

16-31 MARCH, 2022



Down To Earth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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EXTINCT

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courtesy humans**



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India's metropolises and larger cities have experienced a rapidly expanding urban footprint and intensive infrastructure development due to migration and population growth. This has created a demand for fast-paced construction technologies that are often characterised by speedy construction and repetitive units. However, these technologies do not perform well on environmental parameters. At the other end of the spectrum, reverse migration due to the ongoing pandemic has brought the spotlight on to smaller towns. The unprecedented scale of this migration has triggered a need for affordable housing.

India's housing sector is dominated by self-construction: around 70 per cent of houses sanctioned under PMAY are being built under the beneficiary led construction scheme – but what it needs is guidance towards mainstreaming of climate-appropriate native material choices. Government institutions such as the Central Public Works Department have started

promoting indigenous technologies and materials for a self-reliant India. Native materials have multiple advantages over their fast paced, often industry-manufactured, counterparts. The raw materials required are often locally available and respond well to local climatic conditions; they are also better suited to tackle thermal comfort issues of the occupants.

The other big advantage is that these technologies utilise and promote local skills. The self-built housing segment does not only provide an opportunity to fulfil the shelter needs of the displaced population but also to improve quality of life, develop skill and create jobs for 'green recovery' and regional development amidst the ongoing pandemic.

Centre for Science and Environment (CSE) invites applications for a training course on the subject of self-constructed housing and how it can be guided to ensure thermal comfort for its occupants and address the issue of sustainable development for the sector.

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COURSE HIGHLIGHTS

- Green recovery in the self-built housing sector post COVID-19
- Government initiatives and an overview of self-built housing
- India Cooling Action Plan – thermal comfort for all
- Human thermal comfort
- Climate appropriate building materials/techniques
- Building envelope and thermal properties of materials to achieve occupant comfort
- Eco Niwas Samhita – (ECBC-Residential)

WHO CAN APPLY?

Anyone involved with Industrial Training Institutes and other skill building institutions, housing boards and corporations; architects; planners; engineers; and academia.

*Course fee includes tuition fee, external expert lecture sessions, training materials, boarding and lodging, and transport from New Delhi to AAETI and back.

COURSE COORDINATOR

SUGEET GROVER,

Deputy Programme Manager,
Sustainable Habitat Programme, CSE,
9818443366,
sugeet.grover@cseindia.org



COURSE DIRECTOR

RAJNEESH SAREEN,

Programme Director,
Sustainable Habitat Programme, CSE,
rajneesh.sareen@cseindia.org



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Will climate action be a casualty?

CLIMATE CHANGE is the result of our demand for energy, we know. Emissions from the burning of fossil fuels, coal, oil and natural gas, are the reason the world is today on the edge of a precipice. The 2022 report of the Intergovernmental Panel on Climate Change (IPCC) reiterates that the impacts of a warming planet will be catastrophic.

The fact is, not just our world but even the energy market is on a boil—fuel prices have skyrocketed even before the Russia-Ukraine war broke out. The question is if this hike in prices will accelerate the move to a greener, cleaner energy future? Or will the governments backtrack and re-invest in the still-reliable fossil fuel energy system? In other words, will this price turbulence give the energy business of the past a new lease of life?

Europe, and Germany in particular, is at the centre of this conundrum. It has invested in renewable energy, but has also relied on the import of natural gas—a cleaner-than-coal fossil fuel—to meet its electricity needs. Roughly 40 per cent of this natural gas comes from Russia. Now the war has jeopardised this supply. Germany has stopped certification of the already built Nord Stream 2 gas pipeline, which would have transported gas under the Baltic Sea from Russia. It is walking a tightrope on its existing gas contracts from Russia. German chancellor Olaf Scholz issued a statement on March 7, saying that his country and Europe as a whole were dependent on Russia to meet energy needs for heating, mobility and electricity, and so they could not sever these ties in the short term. But it is also a fact that Europe is under pressure from Ukraine and the US to do more. On the same day, US secretary of state Antony Blinken said his country was looking to coordinate with European allies on the possibility of banning the import of oil from Russia. This not only spooked the markets, spiking oil prices to over US \$139 a barrel, but is also an indication of things to come as the war escalates.

So now, energy security is at the core of policy—as much as, if not more than, climate change. Germany has decided to invest in building two liquefied natural gas (LNG) terminals so that it can diversify its supply. In this process, Europe has become the new destination for US natural gas companies. On the other hand, Europe is looking at its investment in renewables—wind and solar—as the “energy of freedom”, giving this clean source an added emphasis. The question is if this

disruption in the oil markets will derail the move towards energy transition or speed it up?

It is the same in the UK, which has set itself up as a climate leader with aggressive reduction targets. But now, ironically, its Committee on Climate Change has cleared the decks to expand oil and gas extraction in the North Sea. The UK is not as dependent on Russia for its energy supply, but its household energy prices are set to double in April. Its energy regulator has lifted the price cap, which on the back of increased oil and gas prices, will add to the household bills. So, the UK is worried about the energy poverty of its people and the anger it will lead to. Therefore, at this moment, the government, which preached that developing world should shun coal because of climate change, has decided to re-invest in its own fossil fuel industry. Will efforts to combat climate change then become a casualty of this energy war?

Global fuel price hike has built a convenient narrative that the energy transition is unplanned, unfeasible

Oil and gas prices have been seeing a high partly because of the two years of COVID-19, when the world saw degrowth like never before. As a result, demand for energy fell; there was under-investment; and new capacity was not added. But then, as the lockdowns were lifted and countries returned to business as usual, energy demand soared. And this led to price hikes. The war has just added fuel to this fire. But what it has done is build a convenient narrative that the energy transition—pushed as it is because of the urgency to combat climate change—was unplanned and unfeasible; that it has led to large-scale disruptions and will not work. Instead, what is needed is to plan for a transition that it is pragmatic and balanced. This, then is the logic for the resurgence of the conventional energy business.

There is a difference, of course. This argument is combined with new language of the need to abate emissions from fossil fuels, including the need to invest in methane reduction; carbon capture technologies so that the emissions from refineries can be pumped back into the ground; and in hydrogen as the next-generation fuel. In this way, the current energy crisis could lead us back to the fossil fuel business, which has been indicted for years for adding emissions to the atmosphere and for jeopardising life on earth as we know it. It seems that we have not learnt the lessons on the impact of burning fossil fuels as yet. And this, at a time when the world is running out of time and carbon space, is indeed something that should worry us enormously. [DTE](https://www.downtoearth.org.in) [@sunitanar](https://twitter.com/sunitanar)

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FOUNDER EDITOR Anil Agarwal

EDITOR Sunita Narain

MANAGING EDITOR Richard Mahapatra

CHIEF COPY EDITOR Snigdha Das

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CREATIVE DIRECTOR Ajit Bajaj

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GRAPHIC EDITOR Sorit Gupta

REPORTING TEAM Shagun, Akshit Sangomla,

Pulaha Roy, Taran Deol, Shuchita Jha,

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WEB EDITORS Joyjeet Das, Rajat Ghai,

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DESIGN TEAM Chaitanya Chandan, Sanjit Kumar,

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PHOTOGRAPHER Vikas Choudhary

PHOTO LIBRARY Anil Kumar

PRODUCTION Rakesh Shrivastava, Gundhar Das

TECH SUPPORT Rajendra Rawat, Jaidev Sharma

MULTIMEDIA Joel Michael, Aishwarya Iyer,

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INFORMATION AND RESEARCH SUPPORT

Kiran Pandey, Susan Chacko, Madhumita Paul,

Sheeja Nair, Lalit Maurya, Dayanidhi Mishra

CONSULTING EDITOR Anumita Roychowdhury

Vol 30, No 21; Total No of Pages: 60

Editorial, subscriptions and advertisements:
Society for Environmental Communications,
41, Tughlakabad Institutional Area,
New Delhi 110062.

Phone: 91-11-40616000, 29955124,

29956110, 29956394, 29956399

Fax: 91-11-29955879.

Email: editor@downtoearth.org.in

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FOR ADVERTISEMENTS Jyoti Ghosh

jghosh@cseindia.org

FOR SUBSCRIPTIONS

[K C R Raja, raja@cseindia.org](mailto:KCR Raja, raja@cseindia.org)



◀ Cover design: Ajit Bajaj

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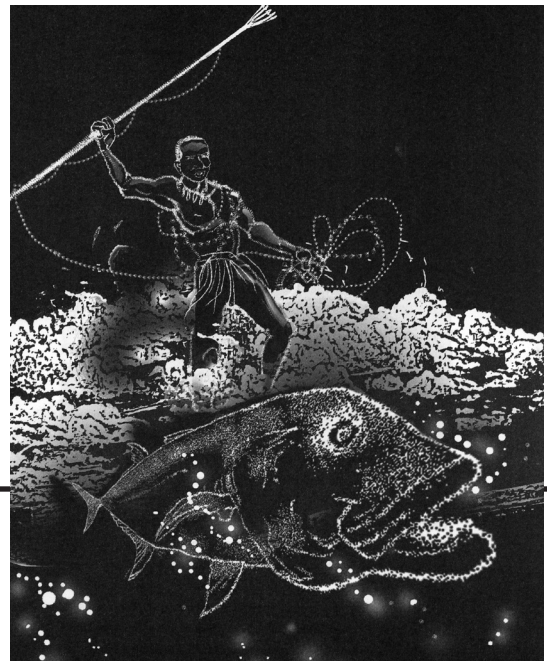


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Engage



Forests include more than just tree cover

This is in response to the article "Patchy growth" (1-15 February, 2022). The article holds a mirror up to the state of forests in the country. Nowadays, the planting of seeds and rearing trees is a commercialised practice. Researchers and the general public show interest in afforestation programmes only because the planted stock will be financially beneficial in the future. This view encapsulates people's attitude towards conservation of nature. We forget that forests are not just about trees and are not only meant for human utilisation. Rather, forest is an ecological system that includes all the organisms as well as abiotic factors present in it.

We know now that dense forest cover in the country has not increased in the last decade. This is because planting more trees is not the only solution for deforestation. First, the rate of deforestation should be reduced. The government should not simply allot it for large development projects.

Besides, the method followed by the Forest Survey of India to map the tree cover is outdated. The definition of forests as an area more than 1 hectare in extent and with tree canopy density of 10 per cent and above leads to an overestimation. This practice should be cancelled and a more comprehensive analysis should be conducted to portray the real picture of the country's total forest cover.

RASHMI R
UTTARA KANNADA

Biomass for power

This is in reference to "Biomass co-firing: NTPC retrofits 13 power stations. Will other companies be able to follow suit?" published online on January 25, 2022. Cofiring of biomass pellets in a coal-fired boiler has its own limitations; two of which are highlighted in the report. The 10 per cent limit of biomass is due to the performance and the life cycle of the biomass. The better method is to gasify the biomass directly and use the "clean syngas" for coal firing. This will enhance the life of the boiler and also remove the limitation on blending. This may help the farmers get better revenue for the biomass. However this requires additional capital investment for the gasifier. But the environmental impact of crop burning will definitely justify this capital subsidy.

RADHAKRISHNAN SRINIVASAN
VIA EMAIL

Profit trumps all

The article, "An unusual contest" (1-15 February, 2022) is an eye-opener on how the authorities destroy nature and the environment and eliminate the habitats of endangered species in violation of the rules framed in the country for the sole purpose of profit making by private parties. This reminds one of the article "Some more unequal" (16-31 December, 2021), which says how the inequality between ordinary people and capitalists are blatantly rising while the economy is on a slowdown. The country's wealth is looted by the profiteers while the health of the country is getting depleted.

AJU MUKHOPADHYAY
PONDICHERRY



Eye-opener on crop insurance

This is with reference to the edition "Partial coverage" (1-15 February, 2022). All the articles captured subjects relevant to current events. In particular, the cover story "Sitting ducks" that analyses the difficulties that farmers face with the Pradhan Mantri Fasal Bima Yojana is quite comprehensive. It sheds a light on the corruption, weather-related hindrances and delay in crop insurance reimbursements. Overall, *Down To Earth's* coverage of the country as a whole and the states is good, not politically biased and highlights the day-to-day problems of the people. Continue the good work.

