

1-15 OCTOBER, 2024

DownToEarth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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₹80.00

CHOLERA

A PERSISTENT PANDEMIC

Infections are rising again in much of the world



HEALTH INSURANCE

Can PMJAY meet needs of the elderly?

P14

WILDLIFE

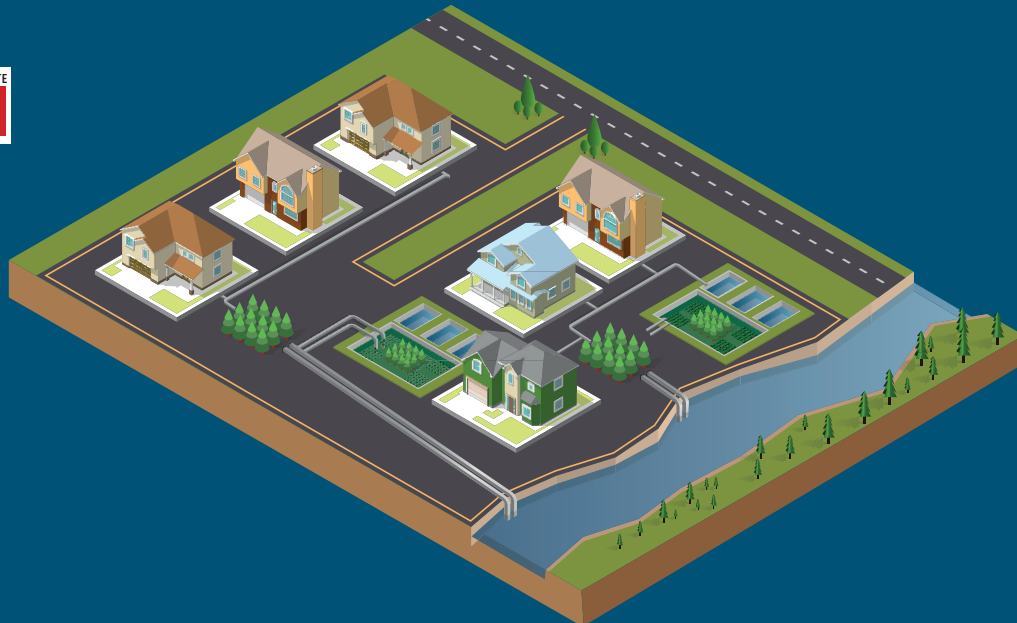
Theories on animal attacks in Bahraich

P18

UN SUMMIT OF THE FUTURE

Pact to reshape global governance for 21st century

P22



ONLINE TRAINING ON

BASICS OF DECENTRALIZED WASTEWATER TREATMENT AND LOCAL REUSE



Date
7TH OCTOBER - 8TH NOVEMBER, 2024



Course Duration
6 HOURS A WEEK (24 HOURS)



Language of instruction
ENGLISH

Decentralised wastewater treatment is based on the important principle – devolving level of the application so that wastewater can be treated at affordable costs, cutting the cost of pumping long distances and promoting local reuse of treated wastewater. The course builds awareness about issues and potential of decentralized wastewater treatment including successfully implemented case studies of local reuse of treated wastewater.

COURSE FEE

₹3,000/-

Indian participants

- Two or more participants coming from the same organisation can avail a total discount of 20 per cent.
- Participants from NGO, Civil Society or students can avail 20% discount.

US\$ 100

International Participant

Top 5 scorers will get a 50% refund of their course fee and 1 year free *Down to Earth* magazine subscription.

LEARNING OBJECTIVE

- To understand the existing problems in wastewater management.
- Understanding the definition, concept and approach of decentralized wastewater treatment vis a vis centralized wastewater treatment and its intervention in urban areas.
- Acquaintance to web based portal MOUNT – case studies showing different technologies and cost effectiveness.
- Understanding about the enabling frameworks and regulations applicable to decentralized wastewater treatment including reuse.

TARGET AUDIENCE

- Working professionals and decision makers from government and non-government institutions
- PMU assisting Govt. in mainstreaming waterwastewater measures
- Urban Planners, Architects, Engineers and Consultants
- Practitioners from consultancies, community-based organizations, social-welfare organizations, nongovernment organizations
- Independent researchers and academicians working in water and sanitation sector
- Representatives of Resident Welfare Association

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Why this race to the bottom?

THE GLOBAL car industry is going through a churn like never before. The entry of the electric vehicle is set to depose the internal combustion (IC) engine, but this is also destabilising the industry giants. What will this mean for the commitment of countries to the green transition, as their crucial industry declines in the face of competition from new players in other countries?

I am speaking about China, which today dominates the electric vehicle industry—in terms of raw materials, battery technology and production of cheaper yet state-of-the-art cars. China invested deliberately in e-vehicles, knowing that its industry could not ever compete with the conventional IC engine. Now, as the world takes action to combat climate change, e-vehicles are part of the change agenda. The EU has set stringent targets for CO₂ emissions from cars and decreed that only zero-emissions vehicles can be sold from 2035. This would mean there can be no new petrol or diesel vehicles in the next 10 years across the EU. In the US, President Joe Biden's government has set a goal of 50 per cent new vehicle sales to be electric by 2030. This push for greener transportation—crucial for combatting climate change—has landed the Chinese industry in a sweet spot. The question is, what will happen as the western e-vehicle industry crumbles in the face of the Chinese dominance?

The vehicle industry has traditionally been the backbone of manufacturing and jobs in many countries. According to data from the European Commission, the automotive industry provides jobs to some 13.8 million Europeans; directly employing 2.6 million people, which is 8.5 per cent of the employment in manufacturing. But this is now in jeopardy. In September, German car major Volkswagen announced that it plans to shut down two of its manufacturing plants in the country, which puts jobs at risk and has led to a political furor. The western car industry is finding it difficult to compete in terms of costs with its Chinese counterparts. European e-vehicles are still more expensive as compared to the petrol variants; and now as more countries seek to withdraw subsidies and incentives for these green vehicles, car owners get pushed to imported vehicles.

The only way then is to do what the US (and now the EU) is doing—put high import duties on Chinese-made vehicles or even components. The US has put a 100 per cent duty on Chinese e-vehicles, Canada has followed suit and now Europe is looking to increase its 10 per cent duty. In addition, the US, which provides a substantial subsidy on e-vehicles, stipulates that the vehicle will qualify for the incentive if it does not contain critical

minerals or batteries supplied by a foreign entity of concern, namely China. This would mean that vehicles containing nickel from an Indonesian company with a Chinese collaborator could also be denied the subsidy—crucial for consumers to make the switch to e-vehicles.

In China, e-vehicles are taking off big time. As per official data, sales of e-vehicles overtook IC engine vehicles in July 2024—as many as 853,000 e-vehicles were sold in a single month. This is because Chinese e-vehicles are substantially cheaper and so affordable. The Chinese say the key reason for this, which is disputed by western governments, is their dominance in battery technology, critical mineral processing and low labour costs. BYD, the Chinese e-vehicle giant, is now expanding operations to Vietnam, Indonesia and Malaysia. The good news is, increased sales of e-vehicles will bring the much needed green transition at least in these countries.

But will the green mobility transition succeed in the western world, which has put restrictions on Chinese imports, fearing the collapse of its own industry? These countries are

stepping up their efforts to secure supply chains—western countries and their allies (India is part of this) have created the Minerals Security Partnership to secure these minerals and promote recycling. The objective is to “friendshore” mineral extraction, processing and recycling so that these countries build the supply chain together. It is still a work in progress and much more needs to be done to mine and process these raw materials, and at competitive costs. Northvolt, the massive battery factory set up in Sweden's freezing far north to take advantage of the cheap hydropower energy, is said to be running into trouble. As per British daily *Financial Times*, the factory, which attracted huge investment, produces much below its potential; this means, it is unable to compete with the prices of Asian rivals.

It is important that countries have an economic stake in the green transition, which requires domestic manufacturing and job creation. At the same time, climate change is a reality; the world needs a fast transformation to low-carbon economies. How will this work? Is it possible to do both? This is an issue that needs open discussion—but is getting lost in the intolerance of our times. **DTE** @sunitanar

We need an open discussion to ensure that the world transitions to low-carbon technologies while ensuring that countries have an economic stake in the transition

DownToEarth

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26

The ongoing cholera pandemic, the world's longest, takes a new turn as cases rise in times of climate change

10

Digest

Sikkim teacher gamifies lessons on environment

18

Wildlife

What triggered latest incidents of animal attacks in Bagraich?

22

Future Summit

UN pact to redefine global governance with digital, climate and peace targets

24

Chemical-free agriculture

Punjab farmers grow organic crops to ensure family's health



46

Patently Absurd

Concerns over high price of promising HIV drug

58

Civil Lines

Governments assume dominant economic role, irrespective of ideology

◀ Cover design: Ajit Bajaj, Ritika Bohra (with AI assistance)

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Contents



74

Can PMJAY succeed in ensuring healthcare needs of India's elderly population?



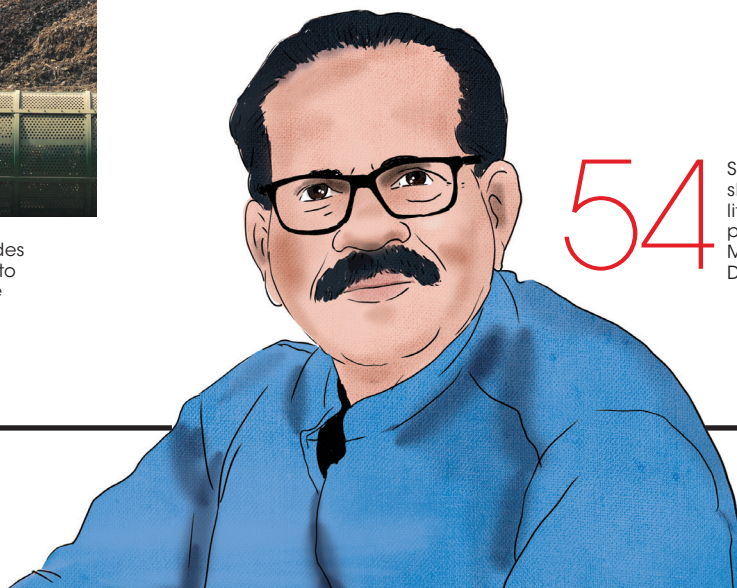
50

Satellite imagery provides a cost-effective option to monitor, improve waste management in cities



40

Increasing evidence on potential health impacts of microplastics



54

Shahu Patole shines a light on little-known food practices of Maharashtra's Dalit communities



INTEGRATED ONLINE AND ONSITE TRAINING ON ENVIRONMENTAL IMPACT ASSESSMENT

CSE is conducting an integrated online and onsite training programme on EIA. The training programme will comprise of two parts: Basic learning (online platform) and Advanced learning (at our residential campus). The course is designed to provide an overall understanding of the EIA process which includes theoretical knowledge via lectures from experts and firsthand experience through group exercises, discussions and case studies.

PROGRAM DESIGN

PART A

BASIC LEARNING (ONLINE)

- Includes sessions on methodology for preparing an EIA, approach for baseline data collection, identification and assessment of impacts along with the Environmental Clearance process.
- Conducted on Moodle Platform where participants will be provided with pre-recorded reading / audio-visual training material which they are expected to self-study as per their convenience. The course material will be for the duration of 2 hours/day

PART B

ADVANCED LEARNING (ONSITE)

- Includes practical experience on assessing impacts for different sector projects.
- Developing Environmental monitoring & management plans;
- Reviewing of EIA reports;
- Understanding the intricacies of the EIA system;
- Working on case studies through group exercises and role play;
- Discussion and knowledge sharing with experts;
- Conducted at CSE's residential campus, Anil Agarwal Environment Training Institute (AAETI) in Tijara, Alwar, Rajasthan.



COURSE FEES

PART A

INR 3000 (Indian participants)
USD 100 (Non-Indian participants)

PART B *

INR 25,600/- (double occupancy)
INR 28,000/- (single occupancy)

* Fees includes accommodation, food, training material and travel from Delhi to the training center and back.



COURSE DATES

ONLINE PART

January 14-23, 2025

ONSITE PART

February 18-21, 2025

WHO CAN APPLY

Industry professionals; environment consultants; environment engineers; researchers; academicians, civil society and students aspiring to work in the field of environment.

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Engage



Sustain success of waterbody revival

This is with reference to the cover story “Lakeside victories” (16-31 August, 2024). The cover package was quite informative and comprehensive in highlighting the success stories of waterbody revival in the rural landscape across the country.

However, the waterbodies need to be made sustainable to be tagged as assets. Revival efforts take place under various government programmes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and state schemes. Gujarat led the pack at the turn of the century with a programme to create farm ponds. But all these initiatives and efforts will not create sustainable waterbody assets unless a few aspects are considered. First, the revival should not just focus on larger waterbodies of say, 10,000 hectares or so. All schemes, be it the Centre’s MGNREGS and Integrated Watershed Management Programme, or the various revival and conservation schemes of states, should consider the conditions of the respective landscapes. Second, these schemes need to be executed with a “ridge to valley” approach, allowing a good portion of rainwater to recharge the groundwater and create sustainable waterbodies in plains and valleys, to ensure water availability even in dry or lean periods.

ANOOP BADHWA
VIA EMAIL

ODE TO ENVIRONMENT

A silent walk

*Confused and in turmoil, the future
Of the mother earth
Making no way out, pushing us
Into the dearth.*

*Symphonic splatters of water, from the
The placid drift of the meandering river
Now unheard and invisible,
beheaded by a human’s cleaver.*

*Chirping birds and jumping deer, a feast
To the eyes in the crack of dawn
Made their way to never-ending dormancy
Giving rise to a silent lawn.*

*Trunks of birch, pine and oak, standing
Along roadsides mimicking a brigadier,
Got logged to the ground,
Providing no resting shoulder.*

*Eternal and majestic mountains, being the
Epitome of firmness
Got its gut dissected, motive signifying
Economic value harness.*

*Nature, the protector, and earth, the provider
When came up with the helping hand,
Exploitation at the greater degree paved
Way to a no man’s land.*

*Nurturing a sustainable future, that’s
Lying on the brink of rupture,
Protecting the earth and the global commons
necessitates ideological restructure.*

*Silence spread over the whole world,
Except the ticking of doomsday clock.
“How should I protect my mother earth...?”
The only thought during my silent walk...*

VIVEKA VARDHAN NAIDU BHYRIPUDI
VIA EMAIL

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Digest

WHAT'S INSIDE

A novel card game to help children learn about climate **P10**

Storm Boris brings heavy rain, floods to central Europe **P11**

WHO authorises Jynneos vaccine against mpox **P12**

1,000 WORDS

VIKAS CHOUDHARY



A family of lesser whistling ducks, also known as Indian whistling ducks, atop plastic waste discarded into a small waterbody in Kanpur Dehat district, Uttar Pradesh. Pollution caused by dumping of sewage and waste in waterbodies threatens both resident species, like the lesser whistling duck, and migratory birds across the country. In separate studies and bird census exercises conducted earlier this year, West Bengal and Kerala authorities have noted a dip in resident and migratory bird numbers because of pollution, habitat loss and climate change impacts.

FOR MORE PHOTOS, SCAN



On the cards

TEACHING CLIMATE change to young students is always a challenge. It is often associated with disasters and catastrophes, which can overwhelm children, says K S Rai, a geography teacher at the Government Senior Secondary School in Namchi city of Sikkim. "When I discussed environmental degradation, I often felt that my students did not fully grasp the urgency of the issue," he recalls.

Climate change is just one sub-topic of a chapter in the NCERT (National Council of Educational Research and Training)'s geography book for class 8. But Rai wanted his students to not just learn about the subject, but also meaningfully engage with it. In early 2023, he introduced a novel teaching tool: a card game designed to explain climate change concepts in an interactive way.

The idea for the game came unexpectedly. In November 2022, Rai arrived late to his classroom and found students engrossed in a round of UNO cards. "Though I reprimanded them for playing cards in class, seeing their excitement over a card game left an impression on me," he says. Over the next few months, he developed a set of playing cards focused on climate change.

The game involves 28 cards, split into two questions and answers. Each card is related to a climate change topic. For example, one card asks, "What is climate change?" and its

A primary school teacher in Sikkim develops a card game to teach climate change to his students

RAJIT SENGUPTA

corresponding card answers, "Shifts in temperatures and weather patterns." Another question asks, "What can we do at school level and at our home to cut the emissions?", with the answer being, "Switch off the energy appliances such as refrigerator, air conditions, fans etc. When not required do not burn waste such as plastics and papers rather reuse or recycle." The students must match the cards correctly to form a pair.

"The game's basic rules are similar to the popular card game poker," says Rai. Students are divided into four groups. The teacher shuffles and deals three cards to each group, with the remaining placed in the centre. The goal is to create two matching pairs and one set of three related cards. The first group begins by examining their cards. If they can form a matching pair, they pick an additional card from the deck. If not, they discard a card, which becomes available for other groups. The group that first creates the correct sequence of seven cards, wins.

For Rai, this game has been transformative in helping students internalise complex environmental issues. "They are no longer just memorising definitions," he says. In 2024, he showcased the game at a teacher training workshop organised by the Green Schools Programme of the Delhi-based non-profit Centre for Science and Environment. "The event had school teachers from across India, and many showed interest in using the cards," says Rai.

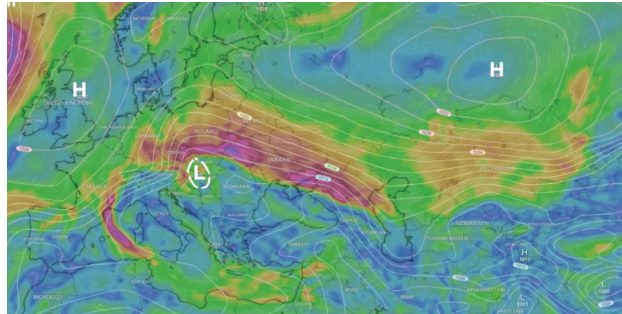


Students at the Government Senior Secondary School in Namchi, Sikkim, playing the climate change card game

WEATHER

Storm Boris inundates central Europe

HEAVY RAINFALL and floods surged across central Europe in mid-September, displacing thousands of people and leaving cities without electricity. Amid heavy rainfall since September 12, Poland evacuated 42,000 people as flooding caused widespread damage to houses and infrastructure, while the Czech Republic relocated 12,000 people. In Austria's capital Vienna, 2 million people were affected by electricity cuts and flooding due to rise in river levels. The country



The low-pressure area (L) over central Europe was trapped between two high-pressure (H) systems

also saw heavy snowfall at altitudes as low as 700 m above sea level on September 16. Romania, Hungary and Slovakia also reported flooding.

The heavy rains

and early snowfall were brought by storm Boris, a slow-moving, low-pressure system, fuelled by a blast of Arctic air that moved in from the north. The cold air collided with warmer,

moisture-lade air from unusually warm waters of the Mediterranean Sea, which recorded its highest-ever temperature in August, the Black Sea and the Adriatic Sea. The low-pressure system was also blocked in the central European region by two high-pressure areas to its west and east.

