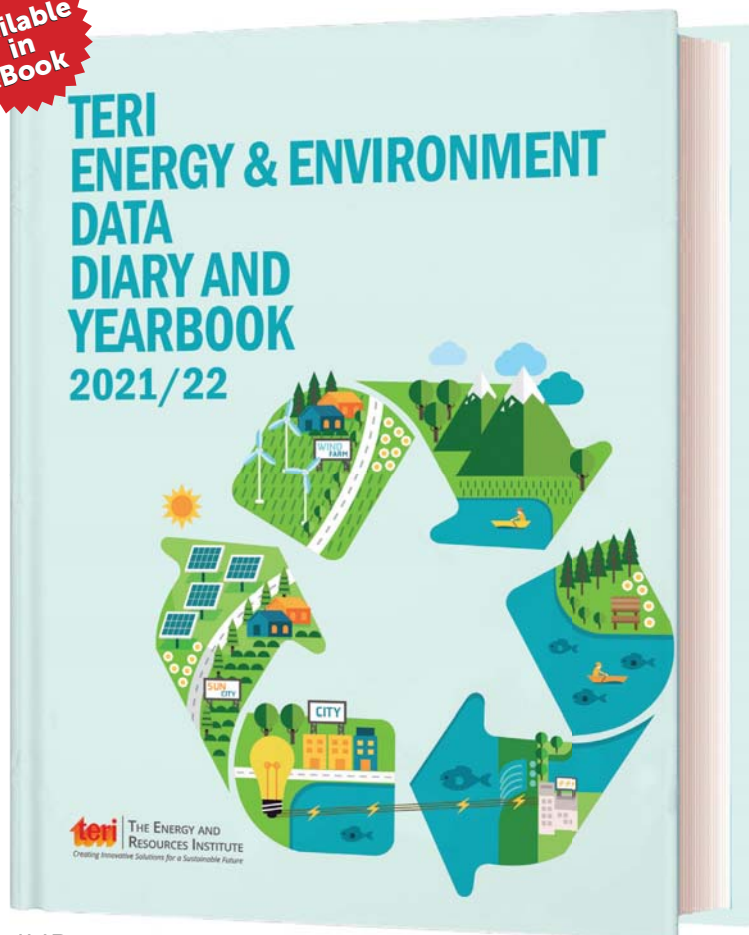
We are living in a fast changing world. Pollution of natural resources, such as air, water, and land is one of the biggest bane of our times. Under such precarious circumstances, it is needed that the young generation is not only made aware about the different kinds of pollution but also about the solutions. This is what this book *Pollution Solutions – For a Cleaner, Greener Earth* is all about.

Filled with eye-opening facts, informative illustrations, and multiple activities, this book is the perfect guide to help the young generation become environmental crusaders.

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# Protecting The One-Horned Rhinoceros

## Lesser Poaching Incidents in Assam Now

In this article, **Nava Thakuria** highlights that poaching incidents of rhinoceros in various forest reserves of Assam in northeast India have decreased drastically. Brutal laws against the poachers, strengthening of ground staff inside the protected forest areas, and increasing public awareness in the fringe localities of national parks and wildlife sanctuaries across the State have positively impacted the mission to save the one-horned rhinos.

The poaching incidents of rhinoceros in various forest reserves of Assam in northeast India have decreased drastically. Brutal laws against the poachers, strengthening of ground staff inside the protected forest areas, and increasing public awareness in the fringe localities of national parks and wildlife sanctuaries across the State have positively impacted the mission to save the one-horned rhinos. Unlike other parts of the globe, common people of Assam irrespective of their political, ethnic or religious differences, maintain a strong will to protect the giant animals. For record only

two rhinos were poached in Kaziranga National Park and Tiger Reserve since January 1, 2021. The last incident took place probably in early January 2022 or end of December 2021, as a decomposed carcass of a fully-grown (around 30 years old) female rhino was recovered inside the world-famous forest reserve in the middle of January. As the precious horn was missing, for which the gigantic animal was apparently hunted down, it was assumed as not a case of natural death.