AJAY
CHENNAI



Down To Earth welcomes comments and suggestions from readers in response to its articles and opinion pieces. We are introducing a "Pick of the Postbag" award, under which the letter adjudged the best will be highlighted and the winner will receive a free one-year digital subscription of the magazine. Letters may be e-mailed to editor@downtoearth.org.in or sent to:

The Society for Environmental Communications; 41, Tughlakabad Institutional Area; New Delhi-110 062. Letter writers should mention their full name, postal address and phone number.



How Bhopal cleared its legacy waste

India currently has more than 3,000 dumpsites that need to be either reclaimed or closed permanently. But how will the



country go about this arduous task? Bhopal, the capital of Madhya Pradesh, offers some interesting solutions. In just three years, the city has reclaimed its 15-hectare dumpsite by clearing 750,000 tonnes of legacy waste. Watch the video to see how Bhopal achieved this feat, and how it plans to keep up the momentum.

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Digest

WHAT'S INSIDE

Marathwada women reclaim farm, ensure nutritional security **P10**

Far-reaching implications of Russia-Ukraine war **P11**

Floods displace thousands in Australia's east coast **P12**



Members of the All India Students Association, a left-wing youth organisation, at a demonstration in Delhi organised on February 25, 2022 against the Russia-Ukraine conflict. Parents of Indian students in Ukraine attended the demonstration and demanded safe return of their wards. In the first week of March, some 8,000 students managed to attain safe passage to India.

FOR MORE PHOTOS, SCAN



A land imagined

SANJIVNI SALVE beams with happiness as she shares with anyone willing to listen, the news of her first harvest of *desi bajra* (native pearl millet). "This is for my family so we get proper nutrition," says the resident of Dhodka Rajuri village in Beed district of Maharashtra. Her decision to sow wild-type seeds instead of the hybrid variety gave her 100 kg of healthy crop, she says.

For years, Salve's husband and sons have decided what to sow on their family's 0.6-hectare (ha) farm. But in September last year, she set aside 0.2 ha to grow nutritious crops of her choice. "I sowed native pearl millet, sesame (*til*) and green gram (*moong*). I also started a small kitchen garden," she recalls. She used buffalo dung and goat droppings as natural fertilisers. While sesame did not survive due to erratic rainfall, she harvested 12 kg of green gram.

Salve's move was driven by COVID-19 lockdowns in the last two years. Markets in Beed were shut, leading to food shortage in the village. This made her realise the need for food and nutrition security.

A similar trend is picking up pace in other villages of the Marathwada region that faced food scarcity during the pandemic. While farm families here typically grow commercial crops, women are now reclaiming some land to grow healthy crops for sustenance. Dwaraka Waghmare of Kathoda village near Beed is one of them. Her family

Women in Maharashtra's Marathwada region reclaim parts of their farmland to grow produce of choice and to ensure nutrition security of their families
SHUCHITA JHA

of sugarcane cutters has 0.9 ha, of which she used 0.2 ha last year to grow pearl millet, pigeon pea (*toor*) and green gram—all gave good yields. "I used local seeds and the crops grew well even in erratic rainfall, while my sons planted hybrid varieties and endured losses," she says.

In all, 180 women across six districts—Yavatmal, Nagpur, Akola, Patbhani, Hingoli and Beed—follow this practice. They receive necessary training and resources from a group of Pune non-profits. While the Society for Promoting Participative Ecosystem Management (SOPPECOM) and Mahila Kisan Morcha Manch (MAKAAM) educates the women on chemical-free farming, non-profit Chetna Vikas provides local seed varieties.

By reclaiming a part of their land, the women are reversing the negative impacts of commercial agriculture, says Seema Kulkarni, senior fellow at SOPPECOM and national facilitation team member at MAKAAM. The trend guarantees produce is kept for families first. "Mixed-cropping and chemical-free farming also ensures access to nutritious food without involvement of market forces," says Manisha Tokle, a social activist with Beed-based Women Sugarcane Cutters Labour Association, which promotes the practice.

Several women have taken interest in adopting the model, but expansion will take time as resources are limited, says Kulkarni.



Social activist Manisha Tokle (right) with Vandana Khandel of Dhodka Rajuri village who has reclaimed 0.2 hectares to grow nutritious crops for her family

RUSSIA-UKRAINE WAR

Oil, wheat, microchip shortage imminent

RUSSIA'S INVASION of Ukraine has had huge consequences for global energy markets. Brent crude, a crude oil mostly extracted from the North Sea and the world's most traded oil benchmark, rose to US \$125 a barrel on March 7, while coal jumped to \$437 per tonne. The reason is reduced supply from Russia, and the rest of the world's reluctance to trade with the country that is facing international sanctions. Russia is a major supplier of liquefied natural gas, particularly to Europe.



Countries such as the US and Iran can increase production to meet the demand, but are unlikely to close the gap quickly, say analysts.

The supply crunch has brought up talks of nations reverting to coal to meet their energy

needs. At a time when environmentalists are calling for a phase-out of fossil fuels, a shift to coal will dent the progress made to achieve climate targets.

The conflict also impacts the agricultural sector. Russia and

Ukraine together account for a quarter of the world's wheat trade; the latter is also a major producer of corn and sunflower oil. Large-scale supply gaps can exacerbate the ongoing food inflation in several nations including India. Countries such as Egypt and Malaysia have already indicated risks to their food security.

In addition, a halt in trade of industrial metals like copper, aluminium, palladium and neon from both countries can lead to a global shortage of semiconductors.

TECHNOLOGY

China's crypto ban shifts mining to US, Kazakhstan

CHINA'S RIGOROUS stance against cryptocurrency has had more widespread impacts on the environment. The country banned cryptocurrency in September last year, citing its use in illegal activities. Since then, mining of currencies like Bitcoin—an energy- and carbon-intensive process—has increased the carbon footprint of other countries. Using data with the Cambridge Bitcoin Electricity Consumption Index, a report published in the journal *Joule* on February 25, 2022, shows the US and Kazakhstan, which already release huge amounts of greenhouse gas emissions, have now become the biggest hubs for Bitcoin mining. The index also says Bitcoin mining consumes around 130 terawatt hours of power per year, one-tenth of electricity used by nations like India. China's tirade against cryptocurrency also has financial impacts. On March 1, Bitcoin tumbled by 5 per cent and risked a drop from US \$40,000 to \$35,000 after China's central bank reaffirmed its ban.

COVID-19

Vaccine wastage high with slump in demand

AS RICH and middle-income countries see higher rates of vaccination against COVID-19, they now face wastage of doses due to low demand. In the US, state health departments reported in March that millions of doses had to be disposed of. Overall, the country reported a wastage rate of about 9.5 per cent or 65 million of the 687 million doses delivered as of late February. Guatemala also saw more than a million doses of the Sputnik vaccine wasted in early March. This is gross negligence, with several nations, particularly in Africa, having abysmal vaccination rates. As per the World Health Organization, at the end of February only 13 African nations fully vaccinated less than 5 per cent of their people. Experts suggest this may be due to distribution issues and vaccine hesitancy. In India, the Centre ordered the states on March 3 to curb wastage by swapping near-expiry vials at private clinics with those of long-expiry ones at government centres.

BITS INDIA

Farmers from various parts of Jagtial and Nizamabad districts in Telangana on March 3 marched 80 km to press for numerous demands, including reopening of the defunct sugar factory in Jagtial and setting up of a turmeric board in Nizamabad. They also demanded waiver of crop loans up to ₹1 lakh.

Karnataka paused all mining and quarrying operations in Chamarajanagar district on March 5 after landslides triggered a massive collapse at the White Stone hill in Gundlupet. Three people were feared dead and buried under mounds of stone debris. The state launched an investigation into operations at the quarry, which it says is over-exploited.



The Central Institute of Cotton Research warned agricultural authorities in Punjab and Haryana of a deadly pink bollworm infestation in the state after spotting larvae and pupa at several small-scale units that manufacture animal feed. If the insects are not controlled within 30-40 days, they can damage kharif crops in the region.

The Union government on February 26 relaxed compliance norms for scientists, making it easier for them to access grants and avail resources for research and development. The new guidelines include single-step approval for administrative issues and reduction in frequency of in-person reviews.

IN COURT

NATIONAL GREEN TRIBUNAL

■ In a matter on the pollution of the Ashtamudi and Vambanad-Kol wetlands in Kollam, Kerala, the National Green Tribunal (NGT) has asked the state and district authorities concerned to take appropriate action. Both wetlands are recognised under the Ramsar Convention.

■ NGT has constituted a joint committee to probe illegal use of construction equipment in Delhi's Pul Pehlad Pur village. The indiscriminate use of the equipment has increased dust and noise pollution in the area.

HIGH COURTS

■ The High Court of Odisha has given the district collector of Puri a deadline of April 4 to come up with a definite plan to control the repeated emergence of illegal prawn farms in the Chilika lake area, despite efforts to demolish them.

■ The High Court of Madhya Pradesh has ordered the state government to remove all statues installed at intersections after January 18, 2013. The court has also fined the state and the Bhopal Municipal Corporation, since the installed statues violate an earlier Supreme Court order.

So far...

Number of cases on environment and development tracked from January 1 to March 1, 2022



FOR DETAILED VERDICTS, SCAN



BITS GLOBAL

The Australian government on March 3 ordered the evacuation of 500,000 people in the state of Queensland along its east coast, after heavy rains triggered flash floods in the region. The deluge that began in the last week of February saw 150 mm of rainfall and led to the deaths of 13 people. Scientists attribute the heavy rainfall to the La Niña weather pattern, the colder phase of the El Niño Southern Oscillation. The phenomenon had also brought floods to the country last March, which were called the worst in 60 years.

Panama on March 3 enacted a legislation recognising the legal rights of nature, mandating that all future plans and policies safeguard the environment from degradation. The law was signed after one year of parliamentary debate and includes the natural world's right to exist, persist and regenerate; to conserve its biodiversity; and to be restored. The law will take effect next year.



Honduras on February 28 banned open-pit mining in the country, saying that the practice has caused widespread pollution, deforestation and environmental degradation. Mining has also been linked with several human rights violations. The country will no longer grant environmental licences for new mine projects and will shut down the projects already in operation.

Malaysia on March 2 announced it is drafting a law to regulate carbon trading that is likely to be ready by the end of 2022. The environment and water ministry said it will develop a single carbon trading platform. The country's decision to frame the legislation comes as a major carbon trading deal worth US \$76.5 billion fell through after being declared illegal by the state's lawyers and criticised by experts.

By Snigdha Das, Aditya Misra, Susan Chacko and Dakshiani Palicha

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Climate justice, now

IPCC's latest climate report provides evidence that climate-justice needs to be at the centre of global policymaking

SNIGDHA DAS
NEW DELHI

THE WORLD'S top authority on climate science has finally started to acknowledge and provide evidence for what everyone knew all along. The Intergovernmental Panel on Climate Change (IPCC) has so far published two instalments of its Sixth Assessment Report (AR6). While the first report, "The Physical Science Basis" released in September 2021, unequivocally attributed extreme weather events to climate change, the latest, released on February 28 this year, lays bare that inequality makes certain communities and countries more vulnerable to climate change impacts. In this report, IPCC for the first time

authoritatively states that climate justice now needs to be at the centre of global policy-making.

The report, "Climate Change 2022: Impacts, Adaptation and Vulnerability", compiled by 270 authors from 67 countries, incorporating research from over 34,000 scientific papers, identifies 127 risks to natural and human systems and notes that nearly half the global population now lives in settings that are "highly vulnerable to climate change."

However, climate change disproportionately affects marginalised groups, amplifying inequalities and undermining sustainable development across all regions, it



states with "high confidence". "The poor typically have low carbon footprints but are disproportionately affected by adverse consequences of climate change," it states, adding that they lack access to adaptation options.

The report identifies that the most vulnerable regions are located in Global South—East, Central and West Africa, South Asia, Micronesia and in Central America. These regions already reel from the compound challenges of high levels of poverty, inadequate access to basic services like water and sanitation, gender inequalities and poor governance.