The heavy rainfall and moisture-laden air are indications of excessive greenhouse gas emissions in the atmosphere, according to scientists quoted in news articles on the storm.

VACCINES

Equity missing in world's pandemic treaty draft

AS PARTIES to the World Health Organization (WHO) convened for the 11th round of negotiations to develop an instrument for pandemic prevention, preparedness and response—called the pandemic treaty—on September 9-20, civil society urged the UN body to ensure an equitable agreement. On September 16, nearly 100 civil society groups wrote to WHO raising concerns on Pathogens Access and Benefit Sharing (PABS) under the treaty, through which developing nations sharing genetic resources and pathogens will receive benefits like access to vaccines. The letter points out, however, that current PABS proposals require manufacturers to commit to donating a mere 5 per cent of their production of vaccines, therapeutics and diagnostics during pandemics, which is inadequate. Listing more gaps and loopholes, it urges WHO to revise PABS. Meanwhile, at the end of the September meeting, the WHO director-general and other stakeholders noted "significant progress" in drafting the treaty, with the next round of negotiations slated in November.

CLIMATE

Industries sued over environmental damage

AT A time when the world is reeling from impacts of greenhouse gas emissions and environmental damage, countries are mounting legal actions against industries deemed responsible. On September 16, Brazil, which is currently experiencing one of the worst drought and forest fire seasons in its history, launched a lawsuit against several landowners to seek compensation for damage to the country's Jamanxim National Forest. The US \$115 million lawsuit accuses the landowners of deforestation, illegal burning and pesticide use, deteriorating the environment. The lawsuit followed just months after Puerto Rico took major oil-producing firms to court, for violating trade law by promoting fossil fuels and misleading the public about their impact. The suit launched in July against companies like ExxonMobil, BP and Chevron seeks \$1 billion in damages to help Puerto Rico defend itself from climate disasters. Local governments in the US mounted similar lawsuits earlier this year, after California, a major oil-producing state, sued five major firms in 2023.

BITS GLOBAL

The World Health Organization (WHO) on September 13 authorised use of the Jynneos vaccine against mpox, amid the widespread outbreak of the viral disease across countries. The vaccine, made by Danish company Bavarian Nordic, is already approved by regulatory authorities in the EU and US. Now, WHO's prequalification will help move measures to ensure access to the vaccine in developing countries, particularly in Africa.



August 2024 was the Earth's hottest in 175 years, the US National Oceanic and Atmospheric Administration (NOAA) said on September 12. Continuing a 14-month streak of record breaking temperatures, August saw an average global land and ocean surface temperature that was 1.27°C above the 20th century average, said NOAA. It added that Europe and Oceania had their warmest August on record, while Asia saw its second-warmest and Africa and North America each had their third-warmest August.

Japan on September 17 suspended an operation to remove a sample of highly radioactive material from the decommissioned Fukushima nuclear power plant. The trial removal was part of an effort to remove 880 tonnes of nuclear debris from the decommissioned plant, which was destroyed after a tsunami in 2011. The plant's operator, however, said the procedure was halted because of equipment failure.

Ecuador began nationwide nighttime blackouts from September 19 amid a severe drought threatening the country's hydropower plants, the country's main source of electricity. The power cuts are planned for four nights a week to conserve water levels in reservoirs. Meanwhile, it has also initiated teleworking in the public sector to save power.

BITS INDIA

The Union government on September 15 lifted minimum export price for Basmati rice and onion to boost farmer incomes. The government said it had lifted the floor price, set for rice in 2023 and onion earlier this year, in view of good crop production and stocks. It also reduced the export duty on onion from the 40 per cent set in May to 20 per cent.

A group of 85 organisations on September 16 urged Narmada Control Authority in Gujarat to release excess water from the Sardar Sarovar Dam. In a letter, the Vikalp Sangam General Assembly cited concerns that the high water levels of over 438,800 cusecs in the dam's reservoir may submerge downstream villages.



Kerala in early September pushed forward with a tunnel project in Wayanad, which is still reeling from landslides in July that killed over 300 people. The government awarded the tender for the project to a Bhopal firm even as it awaits environmental clearance and faces concerns from the State Level Expert Appraisal Committee.

India is the world's biggest plastic polluter, releasing 9.3 million tonnes of plastic waste annually, according to a September 4 study in *Nature* by the University of Leeds, UK. The country's official waste generation rate, around 0.12 kg per capita per day, is likely underestimated, the study says, while its collection is overestimated.

IN COURT

NATIONAL GREEN TRIBUNAL

■ In a case alleging that the use of solid, impermeable tiles in Ludhiana's roadsides were affecting groundwater recharge, the National Green Tribunal (NGT) has asked the city's municipal corporation to remove the material from all sites within its limits. The roadsides must instead be laid with perforated tiles, said the tribunal.

■ Noting that no substantial progress has been made in improving solid and liquid waste treatment and disposal in Telangana, NGT has asked the state's chief secretary to file a fresh action report for consideration by March next year.

SUPREME COURT

■ The apex court halted felling of nearly 25,000 trees in Delhi to create a railway facility. The court was hearing a petition claiming that the trees were in a forest-like area and should be accorded the same level of protection as recognised forest land.

HIGH COURT

■ In the wake of the July landslides in Wayanad district, the High Court of Kerala directed the state and district legal service authorities to file a report on providing psychological assistance to those impacted. The court also directed the state to take measures for children affected by the disaster.

So far...

Number of cases on environment and development tracked from January 1 to September 17, 2024

NATIONAL GREEN TRIBUNAL	SUPREME COURT	HIGH COURTS
341	71	87

FOR DETAILED VERDICTS, SCAN



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Clause No. 10.1....10.8, 10.9, .10, .11, .12, .13,
.14, .16, .17, .19 as per EN15267-3
Clause No. 12.1, 12.2, 12.3, 12.4, 12.5, 12.6,
12.7 as per EN15267-3

QAL - 2

Clause No. 6 as per EN14181
Clause No. 8.3 as per EN15259

AST

Clause No. 8 As per EN14181
Clause No. 8.3 as per EN15259

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NOTIONAL COVERAGE

The performance of Pradhan Mantri Jan Arogya Yojana has been disappointing. Can it meet the healthcare needs of the elderly?

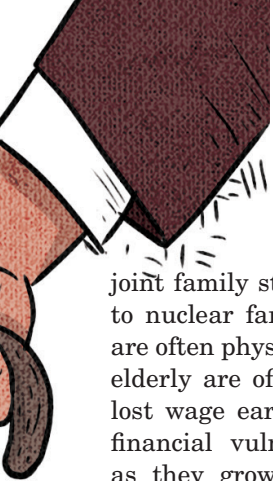
K SRINATH REDDY



THE UNION government has recently announced that it will extend the benefits of the publicly funded national health insurance programme, Pradhan Mantri Jan Arogya Yojana (PMJAY), to all Indians aged 70 years and above. This programme, which enables cashless access to hospital services worth ₹5 lakh a year, will also be available to the elderly already covered under private health insurance policies or Employees' State Insurance Scheme. Those availing benefits of other public health insurance schemes such as the Central Government Health Scheme may either choose their existing scheme or opt for PMJAY.

This is indeed a much needed addition to the ongoing efforts to create the architecture of universal health coverage (UHC) in India by 2030—a target set under the UN's Sustainable Development Goals (SDGs). The target calls for provision of health services to every Indian, without imposing any financial hardship on those who avail the services. PMJAY and a number of separate but complementary state government-financed health insurance programmes endeavour to do this.

Though India is a demographically young nation, it is the world's most populous country and has a large number of persons aged 60 years or older (estimated at 149 million in 2022). This number will grow to 347 million by 2050, as the population swells and life expectancy increases. Many of them will be living on their own, as



joint family structures yield place to nuclear families and members are often physically distanced. The elderly are often retirees or have lost wage earning capacity. Their financial vulnerability increases, as they grow older and savings melt away. Extending PMJAY coverage to those aged 70 years and above is projected to benefit about 60 million persons who presently need assured healthcare.

CAN IT MEET THE NEEDS?

Healthcare needs of the elderly are numerous, wide ranging and often require chronic outpatient care or frequent hospitalisation for acute events. These are expensive, because of the number and nature of diagnostic procedures and the array of technology-intensive treatments involved. While hypertension, diabetes, lung disease, mental health disorders and arthritis require prolonged care, mostly out of hospital, cardiovascular diseases, cancers, genitourinary disorders, gastrointestinal and liver maladies, fractures and dysfunctional joints need hospitalised care with medical therapeutics, surgery, radiotherapy or even a combination of those. Vision disorders and dental problems are also frequent among the elderly. Will PMJAY be able to address all these needs, whenever and wherever needed, without imposing financial hardship on the elderly?

The World Health Organization (WHO) and the World Bank recommend two measures to monitor the implementation of UHC—the extent of financial protection and the level of service coverage. The former is assessed by out-of-pocket expenditure, catastrophic health expenditure and healthcare-induced impoverishment. The latter is assessed by a service

coverage index, which encompasses 14 tracer conditions inclusive of varied health conditions and health system capacity measures. PMJAY, even in its present form, has not demonstrated high levels of performance on either of these indicators. Service coverage is restricted to some health conditions that require hospitalisation; a large list of health conditions, which can and should be managed in primary care, are not covered—whether for outpatient or inpatient care at that level. Outpatient care and medicines are the largest contributors to out-of-pocket expenditure, which creates a chronic strain on those who are not rich.

Even in secondary and tertiary care facilities, frequently utilised outpatient care is not covered. Such care is needed not only for initial consultation but also for several follow-up visits. The degree of financial protection is also incomplete in those institutions, with frequent co-payments demanded by hospitals (for genuinely needed care or additional procedural interventions, which are generated by induced demand or imposed as “essential” for better health outcomes).

The Comptroller and Auditor General of India (CAG) in its 2023 report points out several deficiencies in the performance of PMJAY. Apart from concerns over fraud in patient registration, partly clarified by the government later, the report points to areas of quality deficit in the accredited healthcare

providers in several states. These include non-functioning equipment, deficient bed strength, lack of blood bank and emergency transport services. Instances of co-payments by patients, beyond the amount covered by insurance, were also noted.

Paucity of accreditation-eligible hospitals in tier-2 and tier-3 cities has curtailed the penetration of PMJAY in some states and has limited its population coverage. The fact that smaller cities and towns are not served by well-equipped private hospitals was evident during the novel coronavirus (COVID-19) pandemic. Even when the government permitted and encouraged private hospitals to administer approved COVID-19 vaccines, there were low rates of uptake and utilisation by private hospitals, especially in smaller cities and towns. Hospital care for serious COVID-19 illness was also limited by inadequate hospital capacity in these areas.

Private hospitals have also been less than enthusiastic about the payment rates of PMJAY and are particularly aggrieved about payment delays. In case of the elderly, the claims are likely to be complicated because of coexisting medical conditions that require care from several speciality departments. Private hospitals may be reluctant to deal with that cumbersome process. If PMJAY is going to depend on extensive and enthusiastic participation of private hospitals, that hope maybe

HEALTHCARE NEEDS OF THE ELDERLY ARE NUMEROUS, WIDE RANGING AND OFTEN REQUIRE CHRONIC OUTPATIENT CARE OR FREQUENT HOSPITALISATIONS. THESE ARE EXPENSIVE BECAUSE OF THE NUMBER AND NATURE OF DIAGNOSTIC PROCEDURES AND THE ARRAY OF TECHNOLOGY-INTENSIVE TREATMENTS INVOLVED

belied when the scheme is extended to cover the elderly.

Sections of the private healthcare sector do engage with PMJAY and will continue to do so as the scheme provides a steady and substantial stream of revenue. It has been estimated that two-thirds of the money spent under PMJAY, since its launch, has streamed to the private healthcare sector. Leaders of the sector are keen to demonstrate that they are staunch believers in the value of public-private partnerships in healthcare delivery. However, they will do so on their preferred terms and in their preferred locales. A country-wide programme for UHC cannot therefore overly rely on the private sector's presence, capacity and motivation for its success.

STRENGTHEN PUBLIC SECTOR

The solution lies in strengthening the capacity of public sector health services—all across the country. In India's mixed health system, the private sector can be engaged to deliver some of the healthcare services but overdependence on that sector will hold UHC hostage to the priorities and demands of private healthcare providers. Only when there is a countrywide presence of well-resourced and well-governed public sector health services, can the proper terms of engagement with the private sector be set to protect public interest and advance UHC in an efficient, equitable and economically efficient manner.

However, we are witnessing moves to privatise district hospitals and hearing proposals to create private "managed care" enterprises where the private sector will provide services across the board—from primary to tertiary—

for a fee. What we need is "integrated care" with public sector-led delivery of comprehensive healthcare services which are seamlessly connected across all levels of care. Abandonment of the public sector in any redesign of UHC will come at a high price—both in terms of health outcomes and financial expenditure.

The US is a cautionary example. It has the highest health

THE ELDERLY ARE LIKELY TO HAVE LOWER LEVELS OF DIGITAL LITERACY AND INSURANCE LITERACY. THEIR ABILITY TO RECOGNISE INSURANCE-LINKED ENTITLEMENTS AND ACCESS HEALTHCARE ACCORDINGLY, MAY BE RELATIVELY CONSTRAINED

expenditure and the lowest life expectancy among all OECD (the Organisation for Economic Co-operation and Development) countries, a forum of high-income economies. Indeed, life expectancy has declined in the US over the past decade—from 79 years in 2019 to 76 years in 2021.

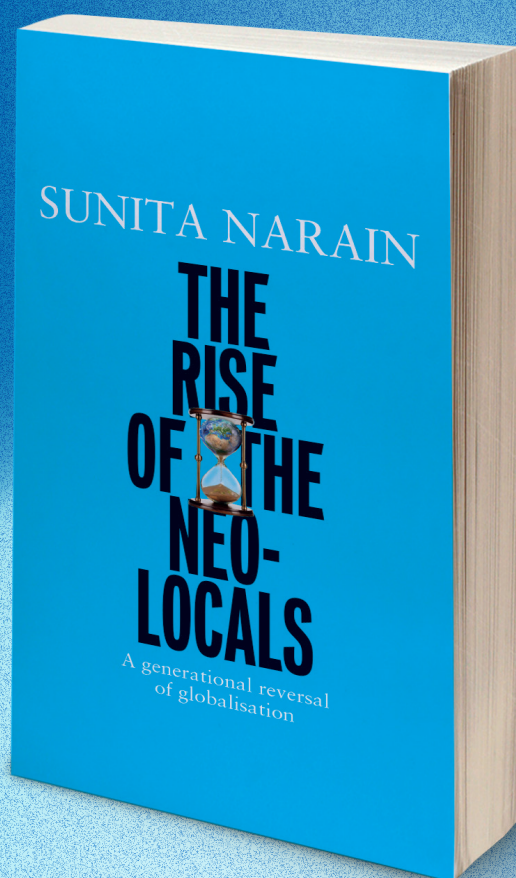
In the Union Budget 2024-25, the government had announced that coverage under PMJAY would be extended to include ASHA workers (accredited social health activists), their helpers and anganwadi workers. This is again a welcome decision. However, budgetary allocation to PMJAY in this financial year has fallen short of the ambition—it has increased only by 1.4 per cent compared to the budgetary allocation for the previous financial year. Unless PMJAY continues to underperform in its utilisation rates, this marginal increase will not meet the healthcare needs of all the intended beneficiaries, which will now include persons aged 70 years and above.

Unless India spends at least 2.5 per cent of GDP (gross domestic product) on health services, we cannot envisage UHC gaining momentum. While investments are needed both for infrastructure expansion and bridging skilled human resource gaps in the health sector, considerably higher investments are needed to meet operational expenses of service delivery through flagship programmes of the National Health Mission.

Elderly persons are likely to have lower levels of digital literacy and insurance literacy than younger adults. Their ability to recognise insurance-linked entitlements and access care accordingly, while participating in informed decision-making through dialogue with health-care providers, may be relatively constrained. Therefore, fully assured and easily accessible health care, suitable for their needs at any point of time, should be provided through an insurance-free model of UHC. Otherwise, we will add stress-induced mental health disturbances to their physical ailments.

PMJAY does indeed provide helpful access to secondary and tertiary healthcare for many who need it. But it should fit well into a well-designed, predominantly tax-funded, model of healthcare which is insurance-assisted—not insurance-driven. It cannot become the engine of UHC in India; it can only be one of the compartments. The elderly need special assistance to get onto that train easily but not with multiple insurance gates to negotiate. [dte](https://www.downtoearthindia.org) [down2earthindia](https://www.downtoearthindia.org)

(K Srinath Reddy is a Distinguished Professor of Public Health, Public Health Foundation of India, New Delhi, and author of Pulse to Planet)



Over the past half-century, the world has moved from post-colonisation to globalisation and now, to de-globalisation. The proponents of free trade are turning towards protectionism.

What does this mean for the world that faces the existential threat of climate change, combined with increased marginalisation of the poor and the anger of the rich?

And all this at a time when the world is losing the war against climate change to many other wars – from Russia's invasion of Ukraine to the conflict in Gaza to the angst against China for its domination of green technologies.

Born in the pre-globalisation era, environmentalist Sunita Narain argues that the developments of the past four decades, including India's environmental movements, the climate emergency, the sweeping protests and the rise of centre-right political forces, indicate that localisation may herald a new norm.

And it may not be an entirely undesirable situation.