One can claim that the State authorities were unaware of the poaching till January 15, 2022, as Assam's

anti-rhino poaching taskforce chief GP Singh asserted that till then 'only one incident of rhino poaching had taken place at Kaziranga in April 2021'. In fact, former England international cricket player and conservationist Kevin Pietersen quoted his version of the success story to appreciate Prime Minister Shri Narendra Modi-led Union government in New Delhi for reducing the rhino poaching in India. "Bravo Narendra Modi and bravo to all the men and women who sacrifice their lives in protecting the animals in India too. I've met lots of them and I respect you immensely!" said the South Africa born British celebrity. Assam Chief Minister Shri Himanta Biswa Sarma was quick to respond to Pietersen thanking for the acknowledgement. "Inspired by our PM Narendra Modi, we've launched aggressive programmes to curb poaching," tweeted Sarma. Sarma in his interaction with the media on January 1, 2023 claimed that Assam recorded 'zero' rhino poaching cases in 2022 as a boost to the rhino conservation efforts. He also added that it was the first time in two decades that there was no incident of rhino poaching across the State. Supporting his stand, the State forest department now clarifies that the female rhino (whose carcass was recovered near Silekhunda camp under Kohora range in January





2022) was killed on December 28, 2021. So, Sarma's statement justifying 'not a single rhino was poached in 2022' across Assam was seemingly correct. But not everyone was convinced with the theory as a resident of a fringe Kaziranga village argued that the government proved that no agency under it had the information about the poaching till January 15, 2023. So, the female rhino was killed inside the park over 15 days back (and its horn was snatched away), but they had no clue all these days. The young villager, who wanted anonymity while speaking to this writer from Kohora, questioned the Kaziranga authority, why it was silent as the media reported about the incident terming it as the first case of rhino poaching in 2022. Reluctant to criticism, the forest department also congratulated Sarma for his strong political will to safeguard wildlife. On World Rhino Day (September 22, 2021), Sarma made a unique decision to burn and destroy over 2475 confiscated rhino horns (from poachers in the past four decades) with an aim to raise awareness about the superstition over the organ. Moreover, he argued that it was a strong message to poachers and the consumers of rhino horn powder in some Asian countries (who believe that it can be used in traditional medicines for enhancing the human sexual power). Native to the Indian subcontinent, the single horn rhino (also known as rhinoceros unicorns) is one of the worst affected rhino species. The reason behind the poaching of rhinos is due to the high demand for horns in several countries (including China) where people term it as a black ivory. A matured horn may fetch a huge sum of money in the international market. The rhino horns are also believed to have other medicinal values supposing to cure the high fever, stomach ailment and cancer. Taiwan, Thailand, South Korea, Vietnam and the Middle East are also known to be huge markets for the horns, where the use of horns for medical purposes and scientific research are legalized. Rhinos



are recognized as vulnerable by the International Union for Conservation of Nature and India's wildlife protection act gives enormous power to the rangers for protecting the grass-eating pachyderm. The veterinarians argue that rhino horns comprise the same protein that constitutes the formation of hair and it cannot have such medicinal values. Rhinos are recognized as a pride for the people of Assam and the 800 square kilometre Kaziranga reserve supports around 2613 priced animals (whereas the global population of one-horned rhinos is around 3700). The UNESCO world heritage site on the south bank of mighty River Brahmaputra also gives shelter to over 150 Royal Bengal tigers and around 250 leopards, over 5500 Asiatic elephants, a sizable number of buffalos, different species of deer, birds, fish, etc.

Besides Kaziranga, other forest reserves namely Pabitora Wildlife Sanctuary (around 107 rhinos), Orang National Park (125) and Manas National Park (50) also support the rhino population to make a total count for

Assam of over 2650 living rhinos. Every year, over 100 rhinos die because of natural causes in those forest reserves. Assam expects to increase the rhino population to 3000 as the incidents of poaching are decreased following the deployment of ground forces with sophisticated weapons and other modern gadgets.

There was a time when Assam used to lose 27 rhinos to poachers in 2013 and 2014. Next year the count was reduced to 17, and 18 cases were reported in 2016. With the declining trend, 2017 witnessed only seven incidents of rhino poaching, followed by seven in 2018, three in 2019, two cases in 2020 and 2021. No less than 55 poachers were arrested last year, where four were killed in the 'encounters'. The development also attracted applauding comments from PM Modi who complimented the government and people of Assam for maintaining efforts to conserve the critically endangered species. ■

*Nava Thakuria is an Assam-based environment journalist and he contributes articles for various publications inside and outside India.*

# Africa's Green Hydrogen Potential

## Extraordinary and Feasible

Harnessing Africa's solar energy to produce 50 million tonnes of green hydrogen a year by 2035 can help secure global energy supply, create jobs, decarbonize heavy industry, enhance global competitiveness and transform access to clean water and sustainable energy. The analysis has been commissioned by the European Investment Bank, the International Solar Alliance and the African Union, with the support of the Government of Mauritania, HyDeal, and UCLG Africa.