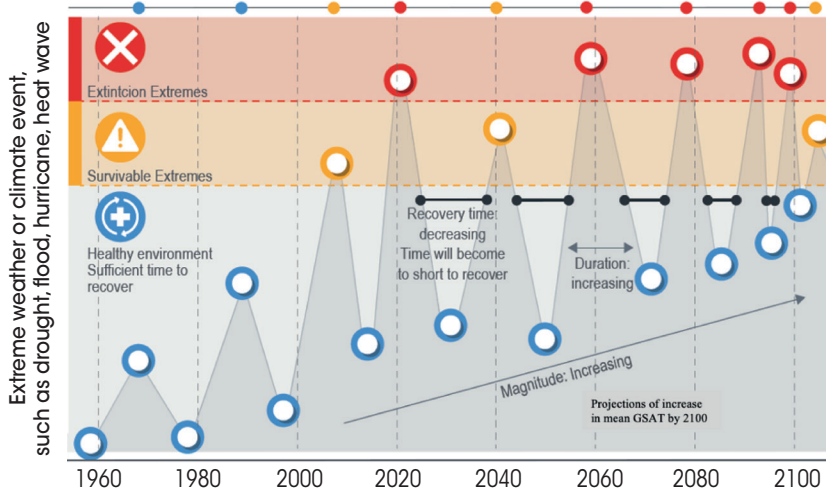
Providing evidence base for the vulnerability of Global South, the report states that observed average mortality from floods, drought and storms is 15 times higher for countries ranked as "very high" vulnerable, such as Mozambique, Somalia, Nigeria, Afghanistan and Haiti compared to "very low" vulnerable ones, such as the UK, Australia, Canada and Sweden in the last decade. Over 3.3 billion people live in countries classified as very highly or highly vulnerable, while 1.8 billion are in countries with low or very low vulnerability. Worse, the population in most vulnerable countries is projected to increase significantly by 2050 and 2100.

POVERTY TRAP IN MAKING

While climate change is already causing more frequent and severe floods, heat waves, wildfires and habitat destruction, the biggest impact will be on agricultural systems. Yields of major cereal crops in climate-affected areas are already significantly lower than they were, due to today's current 1.1°C increase in global temperature averages above pre-industrial levels. If

Survival at risk

Frequency, duration of extreme events increases with rising mean warming



Source: "Climate Change 2022: Impacts, Adaptation and Vulnerability" report by IPCC

that number reaches 1.5°C, the target set out by the IPCC in an earlier report as the highest we can go before a total climate disaster, about 8 per cent of the world's farmland would become unsuitable for agriculture. An increase of 2°C, or more, could be catastrophic, said Debra Roberts, one of the report's co-chairs, in a press conference.

Without strong adaptation measures, the report states, losses and damages will likely be concentrated among the poorest vulnerable populations. Though the impact of crop failure will be felt worldwide, this will be particularly acute in Africa, Asia, Central and South America, on small island nations and in the Arctic. At 2°C of warming, people in sub-Saharan Africa, South Asia and Small Island Developing States will face severe food shortages and malnutrition. This will require farmers and agricultural systems to adapt, from adjusting growing seasons to switching crops or installing water-saving irrigation systems.

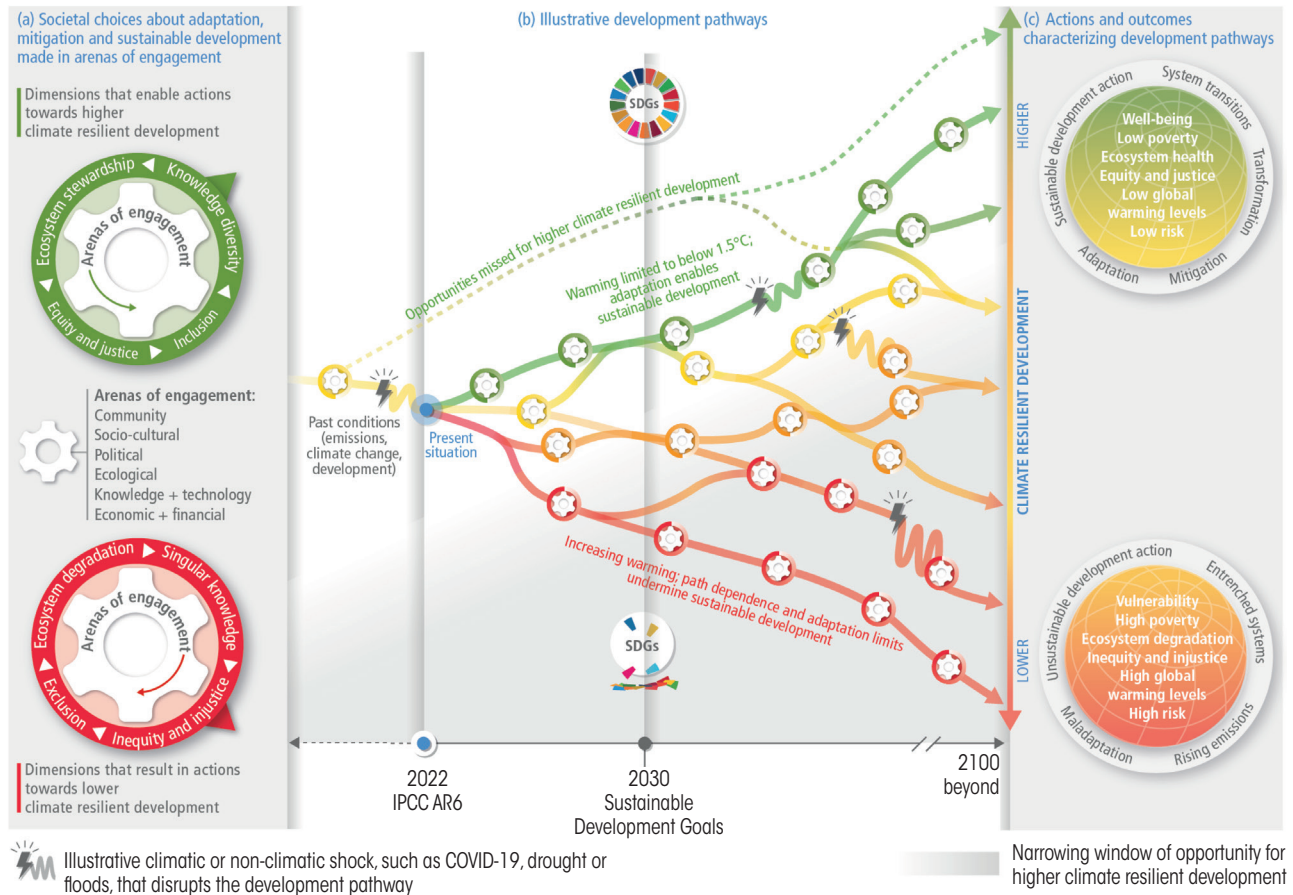
Climate change is likely to force

economic transitions among the poorest groups, accelerating the switch from agriculture to other forms of wage labour. Even with moderate climate change, people in vulnerable regions will experience a further erosion of livelihood security that can interact with humanitarian crises, such as displacement and forced migration and violent conflict, and lead to social tipping points that can also be coupled with environmental tipping points. Under an inequality scenario, the projected number of people living in extreme poverty may increase by 122 million by 2030.

Risk of extreme impoverishment increases for low-income people experiencing repeated and successive climatic events, whereby before they have recovered from one disaster, they face another impact. For example, in mountainous regions, where the combination of glacier recession and extreme rainfall result in landslides. There is robust evidence that this effect has been observed around slow- and rapid-onset climate events related to

SHIFT PATHWAYS

There is a rapidly narrowing window of opportunity to enable climate-resilient development



Source: Climate Change 2022: Impacts, Adaptation and Vulnerability report by IPCC

drought, such as rising temperatures, heatwaves, and rainfall scarcity with devastating consequences for agriculture.

The report also provides evidence that climate change may exacerbate poverty indirectly by increasing cost of food, housing and healthcare, among other rising costs borne by the poor. "Overall, there is more evidence that even under medium warming pathways, climate change risks to poverty would become severe if vulnerability is high and adaptation is low," states the report, which has found that across 92 developing countries, the poorest 40 per cent of the population experi-

enced losses that were 70 per cent greater than the losses of people with average wealth.

Climate change risks also carry the risk of amplifying or aggravating existing tensions within and between communities and countries. "In this regard, specific attention ought to be paid to how responses to climate change exacerbates inequalities within societies and creates tensions between different groups—typically between those who are able to protect themselves from climate change impacts and those who do not have sufficient resources and/or are not prioritised in the responses to climate change," the report suggests.

Considering the disproportionate impacts of climate hazard on most vulnerable groups and regions and their relatively minor contribution to anthropogenic climate change, it is evident that vulnerability reduction and adaptation to climate change have also to be seen as an issue of climate justice and climate-just development, the report concludes. It, however, states with "high confidence" that climate justice requires consideration of the legal, institutional and governance frameworks that significantly determine whether adaptation is successful in addressing the needs of the poor. **DTB**

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**A website on
Environment and Development
for the Young and the Curious**

Officials walk past an artwork at the fifth UN Environment Assembly in Nairobi, Kenya that urges people to turn off the plastic tap



Plastic endgame

The world's adoption of the resolution to end plastic pollution by 2024 is only the first step in a long battle

MAINA WARURU IN NAIROBI, KENYA WITH
KIRAN PANDEY AND **SIDDHARTH GHANSHYAM SINGH** IN NEW DELHI

FROM ESTABLISHING a science policy panel for chemicals and waste management to agreeing to restore ecosystems, the world passed 14 resolutions at the resumed session of the fifth United Nations Environment Assembly (UNEA), held in Nairobi, Kenya, between February 28 and March 2, 2022.

The most crucial of these was the decision to establish an intergovernmental negotiating committee that will forge a legally binding agreement to end plastic pollution. World leaders plan to start negotiations on this resolution in June. If the timeline is kept, this will be the second fastest environmental agreement to move from the adoption stage into negotiations. This highlights the urgency of the problem and the global commitment to address it. The proposed committee has the ambitious task of drafting an agreement on plastics by the end of 2024, when the leaders plan to

PHOTOGRAPH: UNITED NATIONS ENVIRONMENT PROGRAMME

meet for the sixth Assembly.

Of the 11 global environmental agreements either in force or under discussion, the resolution to set up the UN Framework Convention on Climate Change (UNFCCC) in the 1990s was the fastest. World leaders took a little less than two months to move from adopting the resolution to starting negotiations on UNFCCC. In the Paris Agreement under UNFCCC, it took over five months (see 'Swift move').

DIFFICULT TASK

The treaty on ending plastic pollution, which includes microplastics and marine litter, will have both binding and voluntary approaches. The resolution indicates that the committee has to include provisions promoting national and international cooperative measures and national action plans to work towards the prevention, reduction and elimination of plastic pollution. It will also specify arrangements for capacity building, technical assistance, technology transfer and financial assistance.

The resolution indicates the possibility of a global fund and invites governments and other stakeholders to provide budgetary resources. The fund will ensure countries and economies in transition that deal with a large fraction of plastic waste, especially in the global south, are supported by nations whose plastic production and waste generation are high.