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Uttar Pradesh
forest department
officials on a
search mission
in Mahsi tehsil of
Bahraich

Lethal encounters

Incidents of wolf attacks reported from Bahraich are a result of shrinking wildlife habitat and growth of sugarcane fields that provide animals a space to thrive and hide after the hunt

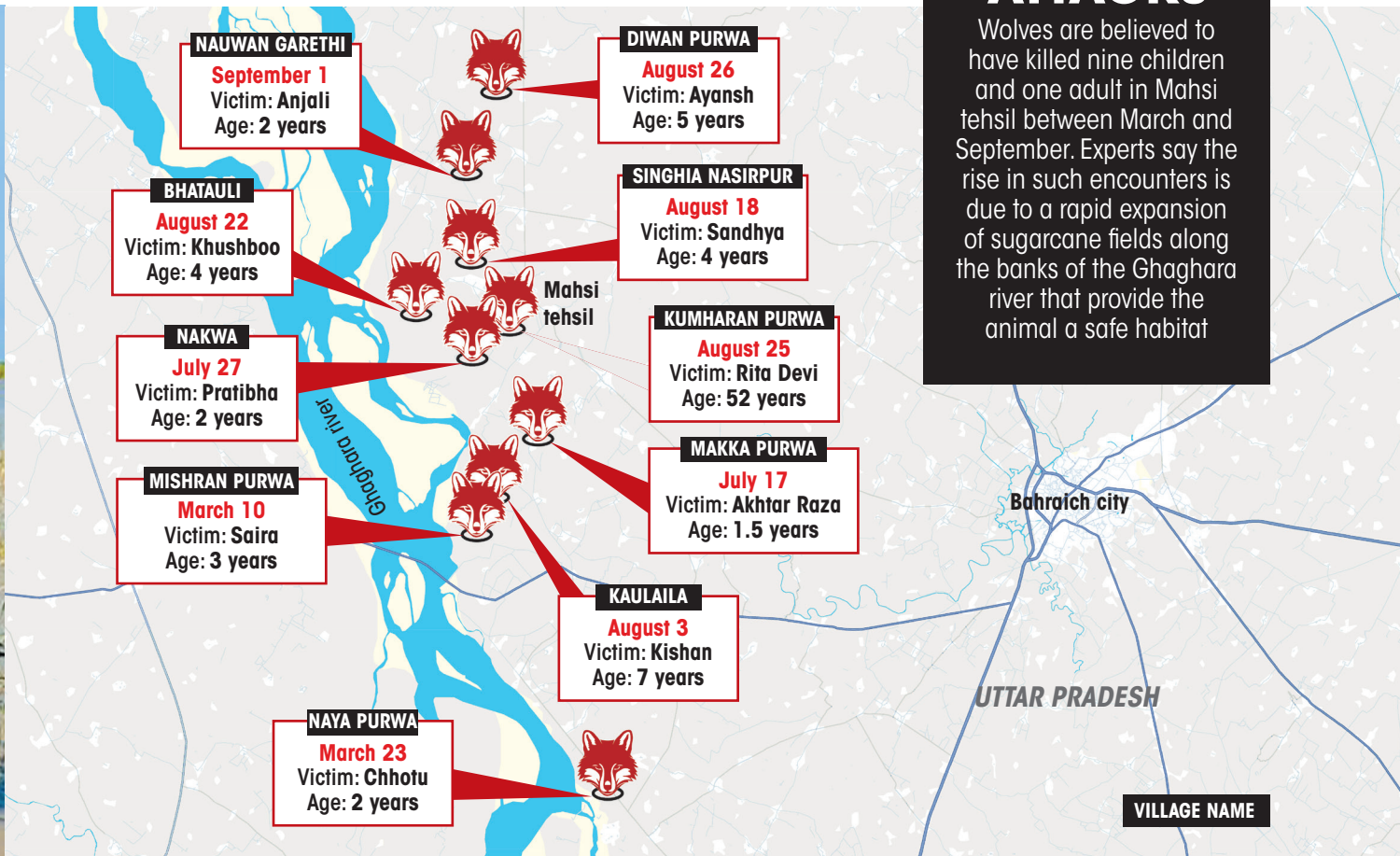
VIVEK MISHRA AND RAJAT GHAI NEW DELHI

AT 3:00 AM on the morning of July 27, my sleep was broken by the screams of my wife from outside the house. As I rushed out, she told me that a wolf had taken away our two-year-old daughter Pratibha. My wife had taken Pratibha to the hand pump across the house because the girl wanted to drink water. The animal emerged from nowhere and carried her away in the darkness,” says a distraught 30-year-old Rakesh Kumar Gautam, a resident of Nakwa village in Mahsi tehsil of Uttar Pradesh’s Bahraich district. “At 6:00 am, the village residents and forest officials found her mutilated body in a sugarcane field about 1 km from my house. I did not see the animal, but the village residents saw it running in the sugarcane field and describe it as a long-haired, white-and-brown wolf, with elongated mouth and

PHOTOGRAPHS: SANJAY SINGH

DEADLY ATTACKS

Wolves are believed to have killed nine children and one adult in Mahsi tehsil between March and September. Experts say the rise in such encounters is due to a rapid expansion of sugarcane fields along the banks of the Ghaghara river that provide the animal a safe habitat



upright ears,” says Gautam.

Between March and September, nine children—all aged seven years or less—and one woman have been killed in similar attacks within 10-15 sq km of Mahsi, along the banks of the Ghaghara river (see ‘Deadly attacks’). Some 35 people have also reported injuries. Residents say there is an atmosphere of terror and they have started guarding the village day and night. Most residents and survivors say that the attacks are by wolves.

Mahsi has always seen incidents of animal attacks because of its location—it lies in the Terai region, the marshy lowlands that straddle southern Nepal and northern India. However, residents say that there has been an increase in such cases. Several hypotheses explain the rise.

One theory is the inundation of the Ghaghara river that flows through Bahraich. The theory posits that climate change has led to flooding during the monsoons, which has altered the wolf habitat. As a result, the animal is often driven out and forced into human settlements in search of food.

Another theory says that sugarcane cultivation has expanded quite rapidly along the river bank in the district, and sugarcane fields do not just become breeding grounds for wildlife, but also offer a hiding place after the hunt. This theory is substantiated by data. As per government figures, area under sugarcane cultivation in Bahraich in 2003-04 was 18,989 ha. In 2023-24, it reached about 80,000 ha—a rise of 350 per cent. Ajeet Pratap Singh,

Divisional Forest Officer (DFO) of Bahraich, agrees with this theory. “Sugarcane cultivation has reached vulnerable areas, allowing wildlife to easily enter the population. It is a major reason for the rise in human-wildlife conflict,” he tells DTE.

Singh also says that the forest department’s investigations show that the attacks are by wolves. “The pug marks at the place where the wild animal picked up the children and those where the bodies were found, often appeared similar and belonged to wolves,” he says. “Our guess of reaching the animal through pug marks was so correct that we actually found wolves eating the dead bodies at three places,” Singh adds. He says the department tracked the suspected pack of wolves in the area through drones

and camera traps, and caught five of the six members of the pack. One of the five individuals died, while four wolves have been sent to zoos at Lucknow and Gorakhpur. One wolf remains at large. "Identifying the animal through pug marks is quick. Since there was an emergency due to the frequent animal attacks, we adopted this technique," he says.

IS IT WOLF?

India is home to two subspecies of wolf—the Himalayan or woolly wolf (*Canis lupus chanco*, found across the trans-Himalayan region) and the Indian peninsular or common wolf (*Canis lupus pallipes*, which once ranged across most of Pakistan, India and Bangladesh). There is no official data, but experts estimate that just 2,000-3,000 individuals remain in the country.

"Wolves normally do not attack people. Wherever there is a high density of wolves in India, there has been no record of them killing people or children," Yadvendradev Jhala, senior scientist of Indian National Science Academy at the National Centre for Biological Sciences, Bengaluru, tells DTE. However, after the attacks in Mahsi, not just residents but even experts are unsure as to how the usually shy wolves started hunting humans. "It is possible that a wolf may have accidentally hunted a child, after which it started preying on children because they are easy targets," says DFO Singh. Gyan Prakash Singh, a former forest officer at Katarniaghat Wildlife Sanctuary in Bahraich, says wolves have a tendency to take revenge. "Their pups must have been harmed

by humans in the past due to which these attacks are taking place," he says. Jhala disagrees with this view. "Animals do not have a sense of vindictiveness; this emotion only manifests in the higher evolved beings—humans," he says.

"In the case of the attacks in Bahraich, it is speculated to be a pack of wolves. Though, I have yet to see a confirmation based on reasonable scientific evidence like a DNA test of hair from the clothing of killed children or from saliva from the wounds, or clear pug mark photos at the attack site or reliable visual confirmation that it is a wolf or a wolf pack. It seems to be a canid. It could be a wild wolf, a pet wolf released by the owners, a wolf-dog hybrid or a feral dog. From the bite marks it does not seem to be a felid or a striped hyena," says Jhala.

According to Jhala, eastern Uttar Pradesh has also seen a lot of hybridisation between Indian wolves and free-ranging dogs. People here also keep wolf-dog hybrids or even wolves as pets, he says. "Having been acquainted with humans, they lose their natural fear of them. If they get loose, they usually have nothing to eat in this region. Hence, they turn on easily available and weak, defenceless prey like children," says Jhala.

The issue of the animal's identity can be settled with DNA tests but the forest department has not carried it out in any of the cases. "If there is a complaint from village residents, a DNA test can be done," says DFO Singh. The state government has declared a compensation of ₹5 lakh for the families of those who died in animal attacks in the affected villages and ₹5,600 for the injured.



State forest department officials put up a poster to help village residents identify animals by their pug marks

ENSURE RURAL PROSPERITY

Upliftment of the poor to provide them better living conditions will
minimise human-wildlife conflicts

Yadvendradev Jhala

IT IS speculated that the attacks in Bagraich are by a pack of wolves. Though, I have yet to see a confirmation based on reasonable scientific evidence like a DNA test of hair from the clothing of killed children or from saliva from the wounds, clear pugmark photos at the attack site or reliable visual confirmation that it is a wolf or a wolf pack. It seems to be a canid—it could well be a wild wolf, a pet wolf released by the owners, a wolf-dog hybrid or a feral dog. From the bite marks it does not seem to be a felid or a striped hyena; yet there are reports of attacks on children sleeping on terraces—something an animal that has lived with humans would learn to do. The consumption of killed humans points towards a single animal and not a pack. If animals were scaled as dangerous based on the number of human deaths per year then the order would be snakes (about 50,000), elephants (about 550), feral dogs related (more than 250), leopards (about 150), tigers (about 55), wild pigs (about 30) and wolves (about 1.4) deaths. Compare this with the phenomenal number of road accident deaths in India, more than 150,000 per year; yet wildlife caused deaths hog the Indian media's attention, something one would expect in the western world and not from the tolerant East.

Human lives take precedence over those of animals—



the trial by the media based on half-truths, threatens the very existence of wolf populations and that of the species, not just the animal responsible for the attacks. If an animal responsible for attacks on humans is left unchecked then communities usually take matters in their hand. Swift removal of such problem animals is a major responsibility of wildlife managers so as to ensure the conservation of the species.

The action by the Uttar Pradesh forest department in capturing five wolves is commendable. However, it may just be that we are barking up the wrong tree, as the attacks continue. Identifying this particular animal that is responsible for the attacks and removing it, is paramount in resolving the problem in Bagraich.

In the long term, the solution is the upliftment of the poor section of the society so that they have better living conditions. This will minimise occurrences of wildlife conflict substantially. The state government's move to provide better housing to the poor in this region will help not only people but also wolves and other carnivores to persist in the landscape that has been their ancestral home.

(Yadvendradev Jhala is Senior Scientist of Indian National Science Academy at the National Centre for Biological Sciences, Bengaluru)

EXTREME POVERTY

Many people in Mahsi live in extreme poverty. Many areas face long power cuts. The houses, which are mostly made of mud, have no doors or toilets. Residents defecate in the open, which exposes them to animal attack. "It is only in areas where there is extreme poverty, where livestock is guarded more than children, that wolves attack children. Any predator would, as it has to survive," says Jhala (see 'Ensure rural prosperity').

Bilal Habib, scientist at Wildlife Institute of India, Dehradun, sees a silver lining in the tragedy. "The Bagraich episode has created an opportunity to change the narrative around wolf conservation in India. For the first time, wolves are at the centre of national discussions. By emphasising the historical connection between humans and wolves, their ecological importance, and the need for coexistence, conservationists can bring wolf conservation back on track," he tells DTE. "Wolves

are crucial to the health of ecosystems. As apex predators, they regulate prey populations, which helps prevent overgrazing and maintain plant diversity," Bilal adds. "The Indian wolf has the same status as the tiger and the lion in the Wildlife (Protection) Act. By being listed on Schedule I, wolves have the highest level of protection. Yet there is no specific conservation policy or investments for the Indian wolf," says Jhala. **DTE**

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Promises renewed

World leaders adopt 'Pact for the Future', reaffirm commitment to global development and governance



ON SEPTEMBER 22, the UN General Assembly adopted the “Pact for the Future” at the Summit of the Future in New York. The two-day summit saw over 4,000 participants, including heads of state, observers, international organisations and civil society, gathered to reshape global governance for the 21st century. The Pact, adopted without a vote, has

been called a “step-change towards more effective, inclusive, and networked multilateralism” by UN Secretary-General António Guterres.

The world leaders agreed to 56 action points in the Pact addressing key global challenges such as sustainable development, climate change, peace and security, governance reforms, gender equality and the needs of future

More than 4,000 people participated in the two-day Summit of the Future in New York on September 21-22

generations. In a way, it reinforces existing agreements such as the Sustainable Development Goals (SDGs) for 2030, the UN Charter, the Universal Declaration of Human Rights and many others.

While the existing agreements set the “what” of international action, the Summit of the Future, as per the UN, looks at “how” the world can better meet the needs of the present while preparing for the future.

Negotiations leading to the Pact began nine months ago, following the release of a “zero draft” on January 26, 2024, by Germany and Namibia, co-facilitators of the Summit. Since then, based on the feedback by stakeholders, the pact has been revised four times.

The most important contribution of the Pact is that it reaffirms international commitment to multilateralism at a time when there are rising doubts about the relevance of the principle and the role of the UN as a key instrument of global governance. The current global landscape remains polarised, with deepening inequalities between rich and poor nations. Wealthier countries, which once championed multilateralism, are increasingly adopting protectionist policies. Conversely, developing countries are advocating for a multilateral and globalised world that supports their development and provides access to international markets.

The shift towards unilateralism was evident during the 2021 UN Environment Assembly, where countries expressed concern over nations turning inward to address global crises. Vaccine nationalism,

trade protectionism and a growing retreat from international cooperation were highlighted as major concerns. The Assembly’s discussions emphasised how this shift negatively impacts efforts to address environmental challenges, which require global solutions. Guterres described it as a “triple environmental emergency” of climate change, biodiversity loss and pollution. He argued for a renewed relationship with nature but stressed that it could only be achieved through collective global action. “Governments and people need to understand that environmental, social, and economic challenges are all interconnected and must be tackled together,” he said.

The Pact highlights this ten-

brink,” Guterres declared. Sierra Leone’s President Julius Maada Bio echoed this sentiment, stating, “This Pact gives us hope and inspiration for a better future.”

On international peace and security, world leaders agreed to reform the UN Security Council to make it more democratic and effective, advance nuclear disarmament and prevent the weaponisation of new technologies, particularly in outer space. In terms of sustainable development and climate action, the Pact calls for accelerated progress toward SDGs, including reforms to the international financial system and increased funding for climate resilience.

The Global Digital Compact, a key component of the Pact, outlines a framework for digital cooperation, particularly in the governance of artificial intelligence (AI) to overcome digital divide. The commitments include ensuring global internet access, anchoring digital cooperation in human rights and promoting responsible AI regulation.

Additionally, the Declaration on Future Generations proposes specific actions to ensure future generations’ needs are considered in decision-making. It also promotes youth engagement in governance. The pact also attempts to strengthen efforts to promote human rights, gender equality and the empowerment of women across the world.

“This [existing] approach to [unilateral] governance reinforces the notion that it is acceptable to have first-class and second-class citizens,” said Mia Mottley, the Prime Minister of Barbados. **DTI**

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THE MOST IMPORTANT CONTRIBUTION OF THE PACT IS THAT IT REAFFIRMS INTERNATIONAL COMMITMENT TO MULTILATERALISM AT A TIME WHEN THERE ARE RISING DOUBTS ABOUT THE RELEVANCE OF THE PRINCIPLE AND THE ROLE OF THE UN AS A KEY INSTRUMENT OF GLOBAL GOVERNANCE

sion. Under “Transforming Global Governance”, the Pact underscores the central role of the UN, stating, “We resolve to strengthen the multilateral system, with the United Nations at its center.” Throughout the Pact negotiations, countries from the Global South pushed for greater representation in international bodies like the UN Security Council and multilateral development banks. These nations also called for urgent financial support to address climate-induced losses and damages. “We are here to bring multilateralism back from the

Family comes first

Health concerns from excessive use of pesticides and fertilisers make Punjab farmers grow organic crops for personal consumption

SHAGUN BARNALA, PUNJAB



IT IS mid September and Tejpal Singh's 12.1-hectare (ha) farmland is flush with paddy. "I have used over 4 tonnes of urea as fertiliser, and sprayed the crop once with pesticide," says the farmer from Kakrala village in Punjab's Patiala district. Adjacent to this field is a small plot that also has paddy, along with seasonal vegetables. "I grow crops on this 1.6-ha plot for my family's consumption. It is all organic, since I use green manure, vermicompost and bio-fertilisers here. I sell whatever is left over," he adds.

About three years ago, medical tests showed that Tejpal's wife had increased uric acid levels. Around the same time, a relative was diagnosed with cancer. "These cases left me wondering about the quality of the food we eat," says Tejpal. He got his crops tested and found high levels of urea, potash

and pesticide residue. "I decided then that my family should only consume organic crops. Since we made the switch, my wife's uric acid has been under control. The taste and quality of the food is also remarkably better," he says.

Punjab tops the country in per unit use of fertilisers such as nitrogen, phosphate and potash. According to data shared by the Union Ministry of Chemicals and Fertilisers in Rajya Sabha on August 6, 2024, the state consumed 103.1 kg of fertiliser per acre (247.61 kg per ha) during 2023-24. This is almost double the national average of 58.25 kg per acre (139.81 kg per ha). The use of nitrogen-phosphorus-potassium (NPK) fertilisers has also jumped by 180 per cent between 1980 and 2018—from 0.69 million tonnes to over 1.92 million tonnes—according to data with the Punjab government. While the state

accounts for only 1.53 per cent of India's area, it uses some 9 per cent of the total fertilisers applied.

The high incidence of cancer in the state is also well established. According to Indian Council of Medical Research-National Cancer Registry Programme data, shared by the Union Ministry of Health and Family Welfare in Rajya Sabha on February 6, 2024, cancer cases in Punjab have risen from 39,521 in 2021 to 42,288 in 2024.

For farmers, there is a direct possible link: agricultural chemicals and pesticides are known to cause cancer. Several of them, like Tejpal, have seen family members diagnosed with cancer or other conditions possibly brought on by consumption of food with fertiliser or pesticide residue. So to ensure their families' health, they are turning to organic cultivation for self-consumption.



In 2023-24, Punjab used 247.61 kg fertiliser per hectare, which is double the national average

the yield will be lower and the crop will look weak and yellow.” He currently grows crops organically on 0.4 ha for personal consumption.

Farmers say fertiliser and pesticide overuse happened due to soil degradation that led to declining yields and pest attacks. “If we shift totally, the yields will drop drastically again, and take four to five years to stabilise. How will we meet our expenses during that time?” asks Sukhvinder Singh of Bhaini Mehraj village in Barnala. Sukhvinder and his extended family farm on 20.2 ha, of which 0.8 ha is for organic farming. “Chemical farming has affected human and soil health, but we cannot go fully organic even in 10 years,” he says.