The report 'Africa's Extraordinary Green Hydrogen Potential' represents the first detailed research of the feasible development of green hydrogen across the continent. The new study combines analysis of investment opportunities focusing on three hubs: Mauritania - Morocco, southern Africa and Egypt with a roadmap of technical, economic, environmental and financial solutions to unlock commercial development.

"Africa has the best solar energy in the world and transforming solar power into green hydrogen can strengthen energy security, cut emissions and pollution and decarbonize industry and transport. The European Investment Bank

is working with partners across Africa and around the world to harness its renewable energy potential to produce low-cost green hydrogen at scale.

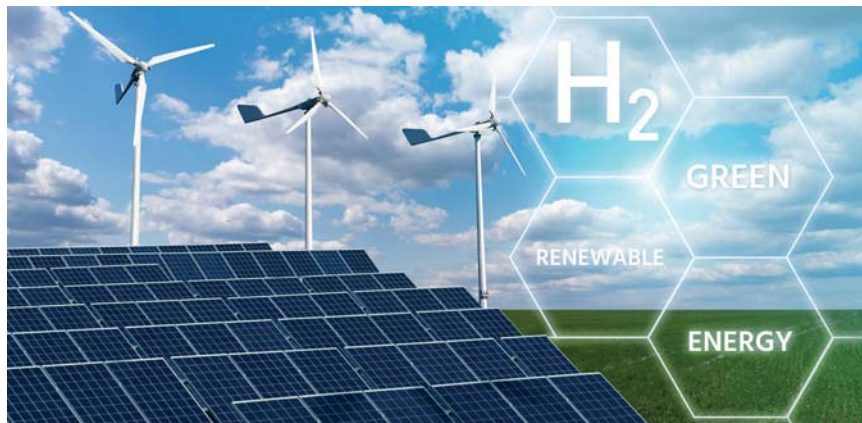
*Africa's Extraordinary Green Hydrogen Potential* shows concrete opportunities to transform access to green energy and clean water across the continent and beyond," said Abdessalam Ould Mohamed Salah, Minister of Energy of the Republic of Mauritania.

"Africa has the best renewable energy in the world and scaling up production of green hydrogen can transform access to low-cost electricity and clean water. Unlocking Africa's green hydrogen potential will require close cooperation between public, private, and financial

partners. The new *Africa's Extraordinary Green Hydrogen Potential* study outlines what can be achieved and what needs to be done. The European Investment Bank is pleased to work with African and international partners to enable large-scale green hydrogen to become a reality," said Ambroise Fayolle, Vice President of the European Investment Bank.

"Solar photovoltaic technology has provided us with the cheapest electricity. It will cost below €2 per kg in several African countries by 2030, much lower than the current mass assumption of €5 and a stark contrast to the USD 60–70 paid for an oil barrel. Thanks to this low-cost electricity and decreasing electrolyser costs, the next step is providing access to a clean fuel, cheaper than all the current fossil fuels. It will enable us to decarbonize the power sector and most hard-to-abate sectors—fertilizers, steel manufacturing, and refineries," said Dr Ajay Mathur, Director General, International Solar Alliance.

"As the global energy and climate crises unfold, mass-scale competitive green hydrogen is ready to provide energy security, affordability, and decarbonization. Integrated hydrogen hubs bringing together upstream,



midstream and upstream players on the basis of long-term off-take contracts are building powerful business models. Pioneering African countries such as Mauritania are showing the way, proving that Africa can help the world with green hydrogen—ensuring for itself a future of industrial development, fast and clean growth for all,” says Thierry Lepercq, President of HyDeal.

The study was previewed at the Mauritania Pavilion at COP27 in Sharm El-Sheikh by Abdessalam Ould Mohamed Salah, Minister of Energy of the Republic of Mauritania; Ambroise Fayolle, Vice President of the European Investment Bank; Dr Ajay Mathur, Director General, International Solar Alliance; Jean-Pierre Elong Mbassi, Secretary General of UCLG Africa; and Hakima el Haité, former Minister of Environment of Morocco; and Thierry Lepercq, President of HyDeal. Government leaders, ministers, international finance, business partners and civil society from across Africa attended the unveiling event. The report was formally handed over to partners on December 20, 2022.