While the resolution calls for strict action to curb the entire life-cycle of plastics, it is silent on whether the agreement will look at the oil, gas or coal sectors that are responsible for the raw materials used to make plastics. Currently, 99 per cent of plastics are

RESOLUTIONS GALORE

World leaders passed 14 resolutions to save biodiversity at the recently concluded fifth UN Environment Assembly

Resolutions adopted on

- Sustainable lake management (for protection, restoration and wise use)
- Nature-based solutions for supporting sustainable development (and meeting 2030 SDGs)
- Sound management of chemicals and waste (to achieve SDG on health)
- Sustainable nitrogen management (to halve nitrogen waste by 2030)
- Biodiversity and health (biodiversity loss and zoonotic diseases linkages)
- Science-policy panel to contribute further to the sound management of chemicals and waste and to prevent pollution
- Sustainable and resilient infrastructure (for green recovery from COVID-19)
- Environmental dimension of a sustainable, resilient and inclusive post COVID-19 recovery
- Enhancing circular economy as a contribution to achieving sustainable consumption and production
- Environmental aspects of minerals and metals management
- Due regard to the principle of equitable geographical distribution (in the composition of the UNEP secretariat)
- Future of global environment outlook (to ensure that emerging environmental problems receive appropriate and adequate consideration by governments)
- End plastic pollution: towards an international legally binding instrument

Source: United Nations Environment Programme (UNEP)

SWIFT MOVE

The resolution to forge legally binding agreement to end plastic pollution is second fastest environmental pact to move from adoption into negotiations



Sources: Typology of International Legal Instruments, Centre for International Environmental Law and UNEP

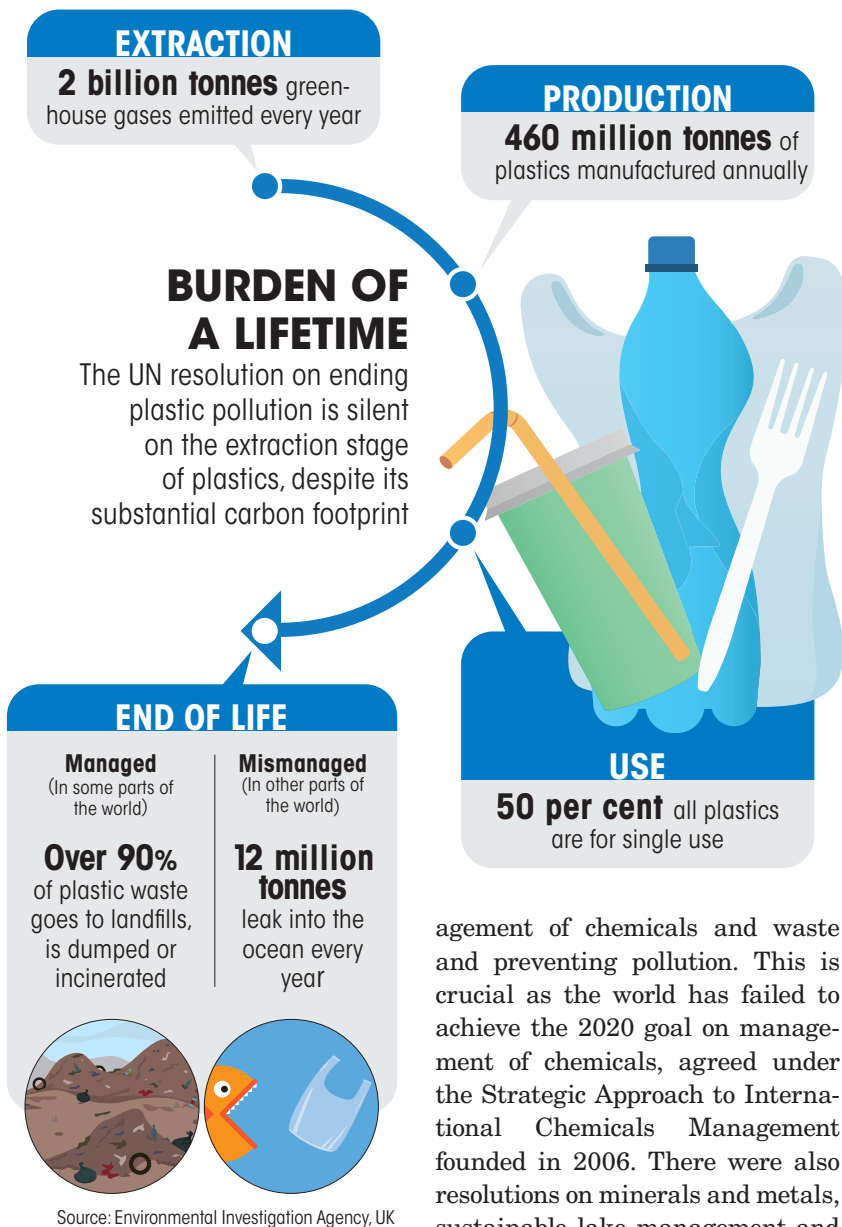
produced from petrochemicals (see 'Burden of a lifetime').

Experts expect fierce resistance from the petrochemical industry, which is not happy with the resolution. In India, the share price of Reliance Industries fell as the news of the global plastic treaty spread across the country. The company holds a 42 per cent stake in the Indian plastic ecosystem.

Since the agreement invites all relevant stakeholders, including the industries, there will be attempts to insert half-baked solutions like chemical recycling (plastic to fuel) and incineration (including co-incineration) in the final text. Unilever a few years back started a pilot project in Indonesia under which it claimed plastic sachets could be "safely" turned into fuel. A report earlier this year by non-profit Global Alliance for Incineration Alternatives says the company clandestinely stopped the operations.

Countries are also holding on to plastics. A report released at the Assembly shows Australia has been dumping plastic in ASEAN countries despite banning the export of plastic waste in 2020. The country has managed to do this by shipping plastics in the form of plastic waste fuel that contains a range of toxic additives. In January, India released new guidelines under its extended producer responsibility (EPR) norms that introduced the concept of plastic credits for the industry. Under this, companies have a liability to collect plastic waste equivalent to the amount they generate in a year. Further, if a company collects plastic waste in addition to what it generates, it can sell the extra as credit to companies that are not collecting enough plastic waste.

The policy has piqued the interest of consumer goods companies



who are using it to greenwash their brands and avoid accountability. Dabur, one of India's largest consumer goods company, in February started claiming it was plastic neutral just by fulfilling its EPR liability.

OTHER PROMISES

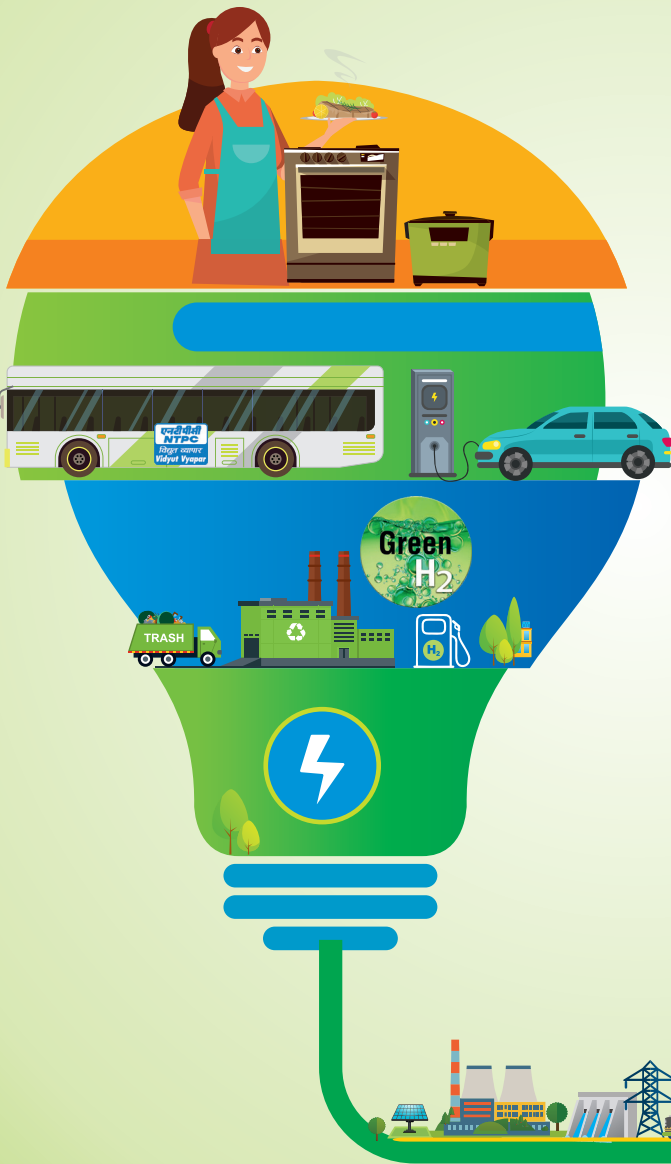
The Assembly passed a resolution supporting the establishment of a comprehensive and ambitious science policy panel on the sound man-

agement of chemicals and waste and preventing pollution. This is crucial as the world has failed to achieve the 2020 goal on management of chemicals, agreed under the Strategic Approach to International Chemicals Management founded in 2006. There were also resolutions on minerals and metals, sustainable lake management and climate mitigation and adaptation.

The Assembly concluded with the adoption of a ministerial declaration reflecting concerns of UN member states on future pandemics and other health risks, if destruction of nature continues at the current rate. The ministerial statement called for enhanced protection of habitats and wild animals in view of risks of the lethal pathogens spreading to humans. [DTE](#) [@down2earthindia](#)



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Urban ladder

Safely managing faecal sludge is India's new sanitation challenge. In the absence of adequate rural treatment plants, a few states rope in underutilised urban facilities

SWATI BHATIA IN ODISHA AND CHHATTISGARH

RAVI KUMAR IN KARNATAKA



IF ONLY toilets could ensure safe sanitation. After constructing 110 million toilets in 60 months, India declared itself open-defecation free on October 2, 2019. The National Annual Rural Sanitation Survey (NARSS) 2019-20, a government-commissioned survey of the sanitation scheme, Swachh Bharat Mission (SBM), soon stated that 99.9 per cent households in rural India now practise safe disposal of excreta. Despite this civilisational leap forward, India's sanitation challenge remains far from over. It

is another matter that some people are already slipping back into the habit of open defecation due to dysfunctional toilets or lack of water. As per SBM dashboard, almost all of the 160 million households in rural India have toilets. Assuming that every household has five members and that an average human releases 128 g of faeces daily, as per the 2015 study in *Critical Reviews in Environmental Science and Technology*, rural India generates 0.12 million tonnes of faecal matter a day. In the absence of

PHOTOGRAPH: SWATI BHATIA / CSE



Wall paintings at Baidia Bandh village in Odisha's Dhenkanal district to make people aware of safe sanitation. Village residents now send their faecal sludge to an urban treatment plant

safe disposal and treatment, such huge volume of waste could create a new sanitation nightmare—a situation similar to when India did not have toilets and exposure to contaminated faecal caused millions of unavoidable deaths.

This is the reason, SBM had laid emphasis on twin-pit toilets built with brick-lined honeycomb design. Such a toilet is like a self-contained treatment plant, where the excreta gets decomposed and can be then safely reused as manure (see 'Mission accomplished but...')

Down To Earth, October 1-15, 2019). Even though the government has over and over again claimed that a majority of toilets built under SBM are honeycombed twin-pits, field investigations by Delhi-based Centre for Science and Environment (CSE) in Karnataka, Odisha, Chhattisgarh and Rajasthan early this year show otherwise.

In 2017, international non-profit WaterAid conducted a rapid assessment of toilets being built under SBM. Though limited to 1,000 households in eight states, it remains the only survey so far to have assessed the design and quality of toilets under SBM. The survey found that in many cases construction was sub-optimal, unsuited to the local geography and not adhering to design parameters. A third of the toilets assessed were unsafe, creating immediate health hazards, it stated.

Then there are toilets built prior to SBM when no design specification was issued. Mahesh S C, deputy secretary (development) of Rural Drinking Water and Sanitation Department, Karnataka, tells *Down To Earth* that currently, single pit is the most predominant structure in his state. Similar concerns were also cited by officials in other states like Rajasthan, Sikkim, Haryana, Bihar and Odisha.

Faecal sludge emptied from these faulty or poorly designed toilets is not decomposed and is full of pathogens. More often than not, people simply dump it in waterbodies or in fields. Though no assessment is available to gauge the untreated faecal sludge that gets dumped in the open, the volume, in all likelihood, is enough to derail the country's progress towards ensuring Sustainable Development Goal-6 to ensure clean water and

sanitation for all by 2030.

SBM, now in its second phase, focuses on sustainability of ODF status and solid and liquid waste management. It recommends constructing faecal sludge treatment plants (FSTPS) in rural areas for safe disposal of waste coming out of households with faulty toilets. But this is easier said than done.

Unofficial estimates show that the country has so far only five operational rural FSTPS—three in Karnataka and one each in Chhattisgarh and Madhya Pradesh. "Gram panchayats have a single person called panchayat development officer who is responsible for overseeing all government projects. So, finding the human resources to construct and manage rural FSTPS is difficult," says Parameswaran B, director, of Odisha's Drinking Water and Sanitation department. Arranging land and securing funds for setting up and running FSTPS are also not easy. "Onsite treatment of faecal sludge is the best option," says Shrikant Navrekar, training director, Nirmal Gram Nirman Kendra, a Nashik based non-profit. But offsite treatment has become an absolute necessity, he adds.