Like Ravdeep, Gulab Singh from Tapa village in Barnala has tried to go fully organic. In 2014, shifted 0.6 ha from his 6 ha to organic farming. After two years, he expanded the practice to the entire 6 ha. But this resulted in a huge loss of ₹1 lakh per ha in 2018. “I could not even recover the production cost,” he says. That year, he reverted to chemical farming on 5.4 ha, keeping 0.6 ha under organic for self-consumption. “A lot of farmers have taken to organic farming in the last few years. But we have been able to think only about how we can eat better. We have not reached a stage where we can afford to make the country eat better,” says Gulab, who works with Kheti Virasat Mission, a Punjab-based non-profit promoting organic farming and straw management practices. [DTE](#)

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Take the case of Ravdeep Singh of Pharwahi village in Barnala district. In 2009, his mother was diagnosed with cancer. “While there may be several reasons for the disease, we cannot rule out the role of chemical-intensive agricultural practices,” he says. So in 2011 he turned to organic farming for both personal and commercial purposes. “You cannot even imagine the amount of pesticides, fungicides and urea I used while practising chemical farming, especially in vegetables,” says Ravdeep, the only farmer in his village to completely switch to organic farming.

But it has not been a simple

shift. In 2011, when Ravdeep took up organic cultivation, the yield was normal. In 2012, it dropped drastically. “It has stabilised now, but not reached the level that I used to get with chemical fertilisers, especially in rice and wheat,” he says. For example, the average yield of wheat from 1 ha through chemical farming is 5 tonnes. But even after 13 years of organic farming, his yield is only 3.75 tonnes. “It started with 1.75-2 tonnes in 2011,” he says.

The prospect of lower yields deters several farmers from going fully organic. Says Jagtar Singh of Patti Khattar in Barnala district, “Without urea and other fertilisers,

FARMERS SAY FERTILISER AND PESTICIDE OVERUSE HAPPENED BECAUSE OF SOIL DEGRADATION THAT LED TO DECLINING YIELDS AND PEST ATTACKS. BUT EVEN THOSE WHO PRACTISE CHEMICAL FARMING HAVE NOW RESORTED TO ORGANIC FOR PERSONAL USE



CHOLERA TAKES AN UGLY TURN

Infections and deaths from cholera, an easily treatable diarrhoeal disease, have increased dramatically across countries. The pathogen *Vibrio cholerae* is now spreading far and wide, taking advantage of warmer temperatures and hitchhiking on frequent cyclones and floods.

A report by **ROHINI KRISHNAMURTHY** in West Bengal and **HIMANSHU N** in Maharashtra with **CHARLES MANGWIRO** from Mozambique, **KIZITO MAKOYE SHIGELA** from Tanzania, **CYRIL ZENDA** from Zimbabwe, **WINNIE BOTHA** from Malawi and **MEKONNEN TESHOME** from Ethiopia

Residents of Amjhara 10 village in South 24 Parganas district, West Bengal, depend on this pond for almost all their needs, from bathing to washing utensils to preparing food. The village saw an outbreak of cholera in April this year, which affected 41 people



THE MONSOON season, though unusually protracted this year, has ended. But the fear of contracting cholera persists across the coastal district of South 24 Parganas in West Bengal. In April, Dhananjay Roy of Fulmalancha gram panchayat in Basanti block had nearly lost his one-year-old son to the acute diarrhoeal infection. “Watery stool jetted out of his body 20 to 25 times for two days in a row. As he lay listless, we rushed him to a hospital,” recalls Roy. Caused by *Vibrio cholerae*, a comma-shaped bacterium, the disease can be fatal if left untreated as it forces the intestine to expel massive amounts of water and electrolytes like sodium, chloride, potassium and bicarbonate through faeces. The infant’s health improved soon after he was administered oral rehydration solution. But over the next fortnight, everybody else in Roy’s six-member family developed the same symptoms, requiring medical attention. Records at the block hospital show that between April and May, over 100 people from Fulmalancha and Chatrakhali gram panchayats contracted cholera—an old foe of the humanity that spreads through water or food contaminated with the faeces of an infected person (see ‘Transmission cycle’).

The outbreak prompted swift action from the district administration and health officials. “A rapid response team of experts, including an epidemiologist, a clinician, microbiologists and a food safety officer, visited the affected villages,” Amit Bera, block medical officer of Basanti, tells *Down To Earth* (DTE). Water samples from several tube wells were found to be contaminated with *Vibrio cholerae*. “Pond water was not tested, as it was bound to be contaminated,” says Atrayee Chakraborty, deputy chief medical officer of health, South 24 Parganas. There is a possibility

that people in these villages still defecate in the open, which then contaminates the pond, on which the village residents depend for almost all their needs—from bathing to washing utensils to preparing food, says Chakraborty. She says some households buy bottled water from companies that do not have licences to sell. These could have also been contaminated by *Vibrio cholerae*, and triggered the outbreak.

To contain the spread, tube wells that yielded contaminated water were prohibited for use and the district administration provided potable water to all households. Roy tells DTE that the measures remained in force only for a month. In his hamlet Amjhara 10, all the tube wells, except one next to the pond, were allowed to be used. “We are not sure if the water is fit for drinking. But then, what choice do we have?” Roy asks.

Chakraborty says at least two major cholera outbreaks have been recorded in South 24 Parganas in the past two decades—in Bishnupur block in 2023 and in Canning block in 2007-08.

Bordering the Bay of Bengal, often considered the “homeland” of cholera, the Sundarbans spanning India and Bangladesh is rife with the diarrhoeal disease

AGE-OLD PANDEMIC

South 24 Parganas stretches from the urban fringe of Kolkata to the riverine villages in the Sundarbans—the vast delta spanning India and Bangladesh. Known for vast tracts of mangrove forests and saltwater swamp, the delta is formed in the Bay of Bengal, often considered the “homeland” of cholera. Studies in fact suggest that the Sundarbans could be the ground-zero of cholera, which has caused seven pandemics in the past 200 years.

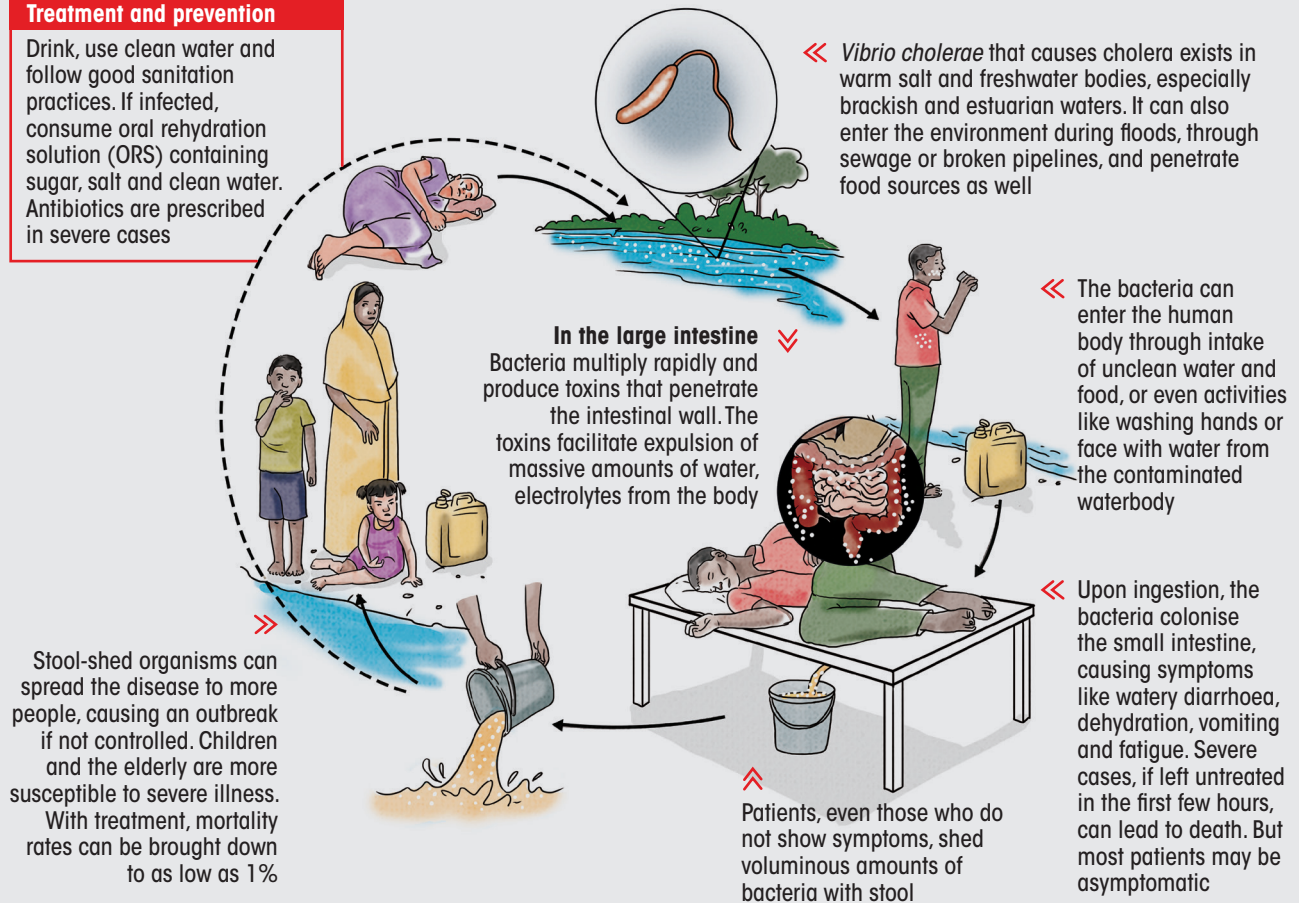
According to the book *Pandemic*, it all began in the 1760s, when the East India Company ordered felling of the mangroves in the Sundarbans, building embankments and growing rice in the region. Over 2,000 sq km of mangroves were felled. As people moved into the Sundarbans, the bacteria, which were until then largely

TRANSMISSION CYCLE

Cholera is a highly infectious but treatable disease that spreads especially in regions with unsafe and inadequate water and sanitation services

Treatment and prevention

Drink, use clean water and follow good sanitation practices. If infected, consume oral rehydration solution (ORS) containing sugar, salt and clean water. Antibiotics are prescribed in severe cases



Source: World Health Organization

hitchhiking on crustacean copepods, found a new host: humans. “A splash of water on the face, or intrusion of that salty water into the well, or water or food contamination is all it takes for an infection,” Sonali Shah, author of the book, tells DTE. Its spread was probably local until the first pandemic took off in 1817 in Jessore (now in Bangladesh), some 250 km from the Sundarbans. Over the next 60 years, *Vibrio cholerae* quietly seeded five pandemics until the 1880s, when Robert Koch, a German physician, identified the bacteria from the intestines and stool samples of infected patients, and described its role in causing the disease.

Scientists have so far recorded over 200 serogroups (groups that share a common antigen, which triggers an immune response in the body) of *Vibrio cholerae*. Only two of these serogroups—O1 and O139—are known to produce the cholera toxin and are responsible for major epidemics. Scientists have also deciphered the bacteria’s infection pathway and developed approaches to prevent or treat the illness, with hydration being the mainstay of treatment. Yet, the world has largely failed to contain the pathogen.

We are currently in the midst of the seventh pandemic, which has been spreading since 1961 and has even secured a spot



in the Guinness World Records as the “longest-enduring pandemic disease outbreak”. What’s worse is that according to the World Health Organization (WHO), cholera cases were on the wane in the 1990s, but show a significant uptick since 2017.

According to WHO’s global cholera statistics for 2023, released on September 4, the outbreaks are spreading globally and are becoming deadlier. The number of cholera deaths reported globally in 2023 increased by 71 per cent from the deaths in 2022, while the number of reported cases rose 13 per cent. As many as 45 countries reported cases of cholera infection, up from 44 the previous year and 35 in 2021. “Preliminary data show that the global cholera crisis continues into 2024, with 22 countries currently reporting active outbreaks,” notes the report, adding that 38 per cent of the reported cases were among children under five years of age.

The WHO analysis further shows that the global burden of the disease has shifted from the Middle East (West Asia) and Asia to Africa, where there was a 125 per

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At the Kasba slum, a cholera hotspot in Kolkata, residents have stopped drinking water from hand pumps after multiple cases of diarrhoea. Water from hand pumps is now used for cooking and bathing

cent increase in cases in 2023 compared with the previous year. “Conflict, climate change, inadequate safe water and sanitation, poverty, underdevelopment, and population displacement due to emerging and re-emerging conflicts and disasters from natural hazards all contributed to the rise in cholera outbreaks last year,” it states.

EMERGING HOTSPOTS

For 60-year-old Rucia Simango, who lives in the densely populated neighbourhood of Liberdade in Mozambique, cholera has been a part of life. For the past 12 years, almost after every rainy season Simango develops the illness, and often requires hospitalisation. “Each time it rains, the locality turns into a lake. Most houses here have open-pit latrines, which also remain submerged and the excrement gets mixed with our food and drinking water,” says Simango, sitting in a makeshift house. Her neighbour Amelia Tembe says that the government has installed a tap in the neighbourhood for supplying drinking water. But only discoloured water flows

through the pipe, that too infrequently. Tembe, who lives with her four children and mother, thus fetches water from a contaminated well or a stagnant stream nearby. “We have been advised by the health authorities to apply chlorine to the water or boil it before consumption. But we do not have money to buy chlorine or fuel. So we just take a gamble and drink the contaminated water,” she adds. Estimates show 36 per cent households in Mozambique lack access to safe drinking water.

Some analysts blame the novel coronavirus pandemic (COVID-19) for the recent surge in cholera outbreaks. As priority shifted towards COVID-19 containment, it resulted in a lapse in contact-tracing and the diagnosis and treatment of cholera patients in high-risk areas, they say. However, Bioye Ogunjobi, a UNICEF official in Nigeria, blames the repeated cholera outbreaks on the governments’ lackadaisical attitude towards ensuring access to safe water and basic sanitation.

Consider Zimbabwe. In 2023, the country experienced one of its worst cholera outbreaks. In Mbare, the oldest suburb in capital city Harare, faecal waste could be seen spilling from the broken sewage pipes of multi-storey residential flats. Even in the central business district and in residential suburbs, mountains of waste remain uncollected. The local authority is able to meet only 25 per cent of the city’s water requirement, leaving the rest of the residents to rely on unsafe sources. Harare’s City Health Department revealed in January 2024 that half of the boreholes in the city were contaminated with sewer and human waste, making them potential sources of cholera and typhoid.

Itai Rusike, executive director of the Community Working Group on Health, an advocacy group in Harare, says, “Although the epidemic is now under control, conditions remain conducive for the disease to flourish.” Explains Precious Shumba, ex-

ecutive director of Harare Residents Trust: The old suburbs in Harare were built before the Independence. Underground water and sewer pipes are sand-blocked, rusty and inadequate for the increased population. With the accelerated urbanisation, unplanned settlements have emerged but without any provision for piped water supply or sewer systems. The result is that residents have dug shallow wells or boreholes alongside septic tanks on their 200-300 square metre residential plots. “Due to high rate of leakages of both sewer and water pipes, cholera outbreaks have also been frequent and rising as well,” Shumba says.

In Ethiopia, WHO has termed the cholera outbreak as a crisis. Since August 2022, when the outbreak started, the country reported 44,044 cases and 571 deaths (as of May 2024). According to Ethiopia Public Health Institute, “15.9 million Ethiopians, constituting 15 per cent of the total population, live in areas with a history of recurrent cholera outbreaks.” Fikadu Yohannes, a medical doctor at the College of Health Sciences, Addis Ababa University, says, “Such recurring cholera outbreaks are an indication of

deprived water and sanitation conditions as well as weak health systems, which contribute to the transmission of cholera.” Ethiopia ranks among the lowest in the Sub-Saharan Africa in terms of access to clean drinking; around 31 per cent of the population depends on unsafe sources of drinking water. In 2022, the country initiated the National Cholera Elimination Plan, under which the government aims to stop local transmission of cholera by 2028 and reduce fatality by 90 per cent. Of the estimated US \$404 million budget for the plan, 90 per cent are allocated for improving water, sanitation and hygiene infrastructures.

But can ensuring safe water and sanitation alone help combat the spread of cholera in a warming world? *Read on.*

The global burden of cholera has shifted from West Asia and Asia to Africa, where there was a 125% increase in cases in 2023 compared with the previous year

Overlooked outcome

Climate change drives current upsurge in cholera outbreaks

VIBRIO CHOLERAЕ has an affinity for brackish water and warmer temperatures. Therefore, researchers steeped in the data of climate change, from geophysicists to hydrologists to environmental statisticians, see the potential of cholera outbreaks increasing as sea levels and water temperatures rise. “With every 1°C rise in temperature, we expect a huge rise in cholera cases,” Suman Kanungo, scientist at National Institute for Research in Bacterial Infection (NIRBI), Kolkata, tells *Down To Earth* (DTE).

A 2020 study published in *Vaccine* finds that the bacteria levels in the environment increased a month after temperatures went up, resulting in a surge in cholera cases in Punjab, Haryana and Chandigarh. Another study published in *American Journal of Tropical Medicine and Hygiene* in 2013 analysed data from Delhi, Ludhiana district in Punjab and parts of Pakistan, and concluded that, on average, chances of an epidemic increased sixfold if the air temperature rose above the climatological average two months prior. When air temperature crossed 31°C, these regions witnessed 50 per cent or more cholera outbreaks. The paper, however, notes that “air temperature alone will not cause an epidemic unless accompanied by appropriate transmission mechanisms such as poor water quality and lack of sanitation infrastructure.”

The combined factors of warmer temperatures and poor water quality were at play at Basanti block in West Bengal’s South 24 Parganas that recorded two cholera outbreaks between April and May. Amit Bera, block medical officer of Basanti, says the summer this year was unusually hot. “High temperatures depleted groundwater levels in the villages, which

forced people to buy water from unlicensed private players,” Bera explains.

Climate change also favours pathogens like cholera by increasing the risk of floods, cyclones, droughts and torrential rainfall. In the first week of June, just after cyclone Remal made landfall on May 26, DTE visited a slum near Kolkata’s Raja Bazar. Such extreme events often expose weaknesses in the infrastructure, such as poor water, sanitation and sewage coverage. Residents complained of sewage from manholes mixing with the piped drinking water supply adjacent to it. Khaleeda Khatoon, a resident, tells DTE that the cyclone flooded the entire area. “My son now has diarrhoea. Doctor says it could be because of contami-



PHOTOGRAPH: CHARLES MANGWIRO

nated water,” Khatoon says.

Several studies have documented cases of cholera in the aftermath of a cyclone. On May 25, 2009, the very severe cyclonic storm Aila battered coastal districts of West Bengal. Soon, reports of an increased number of diarrhoea cases emerged in East Medinipur, one of the districts affected by the cyclone. Researchers from NIRBI found *Vibrio cholerae* in 21 or 54 per cent of the stool samples analysed, as per a 2011 study published in the *Indian Journal of Medical Research*.

Jaydev Khatua, who owns a hotel in the Gosaba block of South 24 Parganas, says, “Almost 90 per cent of residents in the block developed infectious diarrhoea within a few days after the cyclone Aila hit the region. In my family, 13 people fell sick.” A 2011 paper published in *Transactions of the Royal Society of Tropical Medicine and Hygiene* investigated the outbreak in Gosaba block, which was affected by flooding and saline water intrusion induced by

For the past 12 years, Rucia Simanango has had to evacuate her flooded house in Matola, Mozambique, during the rainy season. In many of these years, she contracted cholera

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storm surge and the breaching of river embankments during the cyclone. During 2007 and 2009, monthly diarrhoea cases in Gosaba were only 2-20 per 10,000 population. After the cyclone, as many as 1,076 acute watery diarrhoea cases with severe dehydration were admitted at healthcare facilities between May and August 2009; as many as 14 succumbed to the illness. Two of the five patient samples tested positive for *Vibrio cholerae*.