## Scaling Up Green Hydrogen Production to Transform Access to Low-Cost Energy

The comprehensive analysis carried out in recent weeks by international consultancy CVA suggests that large-scale green hydrogen investment can accelerate decarbonization by enabling large-scale African energy users, such as fertilizer and steel producers, to use green hydrogen. The research is enhanced by CVA’s unique strategic partnership with energy partners across Africa, Europe, and around the world.

The study highlights that solar-powered green hydrogen is economically viable and can be produced at less than EUR 2 per kg, cheaper than traditional fossil fuel energy, and cater both for local energy demand and allow green



hydrogen to be exported to global markets. This is equivalent to energy costs of USD 60 a barrel.

## Roadmap for Green Hydrogen Commercialization Across Africa

The research suggests three requirements to enable 50 million tonnes of green hydrogen to be produced in Africa by 2035:

- National planning, regulation, and incentive schemes need to mobilize private sector investment.
- Pilot projects need to show successful green hydrogen generation, storage, distribution and use at both demonstration and commercial scale.
- Market-based partnerships are needed to enable mass-scale domestic and international off-take and demand for green hydrogen, and increase cooperation to design, finance, build, and operate green hydrogen production, storage, and distribution infrastructure.

€1-trillion green hydrogen investment can deliver the equivalent of more than one-third of Africa’s current energy consumption, boost GDP, improve clean water supply and empower communities.

The new study outlines how production and transmission of green hydrogen can lead to a €1-trillion investment yielding 7 exajoules of

energy (versus a consumption in Africa of 19.9 exajoules in 2021) and a correlative massive increase in GDP, creating hundreds of thousands of permanent and skilled jobs across Africa.

Large-scale green hydrogen investment will transform supply of clean water in areas regularly impacted by drought and chronic water shortages and will help empower communities.

## Decarbonizing Africa’s Heavy Industry

The new analysis estimates that green hydrogen investment could reduce carbon emissions in Africa by 40 per cent, replacing 500 million tonnes of CO<sub>2</sub> a year.

## Enabling Africa to be a Global Green Hydrogen Powerhouse

According to the study, large-scale green hydrogen generation will enable Africa to supply 25 million tonnes of green hydrogen to global energy markets, equivalent to 15 per cent of current gas used in the European Union. The new analysis will be followed by in-depth research of local green hydrogen investment potential, regulatory requirements, and changing demand in the coming months. ■

More information at <https://isolaralliance.org/> or on Twitter @isolaralliance

# Electric Vehicle Charging Market

## Driven by Software Now

**Julien Deconinck** says software innovations are now providing solutions to many of the scaling challenges and will play a crucial role in electric vehicle adoption.

**E**lectric Vehicle (EV) adoption is outperforming all expectations and is now expected to represent over half of US vehicle sales by 2030. The 'key link' to mass adoption is now software, not hardware or vehicles. Fortunately, software innovations are already providing solutions to many of the scaling challenges and will play a crucial role in EV adoption. From USD 1 billion in 2021, EV charging software is forecast to grow to USD 25 billion by 2030, making it one of the fastest growing software sectors in the market today and a huge opportunity for value creation for founders and VCs.

### Key Challenges in EV Adoption that Software Can Help Solve

Electric vehicles are set to revolutionize the industry. But a full transition to EVs requires overcoming several critical challenges. **The first relates to infrastructure and interoperability.**

- While the number of charging points is growing, it is still far away from being able to meet the demands of many EV drivers. EV drivers still must plan their journeys (especially longer ones) as network of chargers are still inadequate, and 'range anxiety' remains a major stumbling block for many willing consumers.
- As the EV market grows, it will strain the grid. According to some estimates,



we will need 1.1 EV chargers for every EV car. This could increase peak electricity demand on local grids by 15–50 per cent, requiring expensive upgrades to accommodate the increased demand.

- The interoperability of different EV charging systems remains a major issue—currently, it causes problem of overnight charging for EV owners who lack off-street parking and journey planning. Having varying protocols meant there were different standards/levels of device management, transaction handling, security, smart charging functionalities. New protocols like the Open Charge Point Protocol (OCPP) and communication standards such as ISO 15118 are now in place, but will need continuous

co-development by all stakeholders, to increase compatibility between different charging stations and management systems.