To overcome the challenges and to provide immediate access to FSTPS, Karnataka, Odisha and Chhattisgarh have rolled out various convergence strategies, which can work as a model for the country.

RURAL AND URBAN CONVERGENCE

Odisha, Chhattisgarh rope in urban plants for rural waste

Odisha was among the last few states to be declared ODF. But determined to sustain the gains achieved under the first phase of SBM, it is taking proactive steps to manage its faecal sludge. In 2020, the state

asked all districts to use the existing FSTPs in urban areas to treat faecal sludge from gram panchayats within 20 km radius.

There are two reasons Odisha opted for the convergence approach. First, most urban FSTPs in the state are currently underutilised. Transporting rural faecal sludge makes these plants economically viable. Odisha has 114 urban local bodies with 118 FSTPs. Most of them are already operational and the others will be ready in the coming months, says Parameswaran. “While the operational FSTPs are already receiving sludge from nearby rural areas, we have completed the process of tagging gram panchayats to the upcoming ones so that they can start handling rural waste the moment they are operational,” he adds.

The model was first launched in

Balasore district where 90 gram panchayats were tagged to the FSTP unit in Balasore town. By May 2021, the model had been upscaled to include 45 urban FSTPs in the state, says Aroop Tripathy, state consultant on SBM. He adds that the model will successfully cover the entire state in the next year or so.

The advantage of the convergence can clearly be seen in Dhenkanal district, where the lone urban FSTP, set up in 2015 with a capacity to treat 27 kilolitres per day (KLD), is successfully handling faecal waste from 49 gram panchayats.

“Earlier, once the toilet pits would get filled, residents would manually take out the untreated sludge and dump it on open fields and dried water bodies. This would often lead to fights among residents,” says Sushant Kumar Jena,

sarpanch of Baldia Bandha village, one of the villages tagged to the Dhenkanal FSTP. The 40-year-old resident says people would often use kerosene to burn the dried up sludge, settled at the bottom of the pit. Now, the entire process has been streamlined.

Residents who need to get their toilet pits cleaned reach out to the panchayat, which issues a slip and raises a request for a sludge collection truck from the FSTP. On a designated day, the truck arrives, collects the sludge and the slip and submits it to the FSTP. The residents pay the panchayat for the cleaning and they have an option of paying the amount in installments. At the end of each month, the FSTP raises a bill in the name of the panchayat, which transfers the money online.

Self-help groups (SHGs) also



Karnataka's first rural faecal sludge treatment plant at 80 Badgabettu gram panchayat in Udipi district. The plant handles waste from six gram panchayats

PHOTOGRAPH: RAVI KUMAR / CSE

play a vital role in implementing the model. While urban SHGs operate out of the FSTP and are responsible for managing the requests and the associated coordination, rural SHGs carry out sensitisation drives. "We have been successfully handling rural faecal waste for the past year and a half," says Atanu Kumar Samanta, executive officer of Dhenkanal municipality that operates the FSTP.

Parameswaran says to avoid any ambiguity in operations, the model allows urban local bodies and gram panchayats to enter into a memorandum of understanding (MoU). They are also free to decide the fees, based on transportation cost and other modalities. In Dhenkanal, for example, the municipality provides the services and ensures they are carried out safely. It also decides the fees in consultation with gram panchayats and maintains a digital record of complaints. The gram panchayats identifies households with faulty toilets, sensitises them, maintains desludging records and collect the money from them.

A similar model is also being implemented by Chhattisgarh. In Kumhari town of Durg district, the government has set up a 6 KLD FSTP designed to cater to seven gram panchayats along with the urban population, says Girish Mathurey, SBM coordinator of the district.

TREATMENT PLANTS FOR CLUSTER OF VILLAGES

Karnataka plans 100 rural FSTPs along with convergence models

In 2020, Karnataka became the first state to come up with solid liquid waste management by-law for rural areas. Under this, the state plans to construct over 100 rural

FSTPs that will cater to clusters of gram panchayats. Currently, it has rolled out 16 pilot rural FSTPs. Three of the FSTPs are operational, nine are under construction and land is being acquired for the remaining four. "The state needs a robust model for safe management of faecal sludge as most rural toilets have single pits," says Harish, the state's deputy director of SBM (rural).

The first rural FSTP, set up in 80 Badgabetu gram panchayat in Udipi district, is a 3-kilo litres a day (KLD) plant constructed inside a solid waste recovery facility. It started operations in January 2022 and now caters to six gram panchayats. The plant is being monitored by a joint committee, headed by the executive officer of the Talu-

IN MOST STATES, URBAN FAECAL SLUDGE TREATMENT PLANTS ARE INFORMALLY TREATING RURAL FAECAL SLUDGE TO OPTIMISE UTILISATION

ka panchayat.

The state is also exploring the option of roping in urban sewage treatment plants for handling faecal sludge in rural areas. Such convergence of STP infrastructure for treatment of faecal sludge is currently being experimented in Raichur and Tumkur districts. The state has recently released a draft MoU document to be signed between municipal councils and gram panchayats. Karnataka's plan is that urban STPs will be used to handle faecal sludge from neighbouring villages and multi-gram panchayat FSTPs will be used for villages away from urban areas. "Karnataka is also pushing for retrofitting of toilets to reduce the rural faecal sludge burden," says Bhanwar Singh Meena, chief

executive officer of Madikheri Zilla Panchayat.

STATES MUST FORMALISE CONVERGENCE SOON

Delays can hit the country's open-defecation-free status

Most urban FSTPs are underutilised in the country and as a result, they informally source faecal sludge from rural areas. For example, the FSTP in Lalsot town in Rajasthan's Alwar district procures faecal sludge from adjacent villages, even though it was constructed for the urban population, says Vinod Kumar Bakolia, plant operator at Lalsot. "We call the collection trucks who then dumps it in the FSTP," says Anil Mauer, a 48-year-old resident of Chandsen village, near Lalsot.

The decision by the Odisha, Chhattisgarh and Karnataka governments to formalise such a sharing has brought the much-needed accountability and transparency in the process. A legal framework will also make gram panchayats responsible for ensuring that people regularly desludge their toilet pits. The urban-rural convergence model is also preferred over the multi-gram panchayat model as it does not require new land and funds, and can be rolled out immediately.

Over time, state governments should also move from demand-driven desludging of pits to scheduled desludging. "This will ensure long-term sustainability for the convergence model. For it to be successful, panchayats will need to maintain records of desludging in rural areas as it will help avoid clashes with urban desludging schedules," says a government official, requesting anonymity. [DTI](#)

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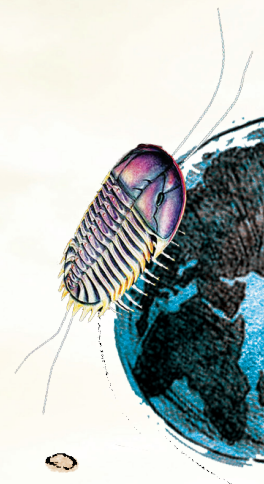
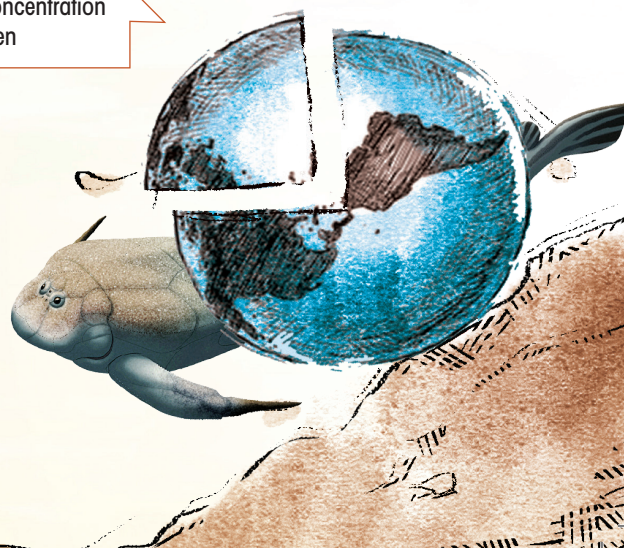
Earth is losing species at an unprecedented rate, which, many believe, is the planet's sixth mass extinction. Since the biodiversity loss this time is the doing of humans, the event also marks the beginning of the Anthropocene Epoch, a self-aggrandising nomenclature that highlights our disproportionate and irreversible impacts on the surroundings

RICHARD MAHAPATRA

1st Extinction
The Ordovician Era
443 million years ago
85% of all species went extinct
Reasons: An "ice age" followed by a rapid warming

2nd Extinction
The Devonian Age
374 million years ago
75% of all species went extinct
Reasons: Fluctuating sea levels, altering global cooling and warming, drop in CO₂ concentration and periods of low oxygen

ILLUSTRATIONS: RITIKA BOHRA / CSE



6th Extinction

The Holocene Epoch

About 99% of the planet's species have been lost in the previous five mass extinctions

Ongoing

Reasons: Anthropogenic factors like climate change and introduction of invasive plant species

5th Extinction

Cretaceous Period

65 million years ago

76% of all species went extinct

Reasons: Meteor crash in the Yucatan peninsula in Mexico, high volcanic activity

4th Extinction

The Late Triassic Age

200 million years ago

80% of all species went extinct

Reasons: Some colossal geological activity in the today's Atlantic Ocean that resulted in high CO₂, global warming and acidified oceans

3rd Extinction

The Permian Age

250 million years ago

95% of all species went extinct

Reasons: An asteroid hit the planet, filling the air with pulverised particles, leading to inhabitable climate conditions



MY GROWING-UP years on the banks of the Mahanadi—one of the planet's oldest rivers, flowing for the last 160 million years through the land mass we now call Odisha—offered more ecological and geological experiences than I would encounter later in life. As I jog my memory, it becomes clear that our lives were marked, in fact, dictated, by ecological indicators. Every tree, every creature, even the speed and direction of the wind, declared the arrival and departure of something.

When the dragonflies swarmed around in September, we rejoiced at the arrival of the winter festival season. In the post-monsoon season, around every puddle of water, or wetland, they had their merry world. Just before this, when the damselflies flew around our house, it was time for the monsoon. Old umbrellas were dusted and sent to a mechanic for repairs, and people thronged the market to stock onion and potato—the two staple foods to be consumed during the food-lean monsoon season. We accepted these as natural cycles. One can say there was a rhythm in our natural living.

In the many excursions along the river, which included mandatory open-defecation sessions, a particular dung beetle, emerging from nowhere, pursued our droppings with uncanny precision. Maybe this specific beetle had not developed a taste for cattle dung, we inferred. Soon, hundreds of them would start rolling balls of our shit to eat and for propagation of their species. The shit balls are of great nutritional value to them and are preserved for future use as well. They are also a safe place for their partner to lay eggs in, again, with plenty of food for the nourishing mother. Later, I found out that dung beetles use the Milky Way as a navigator to locate human localities—all to satiate their taste for our excreta.

These experiences are part of the complex ecosystem of Earth, where every existence has a reason and is rational. The latter is critical because in the ecosystem, an existential rational means an interdependence that intertwines species to hold the existing system together collectively. Each has an ecosystem service for the other that has evolved with them over billions of years, as they carved out their own society or ecological niche. If one fails, the other stutters.

That rhythm stands disrupted.

On December 9 last year, I mourned when an assessment by the International Union for Conservation of Nature (IUCN) on dragonflies and damselflies revealed that “16% out of 6,016 species are at risk of extinction”. In South and Southeast Asia, which includes India, the situation is even worse because a quarter of all species are under threat of extinction. When I was home for the “winter festival season” last year, I did feel the absence of the swarms of these two species. IUCN attributes this extinction of small creatures to the fast-declining freshwater breeding grounds. It means, the decline is due to rapid urbanisation and clearing of wetlands and rainforests to make way for cash crops. “Globally, these ecosystems are disappearing three times faster than forests,” said Bruno Oberle, IUCN Director General, while releasing the assessment. “Marshes and other wetlands may seem unproductive and inhospitable to humans, but in fact they provide us with essential services. They store carbon, give us clean water and food, protect us from floods, as well as offer habitats for one in ten of the world's known species.”