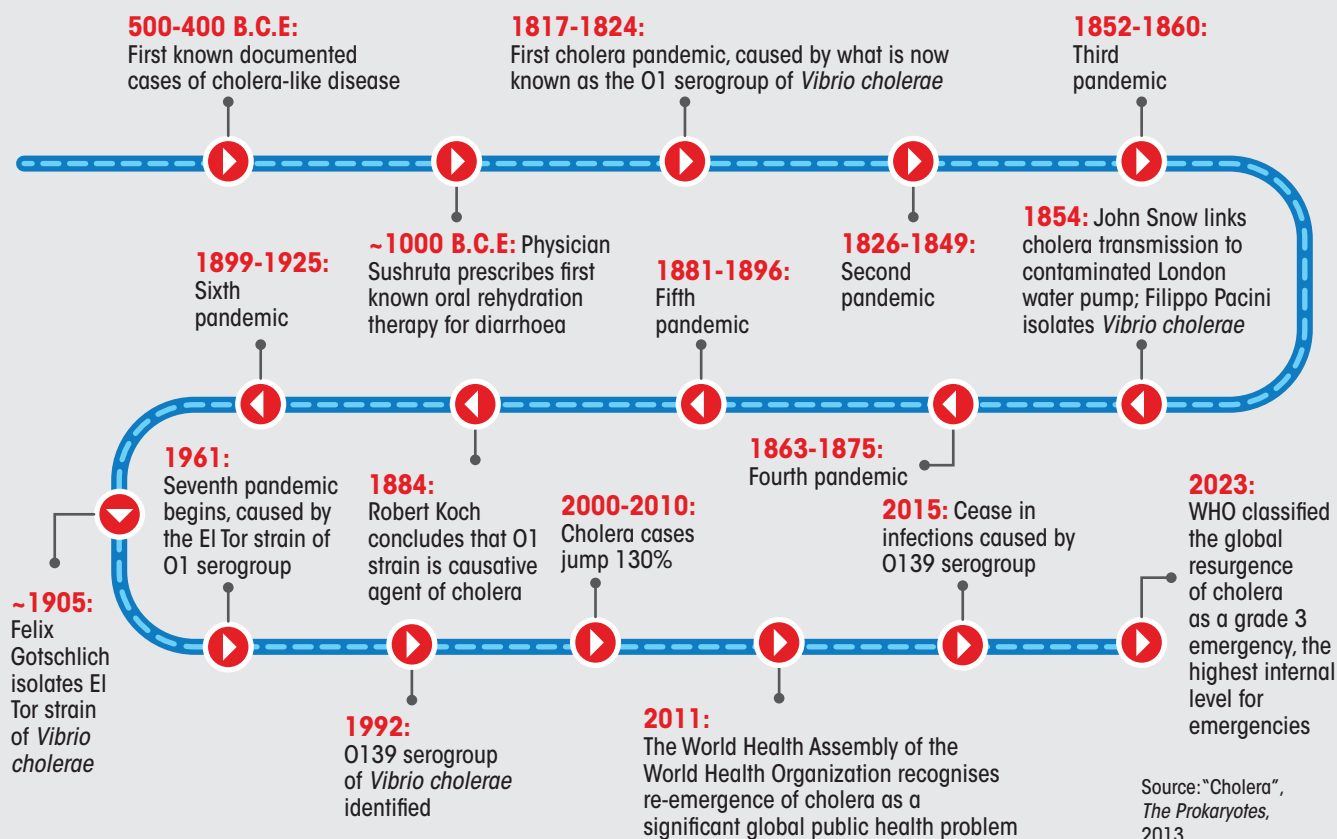
The study highlights that the outbreak occurred in two waves. The first wave was reported in the fourth week of May as the cyclone damaged the piped water supply system. The network was repaired a week later. But since several ponds and tube wells remained submerged in saline water following the cyclone, residents damaged the repaired pipeline to draw water, which likely triggered a second wave in August.

The potential of an extreme weather event to trigger a cholera outbreak can be gauged from the October 1999 super-



INCESSANT INFECTION

The world has seen seven cholera pandemics over the past two centuries, with the current outbreak since 1961 being the longest ever recorded



cyclone that battered six districts in Odisha. Over the next two months, the districts reported 97,000 cases and 81 deaths due to diarrhoea—much higher than the morbidity figures recorded by the state in the previous three years. Of the 107 samples tested, 83 were positive for *Vibrio cholerae*, reads a 2002 paper published in *Epidemiology and Infection*, adding that the cyclone damaged water supply and sanitation systems, which could have resulted in the outbreak.

Though floods are more strongly associated with cholera outbreaks, a 2018 paper published in *American Journal of Tropical Medicine and Hygiene* finds that their prevalence is also higher during droughts. During long periods of drought, households are more likely to store water, which

could become a major source of *Vibrio cholerae* contamination.

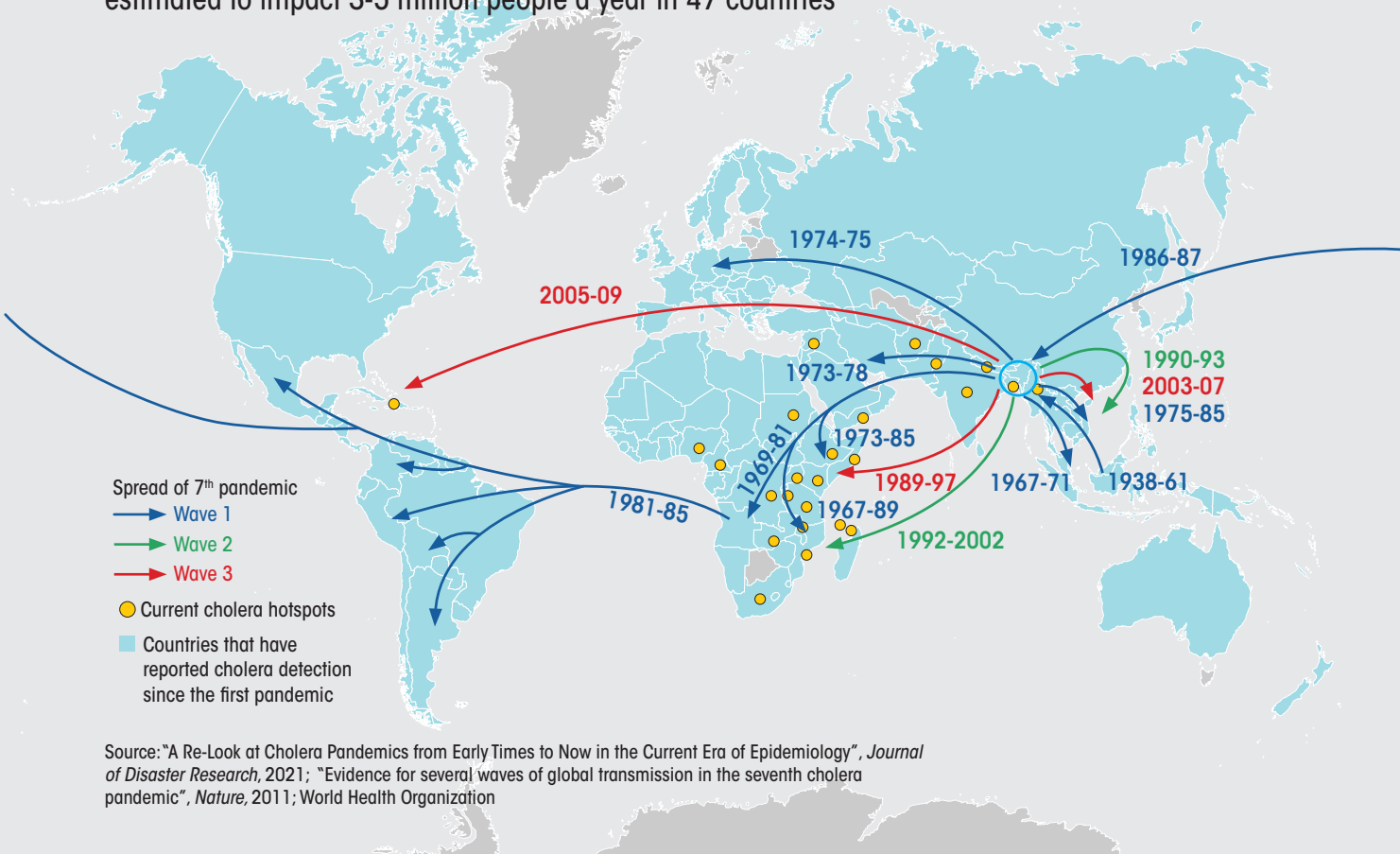
NEW SEASONS, NEWER GROUNDS

Since the late 19th century, scientists have observed seasonal trends in the emergence of cholera infection in areas where the disease is endemic. While most of India, including Delhi, Hyderabad, Odisha, and Chandigarh, has a single peak in cases during the rainy season from May to August, Kolkata sees two seasonal peaks. The first strikes in the summer, associated with rising temperatures, while the monsoon peak is associated with rainfall.

Debbie Shackleton, research associate at the School of Public Health, Imperial College London, tells DTE that the monsoon peak in Kolkata may have emerged due to

GLOBAL SPREAD

First detected in the Bay of Bengal region, cholera has spread to nearly every continent and is estimated to impact 3-5 million people a year in 47 countries



reduced immunity levels with a less severe summer peak, as people in the city have access to treated municipal water. Further, says Shackleton, who examined British datasets on cholera mortality from 1890 to 1940, there is greater vulnerability to floodwaters in monsoons due to higher population density in Kolkata.

The pattern in neighbouring Bangladesh shows even more of a shift from India. "It has a more distinct summer peak than Kolkata and a post-monsoon peak," says Shackleton.

Kanungo warns that with climate change, newer areas could become suitable for *Vibrio cholerae*. Under current climate conditions, though all coastal regions on all continents have conditions ripe for *Vibrio cholerae* growth, places most suitable

are coastal Peru and Ecuador in South America, Canberra in Australia, the Bay of Biscay and the North Sea in Europe, the Gulf of California, the Yellow Sea, the Gulf of Oman, coastal Mauritania, Senegal, Western Sahara, large areas in South-Western Africa and along the coasts of Kenya, Maldives, Bangladesh, Thailand, Vietnam, and Cambodia.

By 2100, the researchers estimate in a 2015 study published in *Acta Tropica*, *Vibrio cholerae* could expand latitudinally. The Pacific coast off of western North America, the Gulf of Saint Lawrence off the coast of Quebec, Canada, the Coral Sea and the Tasman Sea from Fiji to New Zealand, and the Black Sea in Southeastern Europe could offer suitable conditions for *Vibrio cholerae* growth.

Turning the tide

Underreporting of outbreaks and vaccine shortage compound the burden of cholera

CHOLERA OUTBREAKS are soaring globally and are becoming deadlier. This is despite cholera being an easily treatable disease. According to the World Health Organization (WHO), the majority of people can be treated through administration of inexpensive oral rehydration salts. It can be easily prevented by ensuring that communities have access to clean water and lavatories. Even outbreaks can be contained through early detection and rapid action. Yet cholera has a continued global presence because it is a neglected and underreported disease. WHO, which in January 2023 classified the global resurgence of cholera as the grade 3 emergency that requires major to maximal response, acknowledges that “data on cholera are often incomplete and underreporting is common”.

For instance, cholera is a notifiable disease in India. This requires states to report cholera outbreaks to the Integrated Disease Surveillance Programme (IDSP) under the Union Ministry of Health and Family Welfare. In the first week of September, when DTE analysed the data available with IDSP for cholera outbreaks in West Bengal, it did not reflect the two outbreaks in Basanti block of South 24 Parganas in April and May.

Further, IDSP only reports positive cases from outbreaks, not sporadic cases, which could limit our understanding of the true burden of cholera, reads a 2017 paper published in *PLOS One*. It also highlights reporting biases within the country. States like Karnataka appear to have a better reporting system and may report proportionately more cases than states with poor reporting systems such as Uttar Pradesh.

IDSP reports also do not always reveal whether the cases identified as acute diarrhoeal disease were tested for cholera. A 2016 paper published in the *Indian Journal of Medical Research* compared the number of cholera cases reported by India to WHO and the number of cholera cases admitted to Infectious Diseases Hospital in Kolkata between 2007 and 2010. It found that in 2007, India reported 2,600 cases to WHO, whereas 19,000 cases were admitted to the Infectious Diseases Hospital alone.

“My worry is that information gets lost as it passes through the different layers, from ASHAs (Accredited Social Health Activists) to the primary health centres,



PHOTOGRAPH: PETER MGONGO

community health centres, sub-divisional hospitals, the chief medical and health officers, state governments, IDSP and finally the Centre,” says Dipika Sur, former scientist with National Institute of Cholera and Enteric Diseases (NIRBI) in Kolkata.

Another reason for undercounting is inadequate laboratory capacity, especially at primary health centres. “Cholera testing is a specialised process. Samples need to be carried in a specific media. By the time authorities arrange the transport media in the event of a reported outbreak, cases may have stopped. So there is a great possibility that several cholera cases are underreported,” a former surveillance official with WHO tells DTE, on condition of anonymity.

According to Global Task Force on Cholera Control, stigma, and fears of impact on trade or tourism are also some of the reasons governments are reluctant to acknowledge the true burden of cholera. WHO advises against embargoes on imports of food from cholera-affected countries, restrictions on movements of people and require-

Tanzania is grappling with its most severe cholera outbreak in four decades, because of heavy rainfall brought on by El Niño. Areas with inadequate drainage systems and water management infrastructure are particularly affected

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ment of vaccination proof in case of international travel. Yet affected countries have faced discriminations during outbreaks.

VACCINES FOR PREVENTION

Call it the outcome of climate change, conflicts or poor surveillance system, cases of cholera are soaring across the globe, particularly in the developing parts of the world—in Asia and Africa (see ‘Worrying resurgence, p39). And governments see vaccines as the silver bullet to put an end to the pandemic.

In India, says Atrayee Chakraborty, deputy chief medical officer of health, South 24 Parganas, vaccines will be rolled out in five villages in Bishnupur-II block in October. “We chose the block since the bacteria are present in the ambient environment. We have already conducted a survey, and the plan is to vaccinate 50,000 people, including children,” she adds. It is an oral cholera vaccine, Euvichol-Plus, produced by Korea-based EuBiologics Co Ltd. The vaccine uses killed or inactivated whole cells of the two *Vibrio cholerae* serogroups: O1 and O139, and has been prequalified for use by WHO. “Two doses will be given two weeks apart,” Suman Kanungo, scientist at NIRBI tells DTE. Studies have shown that it offers a protective efficacy of 65 per cent and the protection is said to last for up to five years. The pilot programme will also test feasibility, logistic challenges and post-intervention evaluation.

While oral cholera vaccines are used as a preventive tool, administered in an endemic area, and as a reactive measure, administered during an outbreak, Shanta Dutta, director at NIRBI says, “the vaccine can be given when we spot warning signs like before the monsoons, increased seawater temperatures and sea levels.”

This is not the first roll out of oral cholera vaccines in India. In 2011, researchers from India, South Korea and the US initiated a mass vaccination campaign in selected villages in Satyabadi block of Odisha’s Puri district. The campaign was funded by the Bill and Melinda Gates Founda-



tion, the governments of Korea, Kuwait and Sweden and the Korea Racing Authority. A surveillance study between 2004 and 2006 by the Regional Medical Research Centre, in Bhubaneswar had already established that about 17 per cent people in the block suffered from cholera. Two vaccine doses were provided to all healthy non-pregnant residents above the age of 1 year between May and June 2011, some 14 days apart, according to a 2014 study published in *PLOS Neglected Tropical Diseases*. Over 31,000 people received the first dose and 23,751 (46 per cent of them) received second dose. “Our findings suggest that mass vaccination using two doses of oral cholera vaccine, where almost the entire community is targeted, is doable but requires detailed micro-planning, additional human resources, modifications in cold-chain capacity and modifications in the number and the location of vaccination booth,” the researchers write.

Sur says there is also a need to assess for how long these vaccines offer protection. During another trial of oral cholera vaccine conducted in Kolkata in 2006-07, her team wanted to conduct a study five years later to assess if it still offered protection. They were forced to pull the plug due to a fund crunch. “This was important to assess how many years later a repeat vaccine can be administered. We were not proposing to vaccinate the whole country, like polio. We were keener on vaccinating people living in cholera hotspots and finding out if people develop cholera in the subsequent years at an experimental stage,” she explains. Sur also says their study could not explain the mechanism through which the vaccine confers protection. “We measured the vaccine’s effectiveness through IgA (immunoglobulin A is an antibody produced by the body to fight off infections). We observed that IgA had gone down but protection was still there, which means cholera cases were still low even af-

ter three years. We could not explain this scientifically,” she explains.

At present, doctors in India provide cholera vaccines only for those with recurrent diarrhoeal infections, says Kakun Chakraborty, house surgeon at Infectious Diseases and Belegghata General Hospital, Kolkata. According to the Indian Academy of Paediatrics, only one cholera vaccine is marketed in India and can be administered to children aged over one. Still, in India, cholera vaccines are underused in public health vaccination programmes despite the disease being endemic. A study published in the *Journal of Clinical and Diagnostic Research* has identified the probable reasons behind the vaccine’s low popularity in the country. First is the lack of awareness about the disease and the vaccine. Cholera disproportionately affects the poorest and most vulnerable communities. These are the people who need the vaccine the most but cannot afford it.

GLOBAL STOCKPILE EMPTY

Elsewhere in the world, there appears to be a clamour for cholera vaccines. Between 2013 and 2018, as many as 24 countries requested 83.51 million doses, as per a 2020 paper in *Vaccine*. The number of doses shipped has roughly doubled each year. Most requests, notes the study, have been for use in emergencies during an outbreak. The African Region tops the list since it is the most affected by cholera. “The region with the lowest ocv [oral cholera vaccine] use was South East Asia.