#### The second key challenge is equipment and maintenance cost:

- EV charging hardware remains expensive. The cost of a charging station varies significantly by type though generally, a Level 2 240-volt (the typical home charger—with capability for full charging around 6–8 hours) station costs up to USD 2000 incl. installation costs, with level 3 charging stations intended for public and commercial networks costing typically between USD 10,000 and USD 40,000.
- In addition to hardware and installation costs, soft costs drive up

operational costs. These soft costs include complex permitting processes, lagged communication between utilities and providers, and high maintenance cost if not serviced well (especially for outdoor chargers).

**The final challenge relates to the length of time and cost of e-fuelling:**

- Refuelling a gasoline car is straightforward; charging an EV remains more complex. Some stations provide a full charge in as little as an hour (and an 80 per cent charge in as little as 20 minutes), while others require several hours. Overnight charging is often available, but the length of time required can vary depending on the model and station type. The cost of charging also varies depending on vehicle type, location and the charging station, as well as associated fees. On the positive side, in the UK, recent figures show a driver exclusively using rapid or ultra-rapid public chargers pays 18p per mile for electricity, compared with 19p per mile for petrol and 21p per mile for diesel.

## EV Software Companies Provide Essential Solutions

The evolution of charging technologies is following a typical pattern of innovation that both improves performance and commoditizes hardware, so the EV equipment cost and charging time will rapidly drop in the coming years. Software innovation then becomes the real enabler of EV scaling by addressing the industry's remaining key challenges.

On the issue of EV charging infrastructure availability and managing its impact on the power grid, there are already many companies solving the "pain points" here. This revolves around cities and EV charging companies planning placement of chargers, utilities monitoring strain on the grid resulting from EV charging, and EV drivers



planning their trips.

- PredictEV, Volta Charging's proprietary network planning software, uses machine learning to predict current and future EV charging needs, from infrastructure load requirements to site-level specifics. The software can forecast current and future demand with high levels of accuracy, allowing for precision network expansion. State governments in the US are now using PredictEV to identify optimal and equitable charging locations.
- For grid management, we have companies such as London-based Kaluza. The company's advanced platform helps utilities manage the impact of EV charging on electricity grid demand by providing an intelligent, distributed system that can monitor, control and optimize charging. Kaluza uses an AI-driven approach to predict EV charging behaviour and reduce peak demand, while also optimizing energy costs by intelligently scheduling charging to coincide with low energy demand and lower electricity rates. Similarly, WeaveGrid's data-driven platform ensures the grid can accommodate electric vehicles safely by helping utilities in the US find EV drivers, analyse and gather insights on charging patterns, enroll them in managed charging programmes

and EV-specific rates and incentivize beneficial charging habits.

- For journey planning, there are a number of apps that help drivers optimize their trips both from a timing and cost perspective. For instance, in the UK, Zap-Map has almost all public charge points mapped, showing live status data. Its paid version offers What3words navigation, charging network filters, charger ratings and display on car screen.

On the issue of improving the ROI of EV charging infrastructure and reducing the cost of charging session, a number of software companies are tackling the challenges here. Most use-cases revolve around real-time monitoring and improving demand flexibility to reduce charging costs:

- In Europe, The Mobility House developed the easy-to-use and hardware agnostic ChargePilot platform that provides B2C and B2B owners of EV charging stations with a management system for monitoring, maintenance, schedule-based load management and billing. All these capabilities that result in improved user experience and cost savings are provided across multiple geographies, e.g., in Munich, Zurich, Paris or Belmont (CA).
- Based in Denmark, Monta's EV



charging management software is serving drivers, companies, cities, and the electricity grid with one integrated software solution. It makes it easy for businesses to maximize the charging efficiency of their EV charging infrastructure. It offers detailed analytics, real-time monitoring, dynamic pricing capabilities and automatic billing and payment. For drivers, Monta, which is present in nine European countries, helps consumers control their home charge point, identify public charging locations and schedule charging session when electricity is cheapest and cleanest.

- Energy goes one step further in “solving” energy management and cost of charging sessions by pivoting from monitoring to optimization through predictive suggestions. Its software platform automatically schedules charging session depending on electricity prices and leverages home solar panels to obtain free green energy.

Lastly, as more commercial vehicles and fleets are “electrified”, software is more crucial than ever to manage fleets, since companies have to plan deliveries based on charging status of each vehicle.