The existential threat faced by dragonfly is a cause of concern for all of the planet's 8.1 million species. With this assessment of the extinction of dragonflies, IUCN said, “the number of species at risk of extinction on the Red List has exceeded 40,000 for the first time.” The IUCN Red List now includes 142,577 species of which 40,084 (or 28 per cent) are under threat of extinction.

BLINDING CHANGE

THE PLANET IS LOSING SPECIES AT UNPRECEDENTED RATES, WITH THOUSANDS LIKELY TO GO EXTINCT WITHIN DECADES

Evolution and extinction are intimately linked to each other, but never before have we witnessed such a rapid change in biodiversity. “The Global Assessment Report on Biodiversity and Ecosystem Services”, the first such by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released in 2019, shows that the current rate and scale of extinction is unprecedented and is being caused majorly by humans. The IPBES assessment says that 1 million animal and plant species face extinction and thousands of these would become extinct

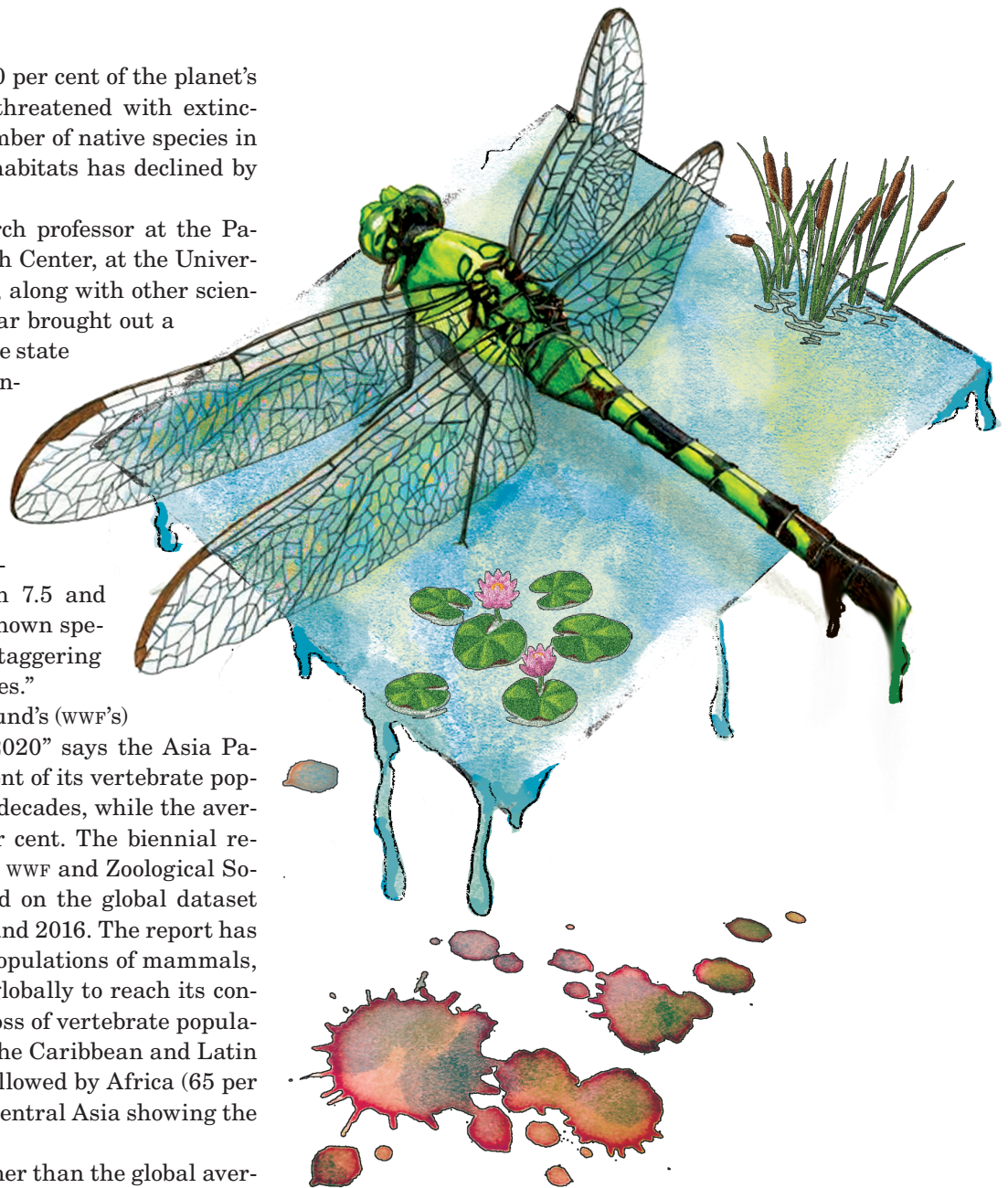
within decades. About 40 per cent of the planet's amphibian species are threatened with extinction. Since 1900, the number of native species in most of the land-based habitats has declined by 20 per cent.

Robert Cowie, research professor at the Pacific Biosciences Research Center, at the University of Hawaii in Manoa, along with other scientists, in January this year brought out a massive assessment of the state of invertebrates that constitute 95 per cent of the known animal species. Cowie and his collaborators found that since the year 1500, "Earth could already have lost between 7.5 and 13% of the two million known species on Earth—a staggering 150,000 to 260,000 species."

The World Wildlife Fund's (wwf's) "Living Planet Report 2020" says the Asia Pacific region lost 45 per cent of its vertebrate population in four-and-half decades, while the average global loss is 68 per cent. The biennial report, prepared jointly by wwf and Zoological Society of London, is based on the global dataset analysed between 1970 and 2016. The report has tracked almost 21,000 populations of mammals, birds, fish and reptiles globally to reach its conclusions. It showed the loss of vertebrate population was the highest in the Caribbean and Latin America (94 per cent), followed by Africa (65 per cent), with Europe and Central Asia showing the least loss (24 per cent).

The loss could be higher than the global average in India, which has lost 12 per cent of its wild mammals, 19 per cent of its amphibians and 3 per cent of its birds over the past five decades. Of about 0.1 million animal species, as recorded in the country till December 2019, about 6,800 are vertebrates. Among these, nearly 550 fall in the critically endangered, endangered and vulnerable categories, according to the Zoological Survey of India, the country's premier organisation in zoological research and studies under the Union Ministry of Environment, Forest and Climate Change.

The "Living Planet Report 2020" points out

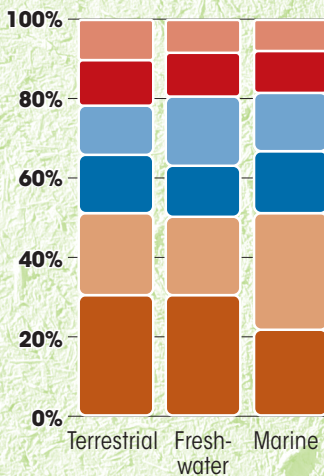


five major reasons behind the biodiversity loss across the planet: changes in land and sea use (habitat loss and degradation), overexploitation of species, invasive species and disease, pollution and climate change. In the Asia Pacific region, including India that is experiencing loss of species higher than the global average, habitat degradation is the biggest trigger, followed by species overexploitation and invasive species and disease. The role of pollution and climate change was proportionately higher at 16 per cent.

PLANETARY LOSS

Human-induced factors are behind the current phase of biodiversity loss

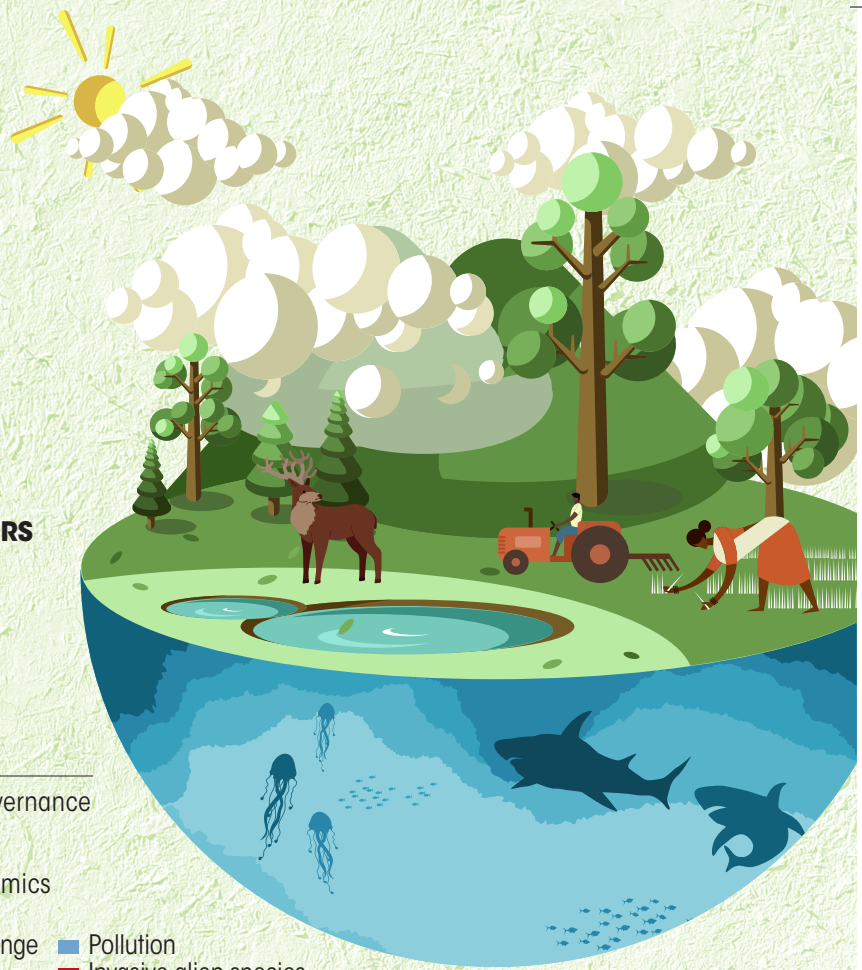
DIRECT DRIVERS



INDIRECT DRIVERS

- Terrestrial**
Demographic and sociocultural
- Freshwater**
Economic and technological
- Institutions and governance
- Marine**
Conflicts and epidemics

- Land/sea use change
- Direct exploitation
- Climate change
- Pollution
- Invasive alien species
- Others



EXAMPLES OF DECLINES IN NATURE

ECOSYSTEM EXTENT AND CONDITION

47%

Natural ecosystems have declined by **47% on average**, relative to their earliest estimated states

SPECIES EXTINCTION RISK

25%

Approximately 25% of species are already threatened with extinction in most animal and plant groups studied

ECOLOGICAL COMMUNITIES

23%

Biotic integrity—the abundance of naturally present species—**has declined by 23%** in terrestrial communities since prehistory

BIOMASS AND SPECIES ABUNDANCE

82%

Global biomass of wild mammals has fallen by **82%** since prehistory. Indicators of vertebrate abundance have fallen rapidly since 1970

NATURE FOR INDIGENOUS PEOPLES

72%

Natural ecosystems have declined by **47 percent on average**, relative to their earliest estimated states

AN ALL-PERVASIVE LOSS

THE LOSS OF BIODIVERSITY IS ON LAND, WATER AND AIR, ACROSS ALL CONTINENTS, AND INDICATES MASS EXTINCTION

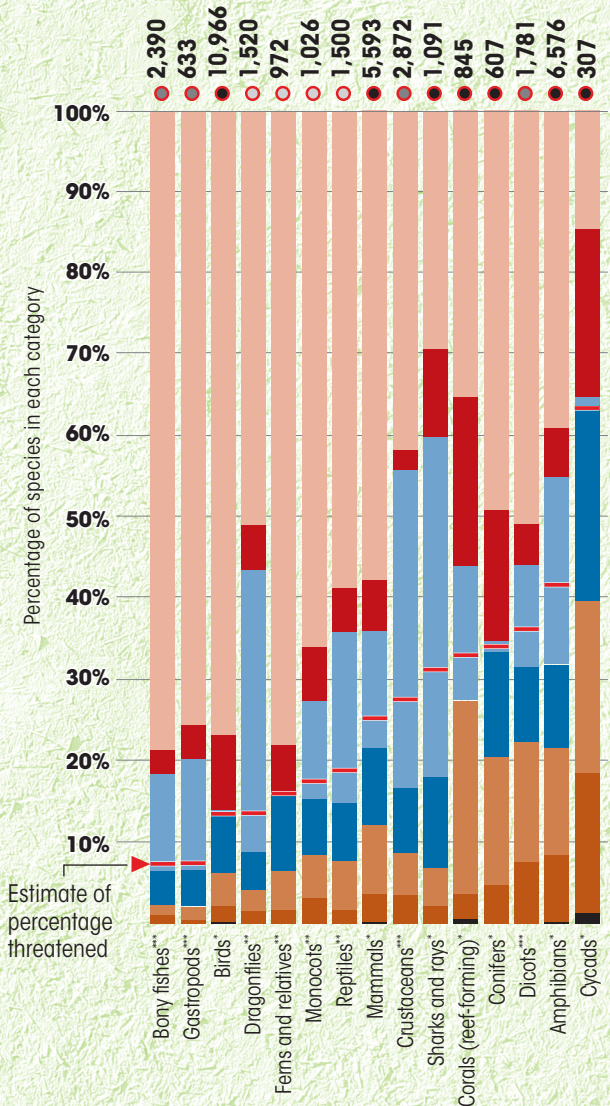
Loss of species afflicts all ecosystems—from land to oceans, from sea surface to the yet-to-be-fully-explored seafloors, from forests to desert, and from swamps to rivers. Scientists are now bringing out specific studies to declare extinction of species almost on a daily basis, which makes clear that the

planet is hurtling towards mass extinction.