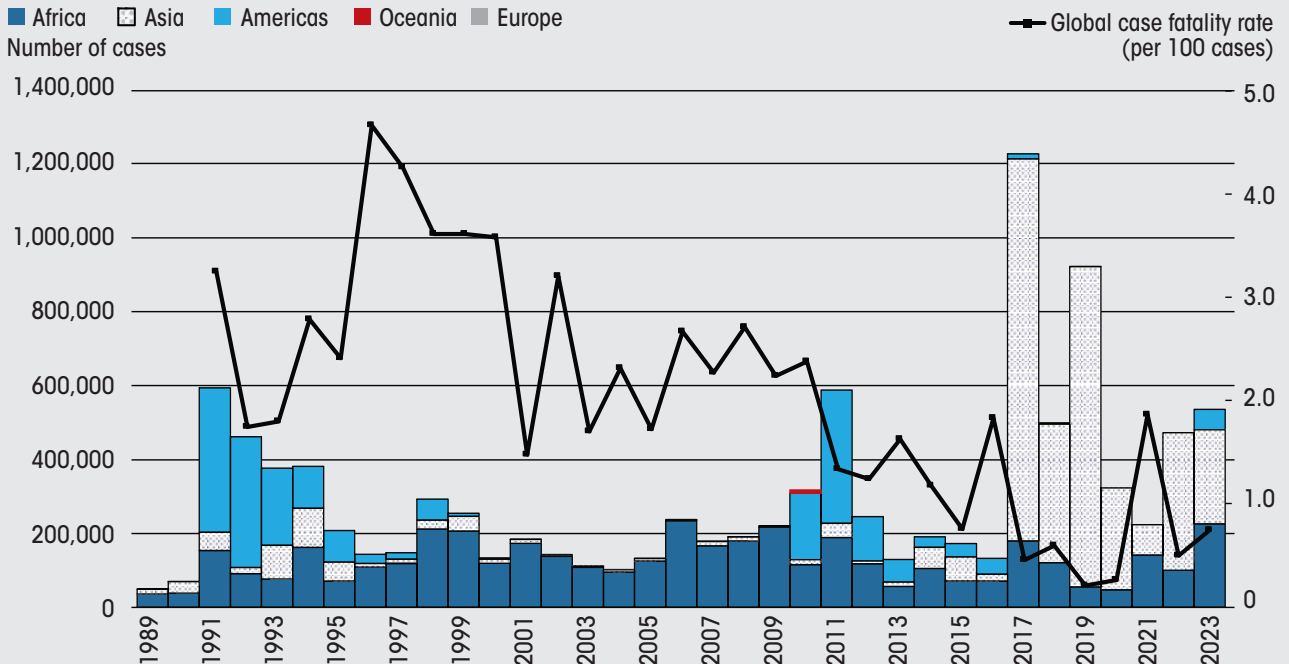
Cholera outbreaks tend to go unreported in this region making it less likely for them to request ocv in an emergency,” it states.

In 2024, the demand for these vaccines outpaced supply, with WHO reporting a shortfall in the global stockpile despite vaccine manufacturers producing them at their maximum capacity. Consequently, WHO recommended a single vaccine dose instead of a two-dose regimen. “Critical

In 2024, demand for oral cholera vaccines outpaced supply. WHO reported a shortfall in the global stockpile despite vaccine manufacturers producing them at maximum capacity

WORRYING RESURGENCE

There was a huge spike in cases in 2017, following which the cholera burden largely falls on Asia and Africa. The latter also contributes significantly to the number of global fatalities per 100 cases



Source: "Public health surveillance for cholera: Guidance Document 2024", Global Taskforce on Cholera Control

shortage of oral cholera vaccine hinders a comprehensive cholera response. The global stockpile of vaccines got depleted. As of May 6, 2024, the stockpile has 3.2 million doses, roughly 2 million doses short of the stockpile target of five million doses," an official working at a private foundation tells DTE on condition of anonymity.

The situation has since improved. The stockpile exceeded the emergency target of five million doses in early June for the first time in 2024. As of June 10, the stockpile contained 6.2 million doses.

New private players are entering the market to cater to the global demand. On March 20, 2024, the International Vaccine Institute announced it was transferring technology to manufacture a simplified oral cholera vaccine—it has a simplified formulation with the potential to lower production cost—to Biological E. Limited, a biotechnology and biopharmaceutical company based in Hyderabad. The

technology transfer is expected to be completed by 2025, after which the firm will manufacture the vaccine for India and international markets.

In 2021, the Central Drugs Standard Control Organisation permitted Bharat Biotech International Limited to conduct a phase III clinical trial of a new inactivated cholera vaccine, Hillchol, developed by Hilleman Laboratories in Singapore. Information on ClinicalTrials.gov, a US government web-based resource maintained by the National Library of Medicine, shows that the firm is still recruiting participants in Andhra Pradesh, Telangana, Karnataka, Uttar Pradesh, Maharashtra, Haryana and Bihar. Globally, six clinical trials in the US, Finland, South Korea, and India, are recruiting patients to test oral cholera vaccines. But in the absence of proper monitoring and surveillance, the potential demand is difficult to predict. **DTE** @down2earthindia



NOTHING MICRO ABOUT THIS MENACE

The evidence on microplastics affecting human and environmental health has become too significant to ignore, a fact that delegates will do well to remember when they meet for the final negotiation on a global plastic treaty in Busan next month

Tribhuwan Singh Bisht

THIS NOVEMBER, the world will convene in Busan, South Korea for the final round of negotiations on the Global Plastics Treaty, a legally binding instrument to help countries address plastic pollution at source. One point of discussion that has evolved between 2022, when the agreement was signed, and now is the addressing of microplastics.

During initial meets, countries largely focused on microplastics, a term used for plastics with a diameter of up to 5 mm, as a component of marine plastic pollution since they are often generated through degradation of larger plastic waste discarded into aquatic environments. But by the fourth round of negotiations in April this year, focus shifted to clear measures to reduce their generation and release, with particular emphasis on reducing intentionally produced microplastics. These include the raw materials used in plastic fabrication and processing, as well as small microbeads added to toothpaste and other personal care products as an exfoliating agent. According to "Microplastics—Occurrence, Fate and Behaviour in the Environment", a chapter published in the 2017 book *Comprehensive Analytical Chemistry*, approximately 6 per cent of liquid skin-cleaning products sold in the EU, Switzerland and Norway contain microplastics.

The greater focus on microplastics and their reduction comes amid increasing scientific research and evidence on their all-pervasive nature. According to the UN, the world produces 430 million tonnes of plastic per year, two-thirds of which are only used for a short

time. This means as plastic production and waste grows, microplastics will grow exponentially as well and eventually end up in agricultural soil, the air we breathe, the water we drink, the food we eat, and even our own bodies. The UN Environment Programme (UNEP) had already warned against this, by labelling microplastics as an emerging contaminant that could potentially threaten the health of humans and other organisms in the "UNEP Year Book 2014: emerging issues in our global environment".

Scientific research also provides greater clues on the potential health impacts of microplastics. For several years, governments have debated whether the presence of

MICROPLASTICS ARE DETECTED IN THE HUMAN BRAIN, LUNGS, KIDNEYS, PLACENTA, REPRODUCTIVE ORGANS AND BLOOD. WHILE NOT EVERY DETECTION IS LINKED WITH HEALTH IMPACTS, SOME CONNECTIONS HAVE BEEN DISCOVERED

these tiny, inert particles can pose a major threat. Even the World Health Organization said in 2022 that there was insufficient evidence to determine the risk microplastics pose to human health.

But, new research is increasingly providing more clues.

HARMFUL TO HUMANS

In a recent preprint, a team of researchers led by the University of New Mexico, US, show that microplastics appear to have invaded the brain. The preprint, which was posted online in May 2024 but is yet to be peer reviewed, shows significant accumulation of microplastics and nanoplastics (particles

less than 1 µm in diameter) or MNPs in the human brain. For the study, the team analysed liver, kidney and brain samples from deceased individuals in Albuquerque, New Mexico, US. The samples available were from 2016 and 2024. "MNP concentrations in decedent brain samples ranged from 7-to-30 times the concentrations seen in livers or kidneys," they say. Some 24 brain samples collected by the team in early 2024 were nearly 0.5 per cent plastic by weight.

Other research also shows that the particles are present in human lungs, kidneys, placenta, reproductive organs, and even blood. While not every detection is linked with specific health impacts, some clues have been found.

A 2022 review paper published in *Marine Pollution Bulletin* explains that exposure to the particles can induce oxidative stress or cytotoxicity in cerebral and epithelial cells. The paper highlights other impacts like decreased immune response, inflammation, DNA damage, disruption of metabolism and impaired reproductive activity (see 'Potential health hazard', p43).

In March 2024, a study published in the *New England Journal of Medicine* also confirmed presence of microplastics in the heart by analysing the carotid artery plaque (a buildup of fatty deposits in the carotid arteries that supply oxygenated blood to the brain) of 304 patients. The researchers detected MNPs in nearly half the patients. Among the 257 patients that came for followup after 34 months, those with MNPs had a higher risk of myocardial infarction.

tion (heart attack), stroke as well as death.

Microplastics exposure also reduces lipid digestion in simulated human gastrointestinal systems, due to the formation of oil droplets, and inhibits enzyme activity during the digestion process, says a 2020 paper in *Environmental Science and Technology*.

How do microplastics enter the human system? One way is through inhalation; microplastics are deposited in the air as atmospheric fallout from industries, construction, urban dust and residues of synthetic textiles and tyre erosion. In a 2023 review paper published in *Groundwater for Sustainable Development*, Indian researchers note that in one day, Dongguan City in China sees about 36 microplastics per sq m deposited into its atmosphere, Paris, France sees about 110 microplastics per sq m, while London, UK sees as many as 575-1,008 microplastics per sq m. Even remote areas of the Pyrenees mountain range on the France-Spain border see considerable microplastic deposition into the atmosphere, at 365 particles per sq m. But analysing whether these deposition rates are harmful is difficult, given that the world is yet to set standards on safe exposure levels to microplastics.

The review highlights that compared to the outdoors, indoor concentrations of microplastics are higher (1,600–11,000 particles per sq m per day). “The high detected concentrations of microplastics in indoor environments might be attributed to the higher flux of indoor microplastics sources and fewer particles being removed by disper-

sion processes than in outside environments,” it says.

Earlier in 2020, a study published in the journal *Environment International* analysed indoor dust samples from 12 countries and detected presence of polyethylene terephthalate-based microplastics (PET-based MPs) ranging from 38 to 120,000 µg per g. It also says that children may take in more microplastics than adults, based on body weight (bw). “The median daily intake of PET-based MPs calculated for infants was in the range of 4,000-150,000 ng/kg-bw/day,” it says, adding that these values are tenfold higher than

MICROPLASTICS ARE SEEN IN VARYING QUANTITIES IN AIR, SOIL AND WATER. BUT ANALYSING THE DEPOSITION RATES IS DIFFICULT, GIVEN THAT THE WORLD IS YET TO SET STANDARDS ON SAFE EXPOSURE LEVELS TO MICROPLASTICS

those for adults.

The food chain also plays a role. On land, microplastics have been found in terrestrial organism wastes like earthworm cast and chicken faeces, with concentrations ranging from 14.8 to 129.8 particles per g, says the 2023 review paper. Among marine organisms, molluscs show the highest concentration (up to 10.5 microplastics per g), followed by crustaceans (up to 8.6 microplastics per g) and fish (up to 2.9 microplastics per g), according to a 2020 study published in the journal *Environmental Health Perspectives*.

It's not just living organisms that contain microplastics. Sea salt can have up to 1,674 particles per kg, which is higher than the concentration in rock salts and lake

salts, says a 2018 study published in *Environmental Science and Technology*. A 2019 study published in the same journal said a single tea bag releases about 11.6 billion microplastics and 3.1 billion nanoplastics into a cup of tea. Other items where microplastics have been detected include take-out food containers and cigarette butts, which also facilitate ingestion.

Other forms of exposure include dermal contact, or through items such as medical implants. A 2021 study in the *Journal of Hazardous Materials* by researchers from Iran and the UK retrieved traces of microplastics from human washes and found 16,000 particles from 2,000 individuals. The largest number of microplastics were found in head hair (more than 7,000) and the least in saliva (about 650 particles). Men had almost twice the amount of microplastics as women. But

gauging the exact impact of these concentrations remains a challenge until the safe exposure limits and standardised risk assessments are established.

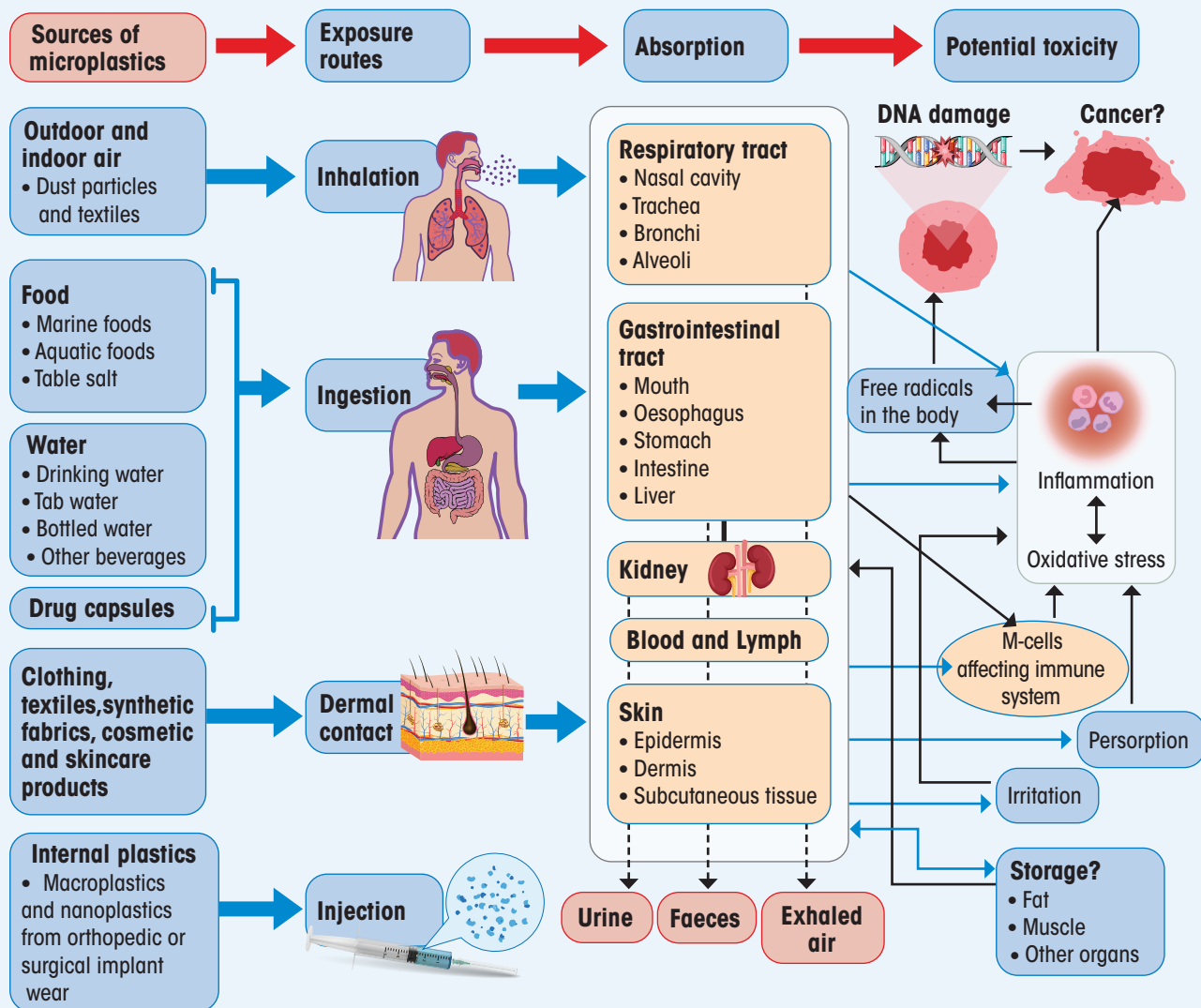
EFFECT ON ENVIRONMENT

Microplastics also impact the environment that they invade. After air, soil is the second-largest reservoir of the particles, majorly deposited through agricultural practices like mulching with low-density plastic. Studies in China, cited in the 2023 review, found average concentration of 310 particles per kg in agricultural sites near Hangzhou Bay, with mulched soils having 571 particles per kg. Landfills and industries also contribute to soil microplastic levels.

Effluents from wastewater

POTENTIAL HEALTH HAZARD

Health implications of microplastics in humans are not fully known, but some risks are indicated



Source: "A review on microplastics and nanoplastics in the environment: Their occurrence, exposure routes, toxic studies, and potential effects on human health", *Marine Pollution Bulletin*, June 2022

treatment plants are a significant source as well. While larger particles are typically captured during the various stages of wastewater treatment, smaller microplastics often pass through. Some of these particles get trapped in activated sludge, which is then applied as fertiliser in agriculture, potentially releasing microplastics into soil.

"Once accumulated in soil,

microplastics may naturally breakdown and bioaccumulate in plants, soil organisms, and biodiversity," says the 2023 review paper. The bioaccumulation has been shown to hamper soil quality and nutrient cycles, alter soil chemical characteristics and reducing water and nitrate-holding capacity, as well as microbial activity crucial for plant growth.

A 2020 study in the journal *Plants* shows that irrigation water contaminated with microplastics results in reduced shoot and root length in *Lepidium sativum* (garden cress). The study suggests that chemicals leaching in the water from the particles may be impacting the grass's germination. Another 2020 study, published in the journal *Plants, People, Planet*,

notes that concentrations of the microplastic ethylene propylene diene monomer rubber, used in artificial sport turfs, may have negative effects on plant growth.

Like soil, water is also heavily contaminated by microplastics. “Exposed agricultural soil surfaces could be significant contributors of microplastics to the atmosphere or rivers (through runoff),” says the review paper. Plastic waste can also enter rivers through domestic and industrial drainage systems, it adds. In fact, says UNEP, about 19-23 million tonnes of plastic waste leaks into aquatic ecosystems, such as lakes, rivers, and seas every year. Without action to reduce plastic pollution, emissions of plastic waste into aquatic ecosystems will triple by 2040. Rivers in regions as remote as Antarctica and Arctic already show microplastic traces.

In the water, microplastics interact differently with various aquatic organisms. For instance, the presence of certain nutrients on the surface of microplastics attracts microbial organisms, which bind to the particles to form biofilms. These biofilms are a food source for aquatic organisms, which may ingest them and thus bring microplastics into the aquatic food chain, explains the 2023 review paper. When they accumulate in large aquatic organisms, microplastics laden with chemical contaminants leach additives and release toxins, causing endocrine disruption and mutations, it adds.

Further, the review paper says that zooplankton exposed to microplastics experience reduced growth, increased mortality, and

disrupted reproduction. And in algae, larger-sized microplastics can reduce the photosynthesis mechanism by blocking the sunlight, whereas smaller particles affect their cell wall and destroy their internal structure.

MITIGATE MICROPLASTICS

Clearly, microplastics cannot just be considered inert contaminants. But many of their impacts are still being understood, which has made it difficult to fix policies and measures to remove or limit their deposition. The Global Plastics Treaty, however, has begun discussions on some aspects such

COUNTRIES ARE TAKING MEASURES TO REDUCE PLASTIC PRODUCTION AND USE. BUT THEY NEED TO ADDRESS SPECIFIC SOURCES OF MICROPLASTIC DISSEMINATION LIKE WASTEWATER TREATMENT

as production of microbeads. Countries have already imposed their own restrictions on these; like the Netherlands introduced a ban on microbeads in cosmetic products in 2014. The UK imposed similar restrictions in 2018, even banning microbeads made of so-called biodegradable plastic. China, US and Canada have also imposed bans on microbeads in the cosmetics industry.