- Vulog and Autofleet are leaders in EV fleet management. Vulog’s integrated software and data solutions power shared mobility services such as car-sharing, ride-sharing, and bike-sharing. Autofleet’s cloud-based software platform helps businesses manage fleet vehicle maintenance, driver safety, fuel monitoring, and route optimization.

- With the ownership of vehicles increasingly becoming “shared” and “electrified” the ability to merge EV charging infrastructure management with vehicle sharing becomes very important and determines both the adoption of the shared ownership model of vehicles and electrification of commercial fleets.

## EV Software as the Key Enabler of EV Scaling

As the EV adoption scales, systematic maintenance of EV infrastructure will become crucial. Whilst EV charger monitoring exists today, the concept of smart, “self-healing” EV chargers are not yet widely adopted. We believe this capability will be software-led, as evidenced by the smartphone market (where your smartphone learns from your daily charging habits to improve the lifespan of your battery). Today, companies such as Driivz claim they can already address up to 80 per cent of operational problems related to EV chargers remotely, by leveraging automated self-healing algorithms. As a result, issues with EV infrastructure can be automatically diagnosed and proactively fixed (even remotely) which maximizes network availability and stability.

From a user point of view, EVs need to be charged much more frequently than gasoline vehicles. Instead of the typical 40 annual fuelling sessions for a gasoline car, an EV may need 500 or more yearly charging sessions. The nature of these sessions is different, i.e., not just one-way, full charge every time. This presents opportunities for software to play a role in the optimization of the charging sessions and to take advantage of those daily interactions to upsell users various services. In the long run, we anticipate the emergence of super-apps from the EV charging software sector, which will fuel significant additional growth.

Finally, EV charging software will be instrumental to the transition towards

renewable energies. According to Virta Global, there will be 140–240 million electric vehicles globally by 2030, which means there will be at least 140 million batteries with an aggregated storage capacity of 7 TWh, or 7000 GWh. In 2021, only 2.4 GW of storage was developed in Europe, but various studies predict we’ll need around 200 GW of energy storage by 2030. EVs will provide crucial power storage to support the generation of renewable energy, using vehicle-to-grid (V2G) technology. As more V2G protocols continue to be developed (currently mostly dominated by CHAdeMO-type chargers), we see software playing a larger role to harmonize the different standards/protocols.

A whitepaper from Kaluza shows a typical EV sits parked 90 per cent of the time with a battery capable of storing 40 kWh of energy—enough to power an average modern home for two days. Unlocking bi-directional charging will enable more affordable, highly resilient energy transition. Companies such as ev.energy and Kaluza are already exploring and developing, trialing, and deploying software in this space. This is done by engaging the automotive OEM early and forming close collaboration with regulators to implement frameworks that enable scale. These companies are now set to play a critical role in providing solutions to help take the strain off the grid and accelerate the transition towards renewable energies.

Overall, we see EV charging software as one of the fastest growing, and potentially one of the largest, new software sectors in the market today. As the complexity and scale of EV charging networks increases, EV charging software looks set to eventually become a USD 50 billion+ market, helping drive the global economy even faster towards net zero. ■

*Julien Deconinck, Managing Director of DAI Magister.*

# Geospatial Energy Mapper

## A New Tool to Map Out Clean Energy Infrastructure

An update to the Energy Zones Mapping Tool, the Geospatial Energy Mapper is an online tool with an extensive catalogue of mapping data for energy planning. It can help identify areas that are suitable for clean energy infrastructure projects.

The Geospatial Energy Mapper is an interactive online mapping tool that can help identify areas across the country that are suitable for wind, solar, and other clean energy infrastructure projects. It can be hard to remember, or for some to even imagine, what life was like before most of us carried around a dynamic mapping platform in our back pocket. Being able to quickly map out the most efficient

route by car, bike, or foot has become second nature. What if the same principle of having an easily accessible and easy-to-use tool could be applied to mapping energy infrastructure?

The Geospatial Energy Mapper (GEM) is a comprehensive, interactive online mapping tool that can help identify areas across the country that are suitable for wind, solar and more. First publicly launched in 2013 as the Energy Zones

Mapping Tool (EZMT), GEM has been redesigned, rebranded and reengineered. GEM is hosted by the US Department of Energy's (DOE) Argonne National Laboratory with funding from the DOE's Office of Electricity. "In GEM we applied lessons learned from almost 10 years hosting the EZMT, including making it easier to learn and use, updating the software architecture, and choosing a name fitting its current scope of uses,"



said Jim Kuiper, principal geospatial engineer and GEM technical coordinator.