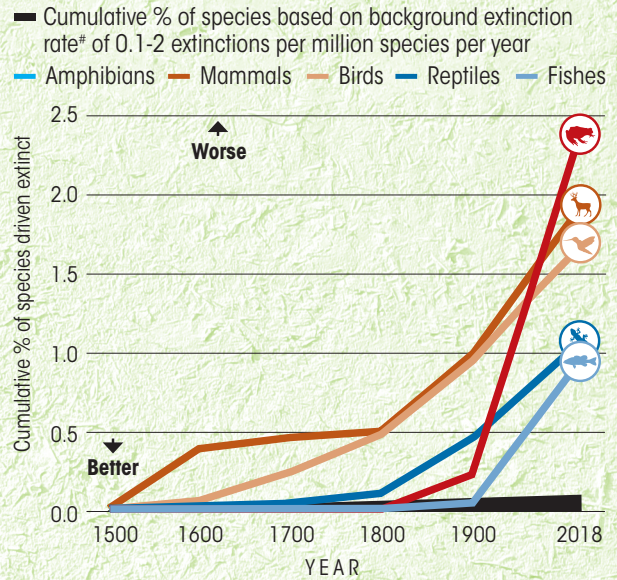
On the deep seafloors, believed to be the harshest habitat, the extinction process is setting in. Elin A Thomas, a doctoral candidate at Queen's University, UK, researching the state of species in the hydrothermal vents, says this ecosystem is yet to be studied and species fully identified. "Our research found that of the 184 species (of Molluscs) assessed, 62% are listed as threatened: 39 are critically endangered, 32 are endangered and 43 are Vulnerable." In the Indian Ocean vents, 100 per

CURRENT GLOBAL EXTINCTION RISK IN DIFFERENT SPECIES GROUPS

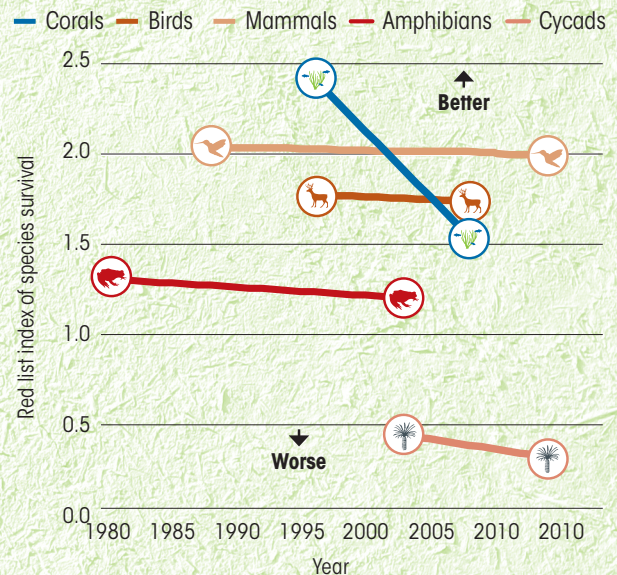
■ Extinct in the wild ■ Critically endangered ■ Endangered
■ Near threatened ■ Least concern ■ Vulnerable
■ Data deficient ■ * Comprehensive; ** Sampled; *** Selected
00 Total number of extant assessed species



Extinctions since 1500



Fall in species survival since 1980



A species exists for around 1 million years before it goes extinct. This is called the background extinction rate, and is expressed as "one species extinction per million species-years". Source: "The Global Assessment Report on Biodiversity and Ecosystem Service", IPBES, 2019

cent molluscs are already listed as critically endangered, Thomas says. This shows the urgent need to protect them from extinction. Yet, International Seabed Authority, a Jamaica-based intergovernmental body, is allowing deep sea mining contracts.

In freshwater bodies like lakes and rivers that occupy less than 1 per cent of the planet's surface space but host 25 per cent of all vertebrate species, making them the densest biodiversity, one in three fish species is on the verge of extinction. Freshwater fishes account for over half of the world's total

fish species. IUCN's Global Species Programme and Species Survival Commission are currently assessing the state of extinction among freshwater fish. "The fact that freshwater biodiversity is declining at twice the rate of that of terrestrial or marine species, is not just an alarming statistic for the environment, it is also highly concerning for people's health and job security," says James Dalton, director, IUCN Global Water Programme. "Freshwater fisheries provide the main source of protein for 200 million people across Asia, Africa

and South America, as well as jobs and livelihoods for 60 million people. And yet here we are, documenting more decline on our watch.” Populations of migratory freshwater fish have fallen by 76 per cent since 1970 and large freshwater species, such as the catfish, by a catastrophic 94 per cent.

Losing species at such alarming rate has far-

reaching consequence on the landmass. Some 300 million years ago, trees started sprouting on the planet. This was an evolution that made food possible for us. Most of our food crops originated from these trees. Every fifth tree species is used by humans for food, fuel and medicines, among other uses. In 2021, Marseille, France, hosted the World Conservation Congress—held every four years and regarded as the largest such congregation—during which conservationists heard with shock the findings of a study: “Over 70 wild relatives of some of the world’s most important crops are threatened with extinction.” The findings, published in the journal *Plants, People, Planet*, assessed 224 plants closely related to maize, potato, bean, squash, chilli pepper, vanilla, avocado, husk tomato and cotton crops. According to this paper, 35 per cent of these wild species are on extinction mode. The genetic materials from these wild varieties are still used to develop new crops, resilient to changing climate and other needs. Without these trees, we will lose biodiversity altogether disabling us from evolving food crops varieties.

In just the last three centuries, global forest areas have shrunk by 40 per cent. Every year, to meet the timber needs from natural sources, the Earth is stripped of 100 million trees. They store 50 per cent of the world’s terrestrial carbon and provide a buffer from extreme weather, such as hurricanes and tsunamis. Last year the Botanic Gardens Conservation International, a charity based in London, published its five-year assessment called “State of the World’s Trees”. The assessment evaluated 60,000 tree species and found that 30 per cent are at the risk of extinction. Extinction in the plant kingdom is “twice the number of threatened tree species globally than threatened mammals, birds, amphibians and reptiles combined”. Over 440 tree species are on the brink of extinction, meaning they have fewer than 50 individuals remaining in the wild, the report reveals. These species are found all over the world, from the Mulanje cedar in Malawi, with only a few remaining individuals on Mulanje Mountain, to the Menai white beam found only in North Wales, which has only 30 trees remaining.





ONLINE TRAINING ON

Understanding Environmental Laws for Better Environmental Management

Course date: May 17-28, 2022 | **Last date to apply:** May 13, 2022 | **Course fees:** INR 2500

India has a comprehensive system of regulations to protect its natural environment and the health of its people. From the enactment of Water Act in 1974, a number of laws and regulations have been put into force in this regard. However, the intended purposes of these laws are far from being fulfilled due to various reasons. One of the issues which stems out is a holistic understanding of the different laws and how they should be looked into in a concerted manner for better environmental management.

Considering the need to fill the gaps, Centre for Science and Environment, is organizing a 12 days online training course on "Understanding Environmental law for improving environmental management".

Course Objective:

This 12 days online course has been designed to capacitate the people working in the field of environment and the prospective environmentalist with an objective to develop a better understanding and knowledge of the laws and their interrelationship. This course will also be beneficial for students as well who aspire to develop their carrier in environment field.

The course will be conducted through **technological learning tools such as presentations, videos, discussion with experts and reading material.**

Learning from the Programme

- Better understanding of the environmental governance structure of the country, major institutions and their implementation statistics;
- Learning about laws and rules waste management, forest and wildlife, air, water and Environmental Protection Act;
- Increased understanding of the obligations of industry and individuals under various environmental laws and regulations and how to meet these obligations;
- Role of National Green Tribunal (NGT), environmental courts and public interest litigation (PIL);
- Understanding of international treaties and agreements Government of India subscribes to the impact of non-compliance with such agreements on business.

Who can apply?

- Industry professionals; Environment Consultants; Environment Engineers
- Researchers and academicians
- Students aspiring to work in environment field

COURSE COORDINATOR









Ishita Garg,

Deputy Programme Manager, Industrial Air Pollution; **Email:** ishita.garg@cseindia.org

***PARTICIPANTS
WILL BE AWARDED
WITH A "CERTIFICATE
OF COMPLETION"
ON SCORING
50% MARKS IN
THE QUIZ**

KINGDOMS UNDER THREAT

PLANT Of the nearly 50,000 known plant species in India, 23 per cent are endemic to the region. At the same time, over two in every 100 flowering plants species are vulnerable and face extinction

	KNOWN SPECIES		INDIA'S ENDEMIC SPECIES 2019	THREATENED SPECIES IN INDIA	DEFINITION
	World	India			
FLOWERING PLANTS					
 Gymnosperms	1,021	82	12	12	Gymnosperm is a flowerless plant that produces cones, seeds. The term means "naked seed", as gymnosperm seeds sit exposed on leaf-like structures called bracts
 Angiosperms	268,600	18,666	4,303	416	Angiosperm is a plant of a large group that comprises those that have flowers and produce seeds enclosed within a carpel, including herbaceous plants, shrubs, grasses, and most trees
NON-FLOWERING PLANTS					
 Bryophytes	16,236	2,780	629	7	Bryophyte is a group of plant species that reproduces via spores rather than flowers or seeds. Most bryophytes are found in damp environments
 Pteridophytes	12,000	1,302	66	2	A pteridophyte is a vascular plant (with xylem and phloem) that disperses spores. Because pteridophytes produce neither flowers nor seeds, they are sometimes referred to as "cryptogams", meaning that their means of reproduction is hidden.
OTHERS					
 Virus & Bacteria	11,813	1,223	No	-	Bacteria are single-celled, living organisms with components to survive and reproduce. Viruses are not considered living since they require a host cell to survive
 Algae	40,000	7,411	1,924	-	Algae is a simple, non-flowering, and typically aquatic plant of a large group that includes seaweeds and many single-celled forms.
 Fungi	98,998	15,396	4,100	1	Any of a group of spore-producing organisms feeding on organic matter, including moulds, yeast, mushrooms, and toadstools.
 Lichens	98,998	2,581	520	-	A lichen is a composite organism that arises from algae or cyanobacteria living among filaments of multiple fungi species in a mutualistic relationship.