The EU has also taken some comprehensive regulatory measures. In 2019, the European Chemicals Agency proposed extensive restrictions on intentionally added microplastics in products placed on the EU market. The Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation that came into effect in October 2023, bans microplastics in

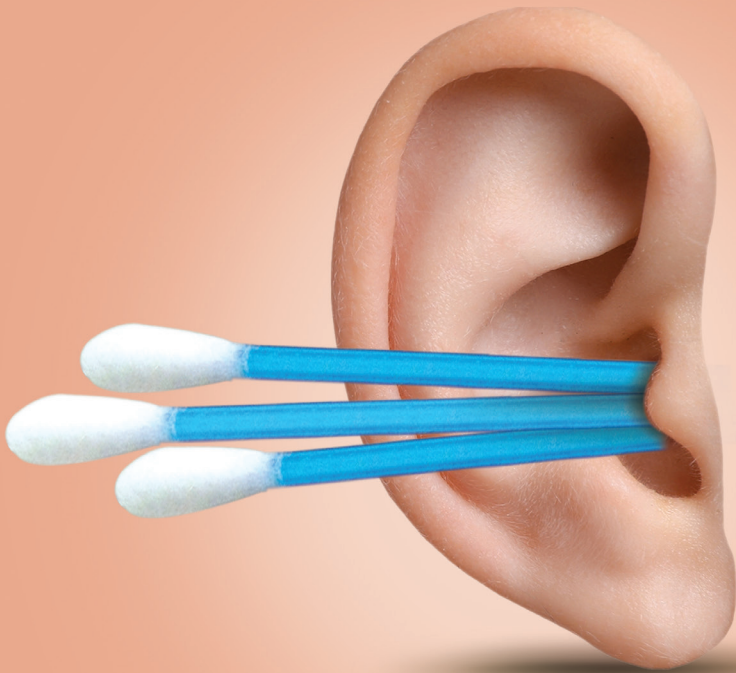
intentionally added to products like cosmetics and detergents.

The treaty discussions also include addressing microplastics during wastewater treatment using newer technologies. Microplastics removal in wastewater treatment plants primarily relies on screening, sedimentation and filtration methods, which show varying success depending on type of technology used and particles targeted, says the 2023 review. It cites other recent technologies that show more promising results, such as electrocoagulation, which involves using electricity to separate pollutants from wastewater, or the sol-gel process, a chemical technique in which microbeads are trapped in a silica gel for removal.

Apart from this, several countries including India have imposed restrictions on overall plastic production and use, which would indirectly reduce microplastic generation as well. The measures that countries will have to put in place in the future to meet the eventual obligations under the Global Plastics Treaty will also help in this regard.

Apart from this, investing in research to detect, monitor and understand the environmental risks of microplastics is also necessary. This requires standardised scientific protocols for microplastic sampling, extraction, and analysis in various sectors, including food. As the world moves toward finalising the Global Plastics Treaty, it is imperative for governments, industries, and individuals to collaborate on reducing microplastic pollution from invading the entire ecosystem. **DEE**

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Elation and dismay over Gilead's HIV drug

Patient groups are opposing the patents on lenacapavir, which can be a game changer in the battle against HIV-AIDS epidemic

THERE IS elation and public outpouring of joy, and there is also anxiety and gnawing worry. Both reactions are related to a new studies of a drug, already in the market, which show that it suppresses and provides protection against HIV at all stages. The exhilaration is understandable because the drug, lenacapavir, discovered by US pharma giant Gilead Sciences, is the closest thing to an HIV vaccine the world has now; it offers hope of ending HIV-AIDS transmission. The gloom is on account of Gilead's pricing of the game-changing drug. It costs as much as US \$44,819 per patient per year in some developed countries, for two shots of the injection taken at a six-monthly interval. That puts it out of reach of most patients and even governments.

First, let's understand why the drug, which is in use as treatment for HIV, will be a game changer. Studies conducted among multiple groups across continents are showing dramatic

results. Lenacapavir demonstrated 100 per cent efficacy and safety in the investigational PURPOSE 1 use of HIV prevention in cisgender women in sub Saharan Africa, said Gilead in July. That is why many of those attending the International AIDS Conference in Munich wept for joy when the results were presented in detail. A blog post published by the *New England Journal of Medicine* explains that there was a standing ovation for the scientists who presented the findings. And on September 12, Gilead announced that its PURPOSE 2 trial had shown 99.9 per cent efficacy. This trial included cisgender men, transgender men, transgender women, and gender non-binary individuals in Argentina, Brazil, Mexico, Peru, South Africa, Thailand and the US who have sex with male partners. That was stunning.

It has been a long wait for a long-acting HIV prevention and treatment formulation—no one is calling it a vaccine yet—to fight the HIV scourge that has no known cure. The statistics are pretty grim. HIV has claimed an estimated 42.3 million lives so far and continues to be transmitted in all countries. UNAIDS estimates there were 39.9 million people living with HIV at the end of 2023, of whom the huge majority are in the World Health Organization (WHO) African Region. Last year, an estimated 1.3 million people acquired HIV while 630,000 people are reported to have died from HIV-related causes. Around 76,000 of these fatalities were among children.

The world urgently needs to prevent the spread of HIV if it is to meet the target of ending the HIV epidemic by 2030 under the UN Sustainable Development Goals (SDGs). Should we begrudge Gilead its patents and resultant profits, when it is offering the best hope of fighting the scourge?



There is a moral issue here. The price is not just unaffordable but apparently immoral, too, given how little it would cost to produce the drug. A global group of scientists have shown that it can be produced for \$100 for the two injections needed in a year, a cost that could be pared to \$40 per patient per year. This garnered as much attention at the Munich conference as Gilead's trial results did.

The scientists from Europe and the US presented a study which put the cost of producing a generic version of Gilead's drug (marketed as Sunlenca) at just \$40 even after allowing for a 30 per cent profit margin, assuming the demand to be 10 million injections a year. They argue that such a low price for generic lenacapavir is vital for a mass prevention campaign that would target communities facing the highest risk of HIV infection.

To ensure this, says Andrew Hill of Liverpool University who led the expert study, Gilead should sign voluntary licences (VLs) with the major generic manufacturers as soon as possible to kick off mass production at the earliest, instead of waiting for further results from other randomised trials. A VL covering all low- and middle-income countries would allow the use of lenacapavir in 83 per cent of the world's population, where 95 per cent of HIV infections are seen. Humanitarian health organisation Médecins Sans Frontières is also campaigning for VLs to make lenacapavir more widely available in all low and middle-income countries through the UN's medicines patent pool. This would enable the production and supply of generic versions in low- and middle-income countries.

Is this likely? Gilead says it is "executing an access strategy that prioritises speed and enables the most efficient paths for the regulatory review and approval of lenacapavir in regions around the world." The focus would be on high-incidence, low-resource countries, which of course are primarily low- and lower-middle-income countries. It would, therefore, be expediting such measures, including VLs, to supply high-quality, low-cost versions of

lenacapavir. However, public health activists are sceptical because they say Gilead's track record is none too good in this regard. Its past VL deals have tended to exclude middle-income countries.

In India, the focus is to ensure that patents are not awarded to Gilead for lenacapavir. The battle is more direct with community health organisations and patient groups once again filing patent oppositions to lenacapavir, just as TB (tuberculosis) patients did with Johnson & Johnson's patents on bedaquiline. These include the Sankalp Rehabilitation Trust that works with vulnerable populations and the Delhi Network of People Living with HIV. The struggle to democratise medicine availability for HIV patients has been launched elsewhere, too, with

other HIV networks questioning the validity of Gilead's patent claims. But the key outcome will be in India, which has the largest generics industry outside the US. Sankalp's contention is that some of Gilead's applications are not tenable since lenacapavir is a known compound and India's patent laws debar the patenting of

derivatives such as salts and esters of a known compound. So claims by drugmakers to extend the patent life on products through incremental changes do not stand the test unless these are proven to be more efficacious.

The generic drug industry, which is scenting lucrative VL deals from Gilead, is studiously avoiding any confrontation with the company that is a tried and tested business partner. Health activists may have chafe about the unfair nature of the VLs, but generics companies that stand to benefit hugely from the handout of VLs are no longer troubled by such concerns. They are clearly a different breed of companies from those which took on drug giants to reach antiretroviral drugs to HIV patients in Africa two decades ago. Now they can sit pretty. If the patent opposition succeeds they benefit; if it does not, they will in any case get VLs from Gilead. On the other hand, what India's patent office decides could be a matter of life and death for people living with HIV/AIDS worldwide. **DTE** ☒ @ljishnu

Gilead's lenacapavir could help win the fight against HIV. But its high pricing puts it out of reach for low- and middle-income countries

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Palette

WHAT'S INSIDE

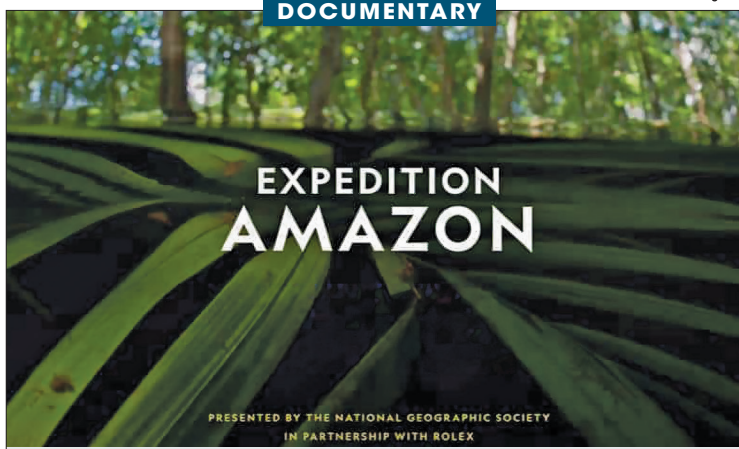
Satellite imagery can help cities improve waste management **P50**

Shahu Patole on food habits of Dalit communities **P54**

Political left, right divide narrows on economic governance **P58**

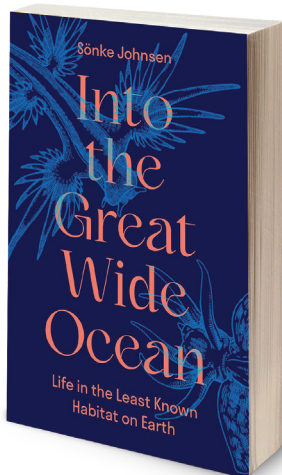
RECOMMENDATIONS

DOCUMENTARY

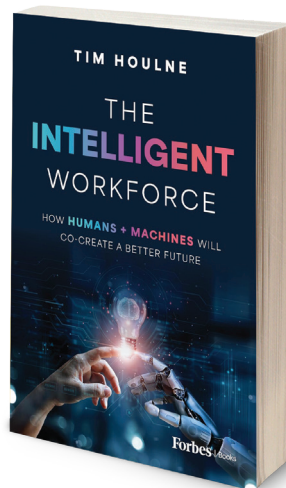


The Amazon river is far more critical for biodiversity than most people realise. The river, which originates in the Andes mountains of Peru and has a plume that stretches all the way to the Caribbean, supports unique species such as river turtles, pink dolphins and Andean bears. National Geographic attempts to take stock of the health of the Amazon and all its dependents in its new documentary, *Expedition Amazon*. Join a group of researchers as they explore the icy mountain glaciers that feed the river and wade across all its tributaries to discover how they continue to change. The documentary will be available on streaming platform *Disney+ Hotstar* from October 10.

BOOKS



The world's oceans, which stretch far beyond countries' territorial jurisdictions, will perhaps always be a subject of scientific intrigue. For decades now, researchers have been mounting expedition after expedition to try and study the unexplored ocean column and the biodiversity found within it. Now, new questions have arisen on how climate change impacts this region, and what solutions are needed to preserve it. In *Into the Great Wide Ocean*, Biologist Sönke Johnsen takes a journey across the waters to find some answers.



The lines between the digital and the real world continue to blur as technology advances at an accelerated rate. But some humans and businesses are still playing catch-up. In this fast-moving, increasingly digital world, the ability to adapt and innovate may determine which businesses survive and thrive. In *The Intelligent Workforce*, serial entrepreneur Tim Houlne shares tips for organisations to harness new-age technologies and create opportunities for humans and machines to work together.



OVERVIEW HELPS

Satellite imagery is a reliable, cost-effective tool for assessing the size and waste burden of dumpsites, and can enhance cities' waste management strategies

**SURAJIT CHAKRABORTY, ATUN ROY
CHOUDHURY, ROHIT BASUDHAR,
PRADIP K SIKDAR**

DUMPSITES ARE a major urban challenge, contributing to air pollution, water contamination and various health hazards. Yet most cities in India continue to struggle with managing them. Delhi, for instance, is home to three major dumpsites—Ghazipur, Okhla, and Bhalswa—which have become environmental time bombs. These landfills release toxic gases into the air and contaminate groundwater through harmful leachates, exposing nearby communities to a wide range of health risks.

Despite the growing concerns, most cities still lack an accurate understanding of the size and waste burden of their dumpsites. Delhi alone generates about



The waste at Delhi's Ghazipur dumpsite has nearly tripled in the past decade

11,000 tonnes of solid waste daily, a figure that excludes waste generated by the city's floating population. The bulk of this waste ends up in these three overflowing dumps, making it difficult for authorities to manage or remediate it effectively. Efforts by municipal authorities, including bioremediation, biomining and waste-to-energy plants, are simply not

enough to tackle the sheer volume of this waste.

Currently, most cities rely on manual estimation to understand the quantum of waste in the dumpsites. The process is lengthy, costly and in certain cases also not accurate, derailing the planning process. Instead, cities can use satellite imagery and Geographic Information System (GIS) technologies to efficiently quantify and monitor dumpsites. Satellite imagery makes the entire process of waste quantification quicker and cheap. Moreover, it provides a comprehensive view of changes in waste volume and surface conditions over time, making it easier to track the progression of these dumps.

Using satellite imagery, we tried to ascertain demarcation of the three dumpsites in Delhi, quantify their waste volume and study the change in their mean land surface temperature (LST) over time. LST, which tends to increase with higher waste levels, was utilised as a key indicator to track waste volume changes and validate our findings.

Our study spanned a decade (2013-24) and relied on satellite imagery from the US Geological Survey's Landsat missions, specifically Landsat 5 and Landsat 9. These images were processed using QGIS to identify the dumpsites with coordinates (latitude and longitude) and superimpose them on composite satellite images to observe significant changes. LST was calculated using scientifically validated algorithms. To estimate dump volumes and areas, we employed a Digital Elevation Model from US

space agency NASA's Shuttle Radar Topographic Mission for 2013, and India's IRS-Cartosat satellite data for 2024.

HEAPS OF TROUBLE

Results from our study reveals significant changes at the Bhalswa, Ghazipur, and Okhla dumpsites over the past decade. While the overall area of the dumpsites remained unchanged, the amount of waste they contain has more than doubled (see 'To the brim', p52).

The Bhalswa dumpsite, covering 29.36 hectares (ha), saw an 88 per cent increase in waste, rising from 1.59 million tonnes (MT) in 2013 to 2.94 MT in 2024. Despite being the largest in size, Bhalswa's waste burden is still outpaced by Ghazipur, which spans 28.72 ha. Ghazipur's waste almost tripled in 10 years, reaching 3.34 MT in 2024—the highest among the three. The Okhla dumpsite, although smaller at 16.71 ha, experienced a 52 per cent rise in waste volume, going from 1.52 MT in 2013 to 2.31 MT in 2024.

In addition to the rising waste volumes, there has been a notable increase in mean LSTs at all three sites, a clear sign of escalating environmental pressure. Bhalswa recorded the sharpest temperature rise, from 31.39°C in 2013 to 35.89°C in 2024. Okhla's mean LST jumped to 35.4°C in 2024 from 32.1°C, while Ghazipur saw an increase of nearly 2°C, reaching 34.11°C in 2024. The high temperatures indicate that much of the waste being dumped is organic, which generates significant heat as it decomposes.

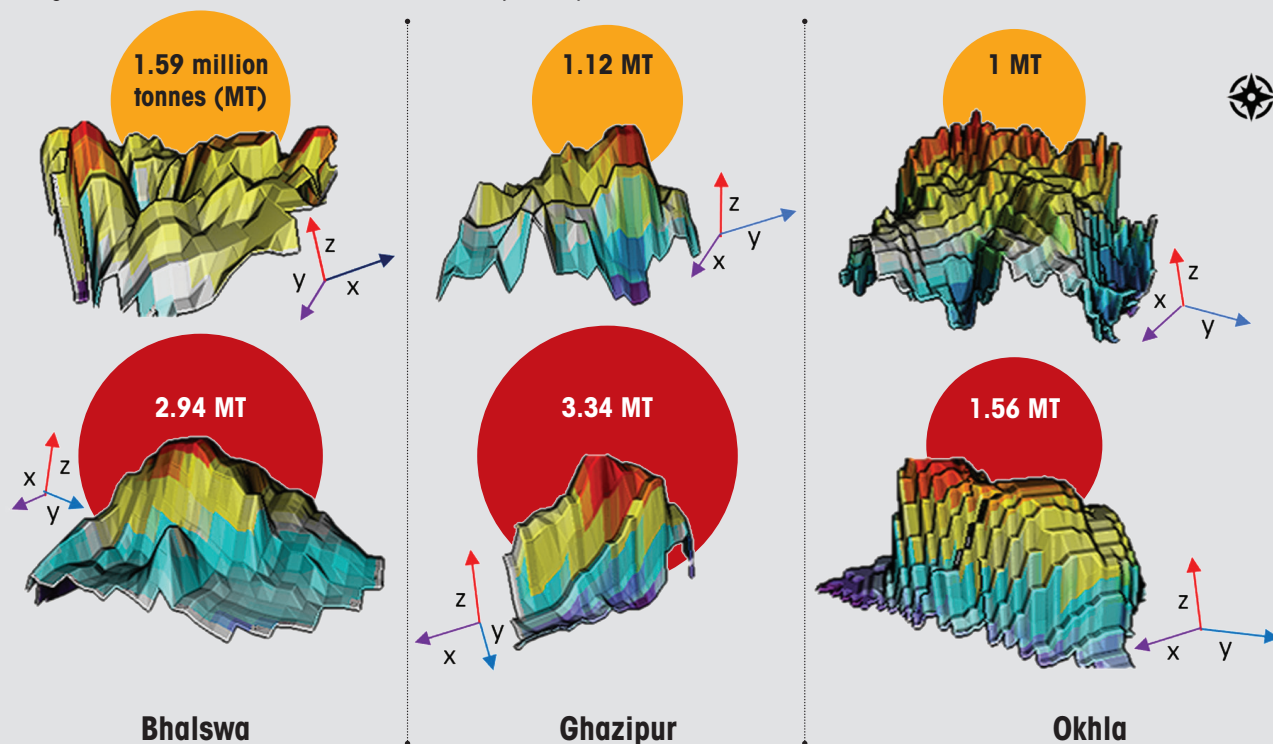
We also generated 3D models of the dumpsites to visualise how their shapes have changed over time. Both Bhalswa and Ghazipur have transitioned from having multiple peaks in 2013 to a single peak in 2024, likely because of

SATELLITE IMAGERY CAN MAKE THE ENTIRE PROCESS OF WASTE QUANTIFICATION QUICKER AND CHEAP. IT PROVIDES A COMPREHENSIVE VIEW OF CHANGES IN WASTE VOLUMES AND SURFACE CONDITIONS IN DUMPSITES OVER TIME

To the brim

The cumulative waste burden of Delhi's three major dumpsites has nearly tripled in the past 10 years

Changes in waste volume and structure at Delhi's major dumpsites in ● 2013 ● 2024



SOURCE: AUTHOR ANALYSIS

ongoing bioremediation efforts. Despite the reclamation initiatives, the waste burden continues to outpace efforts to reduce it, highlighting the need for more effective management strategies.