GEM offers an extensive catalogue of mapping data. This includes energy resources and infrastructure, and other information that might influence energy infrastructure siting decisions. With over 190 different mapping layers—including demographics, boundaries and utilities—users can locate areas for clean power generation, electric vehicle charging stations, and more.

One of the new features is mapping themes, which allow the map to be rapidly set up for a particular focus, like solar, wind or electric vehicles. This new feature helps users quickly load multiple layers related to a particular technology or resource without having to manually browse the mapping catalogue and add individual layers to the map.

With GEMs modelling capabilities, users can generate a customized suitability map or 'heat map.' This map shows which geographical areas in the United States are favourable for the development of certain energy resources and infrastructures. GEM includes preconfigured models for over 40 types of energy infrastructure. Land-based wind turbines or utility-scale photovoltaic solar are two examples. This provides a convenient starting point that users can then easily customize.

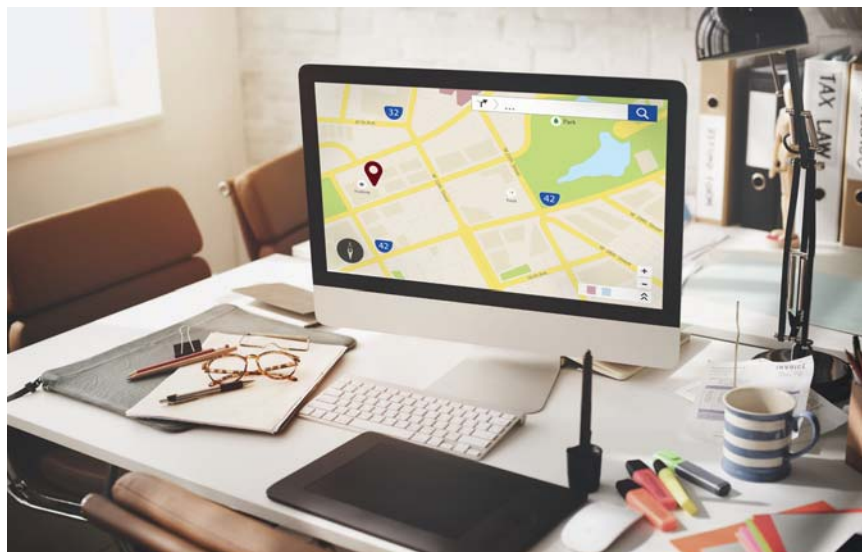


“Choosing where to build utility-scale renewable energy development is a tremendously important decision with effects that reverberate beyond the generation of electricity,” said Michael Levin, a GEM user and PhD student studying renewable energy landscapes at Columbia University. “GEM not only makes energy suitability maps public but allows for the user to customize the

model used to produce such a map.” GEM has nearly 100 modelling criteria to choose from. Population density, proximity to nearest substation, slope, wildfire risk and low-income household percentage are just a few examples. Nine types of energy resources can be analysed for clean energy resource development. They include biomass, coal (with carbon capture and sequestration), geothermal, natural gas, nuclear, solar, storage, water, and wind.

GEM is expected to have a diverse community of users much like the EZMT. The tool has been used by planners and regulators at all levels of government. For instance, Kentucky's Office of Energy Policy used the EZMT for prototyping their Solar Site Suitability on Reclaimed Mine Lands tool. Other users include private industry, public service commissions and regional transmission organizations. Finally, national laboratories, educational institutions, energy and natural resource non-profit organizations, and private individuals have all been EZMT users. ■

Source: <https://www.sciencedaily.com/>





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# Green events

## 1268th International Conference on Green Energy and Technology (ICGET)

January 29–30, 2023

New Delhi, India

Website: <http://researchfora.com/Conference2023/India/1/ICGET/>

## International Conference on Renewable, Environment and Agriculture

January 30, 2023

Ambala, India

Website: [Website: https://10times.com/](https://10times.com/)

## MRAI International Material Recycling Conference

February 2–4, 2023

Kochi, Kerala, India

Website: <https://10times.com/>

## Water & Solid Waste Expo

February 16–18, 2023

New Delhi, India

Website: <https://10times.com/>

## World Sustainable Development Summit 2023 (WSDS)

February 22–24, 2023

New Delhi, India

Website: <https://wsds.teriin.org/2023/>



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