UNTAPPED POTENTIAL

Our study highlights the immense potential of using GIS to monitor and manage urban dumpsites. Although we relied on freely available satellite images, which offer limited resolution, city administrators can access much more detailed and precise data by utilising high-resolution satellite images.

The study used open-source satellite images with a limited pixel

range, which resulted in a variation of up to 5 per cent in the assessed waste quantities compared to figures reported by the Municipal Corporation of Delhi. However, this margin of error can be reduced to less than 1 per cent by using the latest high-resolution satellite data.

To validate our findings, we compared the data generated in our study with waste volume estimates from a concurrent drone survey at the Ghazipur dumpsite. The drone survey's volumetric report showed a 97 per cent match with our GIS-based estimates.

By integrating GIS with remote sensing, GPS and diverse systems engineering models, city adminis-

trators can effectively measure and monitor waste dumps. These technologies not only provide accurate assessments of current waste volumes but can also help project future waste demands, aiding in long-term urban planning. This includes identifying appropriate locations for new sanitary landfill sites and improving overall waste management strategies. [DTE](#) [@down2earthindia](#)

(Surajit Chakraborty, Rohit Basudhar and Pradip K Sikdar are with the Indian Institute of Social Welfare and Business Management, Kolkata. Atun Roy Choudhury is with Cube Bio Energy, a waste management company in Hyderabad)

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Why Dalits were exempt from any dietary restrictions

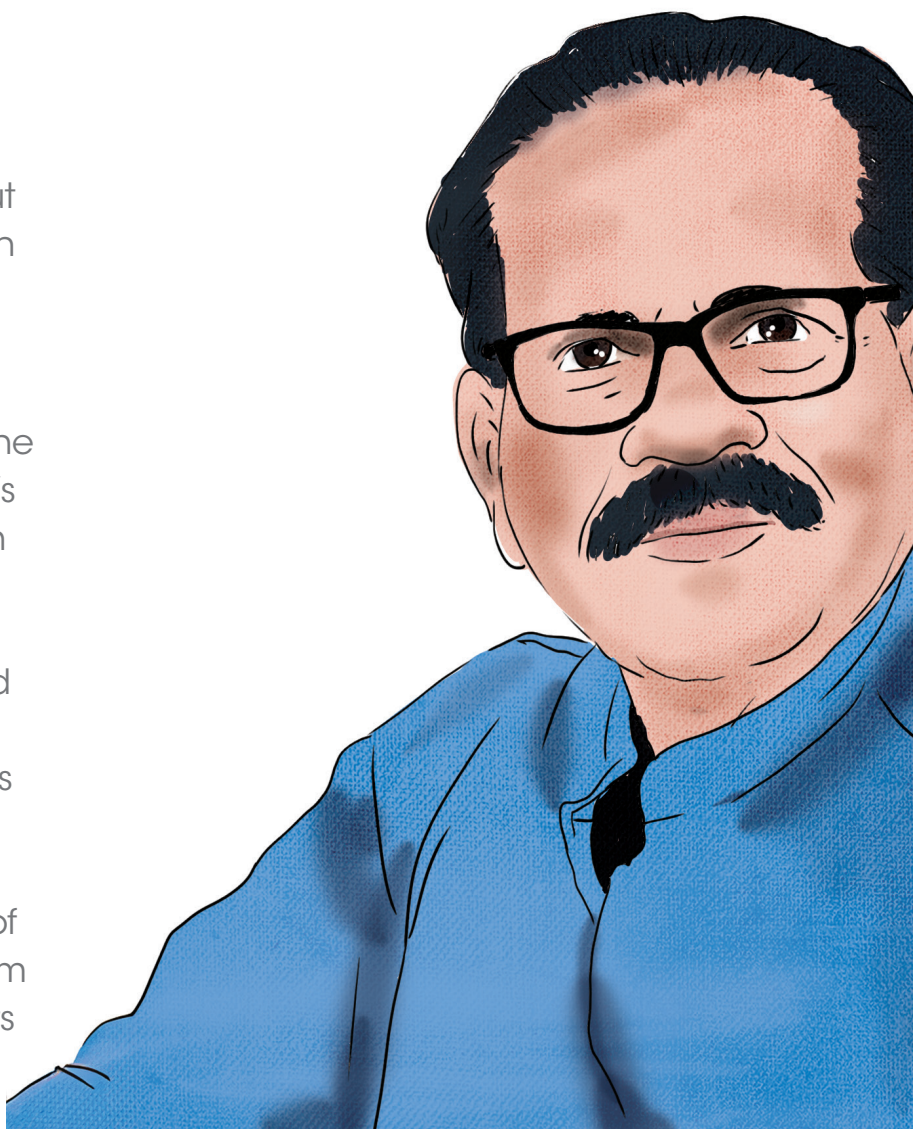
With the arrival of television, followed by the internet, a plethora of cookery shows have exploded in our drawing rooms. Discerning viewers, however, can notice one facet of these shows: they are not just anchored by those with elite, upper caste backgrounds, but the recipes, too, are most often from groups belonging to the upper echelons of society.

This is something that struck **SHAHU PATOLE** hard. The academic from Maharashtra's Marathwada region was keen to highlight the cuisines of India's subaltern sections—its Dalits and Adivasis—which led him to write *Dalit Kitchens of Marathwada*. The book details the foods of Maharashtra's Mahar and Mang Dalit communities and is a labour of love for Patole, who comes from a similar background. Excerpts from an interview with

RAJAT GHAI:

What ignited the idea to write about Dalit kitchens?

A lot has been written about *sattvic* (pure) and *rajasic* (royal) diets, but our kitchens, our food, have been neglected. We also eat, we also live in the same society, the same country; but our food culture is never recognised. This is what compelled me to write about the topic. If our future generations ever wonder what their forefathers ate, this



documentation will be invaluable to them.

The book says that while meat was forbidden for those within the Hindu caste pyramid (Chaturvarna system), those outside the pale of caste (Dalits) were exempt from it. Why this dichotomy, in your view?

The system needed bonded labourers under the guise of religion and societal structure, particularly for sanitation work. Dalits were made dependent on villages and were considered untouchable. The primary motive of the village inhabitants was to get their dirty work done at the lowest possible cost. This is likely why Dalits were exempt from any dietary restrictions.

Why did you restrict the scope of the book to the two Dalit communities, namely the Mahars and the Mangs?

The food habits of the so-called upper castes are always discussed and documented, but these two

castes are often overlooked. I am familiar with their food practices, which is why I chose to write about them. If I had written about other castes, there was a risk of making errors.

The book notes that the Mahar and Mang communities were in charge of disposing dead animals, among other things. At the same time, you also observe that it was not always that the two communities ate meat. What, then, were the main sources of non-vegetarian food for them?

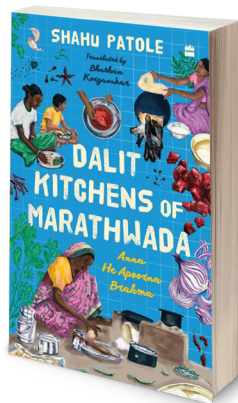
Muslim butchers would bring meat to sell in the weekly

markets, and these castes would purchase it from them.

You also note in the end of the book that these two communities, which mostly ate *jowar* (sorghum) and *bajra* (pearl millet) have increasingly turned to wheat and rice, especially after the 1972 Maharashtra famine. Why this change?

The 1972 drought was not just about water scarcity; it also led to a massive food shortage. The Central government distributed various food grains, including wheat, rice, hybrid *jowar*, milo, corn and *sattu* (Bengal gram flour), to help people survive. People had to eat whatever was available. It took time to cultivate *jowar* and *bajra* again after the drought, so people continued eating wheat and rice but abandoned the other grains, which they never really liked. During the drought, the government introduced the Rojgar Hami Yojana (employment guarantee scheme), which provided disposable income to people. This also influenced their decision to buy wheat and rice.

What about Dalit women? They were a minority within a minority. How did they manage the family kitchens on a daily basis when there was so much poverty and so little to eat? Also considering



DALIT KITCHENS OF MARATHWADA

Shahu Patole and
Bhushan Korgaonkar

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THE SYSTEM NEEDED BONDED LABOURERS UNDER THE GUISE OF RELIGION AND SOCIETAL STRUCTURE, PARTICULARLY FOR SANITATION WORK...THE PRIMARY MOTIVE OF THE VILLAGE INHABITANTS WAS TO GET THEIR DIRTY WORK DONE AT THE LOWEST POSSIBLE COST. THIS IS LIKELY WHY DALITS WERE EXEMPT FROM ANY DIETARY RESTRICTIONS

that they had to work in the fields and look after the children as well.

In villages, almost all women had to work, with a few exceptions in wealthy households. The conditions for women were largely the same, regardless of caste or class. However, women from Dalit and other lower castes did enjoy some advantages, such as greater freedom, easier access to divorce, the ability to remarry, widows' remarriages and the absence of a dowry system. They faced the same food shortages as men, but they also had decision-making power within the household.

The description about the dish Ambura has this line: "Mangs and bullocks would serve their masters throughout the year without uttering a single word of resentment." I found this strikingly similar to the antebellum American South, where black slaves and livestock of plantation owners were considered to be similar. Would you say the condition of the Mahars and the Mangs was a type of chattel slavery?

Mangs are honoured on certain days, including during the festival of Pola, which is primarily a festival for bullocks. However, this respect is limited to just one day. I do not believe we can directly equate the caste-based servitude in India with the chattel slavery of the American South. Lower castes were compelled to work under the pretence of religion, culture, caste and social systems. They were told, "You are born into these castes as a result of your sins in a past life. You must redeem yourself by working hard now."

RECIPE **FASHI (EPIGLOTTIS)**

THE FASHI begins where the tongue ends. It is also called tilli or tilvan. Epiglottis is the anatomical term for it. It is a thin, dark and elongated piece of flesh, with a purple or bluish tinge and is a few centimetres thick. It has a coating that looks like a plastic glazing and looks like a thin chocolate cake. The surface flesh looks like jelly. Underneath is dark, chocolatey flesh. Although the method of making fashi is similar to that of mutton, fashi has to be cooked separately. It is delicate and cooks faster than normal meat because it releases its own juices while cooking.

INGREDIENTS (FOR MARINATING)

1. Fashi
2. Salt
3. Turmeric
4. Ginger-garlic paste (optional, but greatly improves taste)

INGREDIENTS (FOR COOKING)

1. Oil or animal fat (used when there is no oil to be had)
2. Onions, chopped (finely or roughly)
3. Red or green chillies, roughly chopped (optional, but an improvement)
4. Green coriander leaves, chopped

METHOD

Cut and wash fashi. Mix with marinade and let it rest for 10–30 minutes. Heat fat in a pan. Add onions and fry till a nice brown. Add marinated fashi and cook a bit. Fry chillies in a little oil and add. Or add chillies directly without frying. Cook till done. Fashi is a delicate meat and cooks quickly, releasing a lot of liquid. Taste for salt and chilli flavour. Add more if needed. Add very little water to make a thick gravy or none to make a dry version. Expert cooks say excess water spoils the dish. Throw in a small fistful of chopped coriander leaves, if available. Fashi tastes delicious with bhakri.

Fashi is delicate and has no bones and no fat, so children relish it very much. In some regions, fashi cooked without chillies was given to lactating mothers to help produce more milk.

(Excerpted with permission from Dalit Kitchens of Marathwada by Shahu Patole, trans. Bhushan Korgaonkar, HarperCollins)



You have noted in the beginning that your siblings were not comfortable with your writing this book.

It was not just my siblings; many of my relatives and others from our community did not like what I wrote—and some still do not. However, my siblings have now become supportive of my work as they understand the perspective I am coming from.

Do you think your book will encourage more Dalit writers to tell the story of their cuisines themselves, something which has not been seen so far?

I believe that only those Dalit writers who feel no guilt or shame about their own community, caste, food and culture can openly and freely write about their food heritage. [@down2earthindia](#)

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When the left meets the right

AS THE year of elections nears its end, countries continue to vote. Every day, election updates flood news across the world, strikingly defined by “polarisation”. Polarised campaigns have become near universal in 2024, where by December some 40 countries with a combined population of 3.2 billion and GDP (gross domestic product) of US \$44.2 trillion would have voted. Countries are witnessing two axes of polarisation: the first is an articulation of nationalistic identity that includes immigration as a major political issue (particularly in the developed block); the second is around “populism” or economic redistribution, with the government offering more and more social benefits to voters.

In the typical political narrative, elections are being fought between the “left” and “right” blocks of ideology. Even as there is near consensus in the rise of the right, the revival of the left is slowly gaining political traction. These two blocks are primarily economic by origin. While the right block pushes for less government intervention, the left urges a dominant role for governments. Over time, the two are identified with other contrasting ideological stands, but the economic model a government pursues remains at the core of the contest between them.

Across the world, including in India, populism and the nationalistic identity agenda have proven electorally beneficial. Populism, by definition, is to be with “the people”, pitting them against the advantaged or “elite” population. It is rising in western democracies as well as in emerging and developing economies. The rise of populism has to be understood in the context of high inequality and economic slowdowns. These set the perfect context to the political campaign pitching a population group against the “othering”, mostly comprising immigrants and people from different religious or social backgrounds.

Does this mean the world is clamouring for the government to return as the dominant factor in the economy? Or, to put it another way, is the right block now pursuing the left’s ideology? First, let’s understand the current role of

governments. According to the International Monetary Fund (IMF), government debts—including in large economies like the US and China—have reached 93 per cent of GDP in 2023, and may rise to 100 per cent of GDP by 2030. This indicates that governments are spending more and thus, increasing their borrowing. This, contrary to what we tend to believe, vouches for a dominant role for governments in public spending. Moreover, Gita Gopinath, IMF’s first deputy managing director, recently said that government spending may increase further in the coming years. “There are big structural shifts that call for greater government spending. Countries will need to spend more on climate mitigation and adaptation, on healthcare and on pensions as population age, and on defense needs as geopolitical tensions rise,” she said.

Amid this cacophony of left and right voices, it seems that governments have been dominant

There is no real difference between the two blocks of economic governance. The right seems to have embraced the left

spenders for the past 60 years, irrespective of ideological affiliations. It is evident now that this trend will continue. There is no real difference between

the two blocks of economic governance; the right seems to have embraced the left overwhelmingly. “Conservative politics has traditionally been defined by its emphasis on fiscal prudence and the idea of a small state. While parties leaning left are usually associated with more spending and a larger presence of the state in the economy. The reality may be different though,” says a recent analysis by IMF researchers, who studied content of over “4,500 political platforms from 720 national elections held between 1960 and 2022 in advanced and emerging countries.” They conclude: “Political discourse on fiscal issues has become increasingly favorable to higher government spending since the 1960s. From socialists to nationalists, support for more spending has steadily increased, while fiscal restraint rhetoric has lost favor across the board in the last three decades, after being most popular in the 1980s.” **DTE** @richiemaha

Integrated Online and Onsite Training Programme On **WATER AUDIT: A TOOL TO ACHIEVE WATER NEUTRALITY**

As different parts of the world have been facing water scarcity lately, there is a dire need to conserve this most important resource. The industrial sector is the second highest user of water after agriculture. Although the industrial sector accounts for only 10% to 15% of the aggregate annual water demand in developing countries, water is a critical input for process and cooling requirements in a majority of the industries. In this regard, industries are thriving to move towards being water neutral, which refers to balancing the amount of water used with the amount of water replenished or offset.

In order to achieve water neutrality, water audit is a foundational step as it helps organizations understand their water use, identify areas for improvement, and implement measures to balance their water consumption with replenishment efforts.

With this background, Centre for Science and Environment (CSE) is launching an integrated training programme on Water Audit: Tool to Achieve Water Neutrality.

THE TRAINING PROGRAMME WILL COMPRISE OF TWO PARTS

Basic learning (online platform) and Advanced learning (at our residential campus- AAETI). The course is designed to provide an overall understanding of the concept of water neutrality and water audit process which includes theoretical knowledge via lectures from sector experts, first-hand experience through group exercises, discussions, exposure visit to industries.

PART (A)

BASIC LEARNING (ONLINE)

OCTOBER 15-27, 2024

- Introduction to concept of water audit
- Instruments used for water auditing
- Basics of water circuit diagram
- Fundamentals of Cooling towers, and Boilers
- Specific Water Consumption and Benchmarking
- Industrial wastewater management
- Highlights of CGWA notification
- Case studies and assignments

PART (B)

ADVANCE LEARNING (ONSITE)

JANUARY 21-24, 2025

- Concept of water positivity and neutrality in industries
- Data analysis, validation and interpretation for water balancing
- Water and wastewater management through smart metering & IoT
- Monitoring and Metering in industries
- Achieving ZLD in Industries
- Sector specific Case Studies
- Advance wastewater treatment technologies with case studies

NOTE: The training will be conducted on Moodle Platform where participants will be provided with the reading /audio-visual training material.

The course material be for the duration of 2 hrs per day and live sessions will be on weekends for discussions.

VENUE: Anil Agarwal Environment Training Institute (AAETI), Neemli, Rajasthan.

The 4 day's training will have sessions from sector experts, followed by class exercises and industry exposure visit.

**LAST DATE TO APPLY:
OCTOBER 11, 2024**

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Part A: **INR 3,500/-** (Indian participant), USD 100/- (Foreign nationals)

Part A+B: **INR 28,000/-** (Indian Participants)

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Award of certificate: Certificate of completion will be awarded for both the programme.

WHO CAN APPLY

Industry professionals, EHS officials, Environmental Consultants, Engineers, Regulators, Environmental laboratories, Academic institutions, Students, Research scholars, and others aspiring to work in the field of water.

FOR ANY QUERY PLEASE CONTACT

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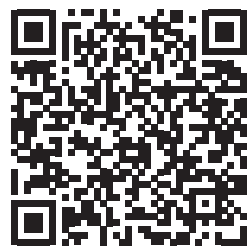
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