Source: Botanical Survey of India, Kolkata, 2019








ANTHROPOGENIC CATALYSTS

THIS RAPID, ALL-PERVASIVE LOSS OF BIODIVERSITY IS DRIVEN BY HUMAN-INDUCED FACTORS SUCH AS CLIMATE CHANGE AND INTRODUCTION OF INVASIVE SPECIES

The rapidly snowballing loss in diversity is largely triggered and fuelled by new age emergencies and interventions, like climate change, change in atmospheric composition and spread of invasive alien species. In 21 countries with detailed records, the numbers of invasive alien species have risen

by an average of 70 per cent since 1970. This combination of declining endemic species and the spread of already widespread species (humans purposefully or unwittingly transport species around the world) drives "biotic homogenisation"—a convergence of biological communities across regions that blurs the patterns on life's rich tapestry. According to the Convention on Biological Diversity: "Invasive alien species are species whose introduction and/or spread outside their natural past or present distribution threaten biological diversity." These species are found in, or known to, impact animals, plants, fungi and microorgan-

ANIMAL India has four of the world's 35 global biodiversity hot-spots—the Western Ghats, the Nicobar Islands, parts of Assam and Meghalaya, and the Eastern Himalaya

FAUNAL GROUPS					NUMBER OF SPECIES		PERCENTAGE ENDEMISM
					TOTAL	ENDEMISM	
 Protozoans					3,525	640	18.2
 Invertebrates (including insects, spiders, ticks, mites, earthworms, crabs, worms, and others)	Threatened species 135				90,986	26,782	29.43
Chordates, Cephalochordates, Urochordates					6,656	1,115	16.75
 Fish 305 threatened species					3,364	482	14.32
Critically endangered 28	Endangered 86	Vulnerable 46	Near threatened 28				
 Amphibia 87 threatened species					414	287	69.32
Critically endangered 20	Endangered 33	Vulnerable 22	Near threatened 12				
 Reptilia 68 threatened species					584	220	37.7
Critically endangered 7	Endangered 18	Vulnerable 29	Near threatened 14				
 Birds 173 threatened species					1,340	81	6.04
Critically endangered 17	Endangered 21	Vulnerable 53	Near threatened 82				
 Mammals 121 threatened species					427	45	10.53
Critically endangered 17	Endangered 21	Vulnerable 53	Near threatened 82				

Source: IUCN, December 10, 2019; Zoological Survey of India and India's National Biodiversity Action Plan, 2019

889 The number of rare and threatened vertebrates and invertebrates in the country

0.9
million km²

Total conservation areas in India. This is equivalent to 27 per cent of the geographical area of the country

isms, and can affect all types of ecosystems.

The old story of invasive alien species wreaking havoc on local biodiversity has a new villain and geography: the marine invasive alien species and the islands in the Asia-Pacific. What scares global conservationists and biodiversity experts is that the world does not know enough about these destructive marine invasive alien species to prepare a strategy for their elimination.

Invasive alien species have spread across and populated faster. They have been regarded as the most serious drivers of biodiversity loss across the Asia-Pacific region. While agriculture-intensive

areas and urban clusters are the usual victims, such attacks mostly happen on islands and around coastlines. For the Asia-Pacific region, this poses a serious threat to local livelihoods. The freshwater ecosystems in the region support close to 28 per cent of aquatic and semi-aquatic species. Around 37 per cent of these species are threatened by overfishing, pollution, infrastructure development and invasive alien species.

The IPBES 2019 assessment highlights the spread of marine invasive alien species that are yet to be studied well. "There is also increasing evidence that marine invasive alien species consti-

tute an extremely serious, but less well understood, threat to fisheries, coral reefs and the overall functioning of marine ecosystems and food webs in the Asia-Pacific region,” it reads. Recently, the journal *New Scientist* reported that waters around the Galapagos Islands “have been invaded by more alien species than previously thought”. There have been widespread reports of oceanic islands being invaded by invasive alien species.

In its latest report, “Climate Change 2022: Impacts, Adaptation and Vulnerability”, the Intergovernmental Panel on Climate Change (IPCC) has, for the first time, mentioned the extinctions taking place due to climate change. “In terrestrial ecosystems, 3 to 14% of species assessed will likely face very high risk of extinction at global warming levels of 1.5°C, increasing up to 3 to 18% at 2°C, 3 to 29% at 3°C, 3 to 39% at 4°C, and 3 to 48% at 5°C,” warns the IPCC, reflecting other similar forecast. Species have evolved while the Earth experienced extreme colder and warmer periods.

But the current period of human-induced warming is turning out to be a situation which organisms may find unadoptable. For nearly all the planet’s surface, the warmest period of the last 2,000 years was experienced in the late 20th century and in the first two decades of the 21st century. The current warming is 1.2°C above the pre-industrial levels. This means, from the evolutionary perspective, humans are already moving out of the Holocene environment that ensured the right temperature for us to evolve and take up farming. The IPCC report has reiterated that “in the coming 50 years, 1 to 3 billion people are projected to experience living conditions that are outside of the climate conditions that have served humanity well over the past 6000 years”. The IPCC report cites that half of all species are moving towards the poles or to a higher elevation to adapt to the new planetary climate. At the sea, due to the warming, species have travelled poleward at the rate of 59 km per decade on average.

HALF OF ALL SPECIES ARE MOVING TOWARDS THE POLES OR TO A HIGHER ELEVATION TO ADAPT TO THE NEW PLANETARY CLIMATE. AT THE SEA, DUE TO THE WARMING, SPECIES HAVE TRAVELLED POLEWARD AT THE RATE OF 59 KM PER DECADE

MASS EXTINCTION? ALL EVIDENCE AND CALCULATIONS INDICATE THAT THE PLANET IS WITNESSING ITS SIXTH MASS EXTINCTION

The history of life on Earth is a random collation of the evolution, multiplication and extinction of new species. Of the 4 billion species that have evolved over the last 3.5 billion years, some 99 per cent have disappeared in a series of extinctions, estimates Michael Novacek, senior vice president and provost of science at the American Museum of Natural History, in his 2001 research book *The Biodiversity Crisis: Losing What Counts*. New species have evolved after each bout of mass extinction.

Scientists have tracked extinctions since the Cambrian period that began some 540 million years ago, when life forms diversified exponentially triggering the start of what we now call biodiversity. The Earth has experienced five mass extinctions so far; one every 100 million years on average. Each extinction period has lasted from 50,000 to 2.76 million years.

Does this mean, we are currently experiencing the sixth mass extinction? Robert Cowie believes so. “Drastically increased rates of species extinctions and declining abundances of many animal and plant populations are well documented, yet some deny that these phenomena amount to mass extinction,” he said when his January study was published. In the 1980s, scientists defined mass extinction as “any substantial increase in the amount of extinction (lineage termination) suffered by more than one geographically wide-spread higher taxon during a relatively short interval of geologic time, resulting in an at least temporary decline in their standing diversity”. The “short interval of geologic time” is further defined as a period less than 2.8 million years.

Fossil records of earlier species and extinction studies suggest a species exists for around 1 million years before it goes extinct. This is called the background extinction rate, and is expressed as “one species extinction per million species-years”. It is used to establish

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whether an extinction rate is unusual or faster. “If we use the same approach to estimate today’s extinctions per million species-years, we come up with a rate that is between 10 and 10,000 times higher than the background rate,” academics Frédéric Saltré and Corey J A Bradshaw of Flinders University, Australia, say in a 2019 article in *The Conversation*. Some scientific studies infer that given the current rapid rates, a mass extinction period could also be reached in just 240 to 540 years.

The ongoing sixth mass extinction is different from the previous events. While the earlier extinction periods were triggered by the planet’s warming, the ice age or even volcanic eruptions, the current one is being driven by just one species—*Homo sapiens*, or us.

In 2017, some 15,364 scientist signatories from 184 countries warned in a paper in the journal *BioScience* that humans had unleashed the sixth mass extinction “wherein many current life forms could be annihilated or at least committed to extinction by the end of this century”. From an evolutionary perspective, this phase is not just drastic

but also unique, for the simple fact that it revolves around one super colonising species.

Evolutionary scientists say the “age of humans” or the Anthropocene (Anthropos is Greek for human and -cene is a substantial geological time period within the current 66-million-year-old Cenozoic era) is the third and fundamentally new stage of evolution for the planet. Simple single-cell microbial organisms were at the core of the first stage of evolution, spanning over 3.5 billion to 650 million years ago. The second stage started some 540 million years ago with multi-cellular life springing widespread biodiversity. The third stage is all about the *Homo sapiens* that have not only colonised the planet but have also decided which species and diversity will survive and thrive here. Our species are now distributed across the globe and our user-centric existence has led to hominisation of flora and fauna.

This becomes clear from a recent census of the biomass on Earth. The one-of-its-kind exercise was conducted in 2018 by scientists Ron Milo and Yinon M Bar-On of Israel’s Weizmann Institute of Science, and Rob Phillips of the California Institute of Technology, US. The census involved deciphering the composition of the 550 gigatonnes of biomass distributed across all kingdoms of life on Earth.

The results not only highlighted the devastating changes in the planet’s biodiversity but also brought out the impacts of the Anthropocene. “It is definitely striking, our disproportionate place on Earth,” Milo had said at the time. According to the census, the 7.6 billion humans account for just 0.01 per cent of all biomass on Earth. In contrast, bacteria account for 13 per cent of the total biomass; plants 82 per cent and all other forms of life just around 5 per cent.

The census also attributes humans to the annihilation of 83 per cent of all wild mammals and half of all plants. Of the birds left in the world, 70 per cent are poultry chickens and other farmed birds. And of all the mammals, 60 per cent are livestock (cattle and pigs), 36 per cent are humans, and a mere 4 per cent are wild, it says.

“When I do a puzzle with my daughters, there is usually an elephant next to a giraffe next to a rhino. But if I was trying to give them a more realistic sense of the world, it would be a cow next to a cow next to a cow and then a chicken,” Milo had said while explaining the findings.



THE ANTHROPOCENE SOON, WE WILL BE THE FIRST SPECIES TO HAVE A NEW GEOLOGICAL EPOCH NAMED AFTER US—AN UNFORTUNATE EVENT DENOTATIVE OF OUR IRREVERSIBLE IMPACT ON THE PLANET'S ECOSYSTEMS

Nick Longrich, senior lecturer in evolutionary biology and palaeontology, University of Bath, UK, says it is the migration of *Homo sapiens* out of Africa and the arrival of modern humans led to the extinction of other human species. Nine human species lived on Earth 300,000 years ago. “By 10,000 years ago, they were all gone. The disappearance of these other species resembles a mass extinction. But there’s no obvious environmental catastrophe—volcanic eruptions, climate change, asteroid impact—driving it. Instead, the extinctions’ timing suggests they were caused by the spread of a new species, evolving 260,000-350,000 years ago in Southern Africa: *Homo sapiens*,” he says in a November 2019 article in *The Conversation*. His reasoning? “Humans reproduce exponentially, like all species. Unchecked, we historically doubled our numbers every 25 years. And once humans became cooperative hunters, we had no predators. Without predation, controlling our numbers, and little family planning beyond delayed marriage and infanticide, populations grew to exploit the available resources,” he says in the article.

Hence, the concept of a “natural environment” no longer makes sense, as there is nothing on this planet, animate or inanimate, that humans have not tinkered with. Soon, we will be the first *Homo sapiens* to witness the Earth entering into a new geological epoch that is named after us. This is not a fortunate event, but rather a call of urgent attention to our irreversible impacts on the planet’s ecosystems. In 2016, for the first time, the International Geological Congress held in Cape Town, South Africa, informally voted to declare the arrival of the Anthropocene. In May 2019, a 34-member panel of scientists called the Anthro-

**THE ANTHROPOCENE
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THE NATURAL SYSTEMS**

pocene Working Group (AWG)—set up by the Sub-commission on Quaternary Stratigraphy, part of the International Commission on Stratigraphy that oversees the geologic time chart—voted to declare the descent of the new epoch. AWG will soon put forth a formal proposal for this to its parent body.

This will mark the end of the current epoch called the Holocene, which started approximately 11,700 years ago. This age, retrospectively designated by contemporary scientists, tentatively coincides with humans adopting settled agriculture after a change in the planet’s climate. At the start of the Holocene, the planet had a new geography, demography and ecosystem as the Paleolithic Ice Age came to an end and a warm season set in. Glaciers melted, new forests came up in vast areas, mammoths and woolly rhinoceros succumbed to the warm climate and humans decided to quit food gathering and hunting for more settled lives. This also led to more growth in human population.

In terms of the Anthropocene, 29 of the 34 members of AWG have supported the proposal to declare the mid-20th century as the beginning of this epoch. Scientists argue that the Anthropocene started to set in with the advent of the industrial revolution that led to industrial production, discovery of chemicals and their cascading effects on the natural systems. Scientists are already scoping for sites to look for evidence of such human intervention in our ecosystems. In particular, they are looking at radionuclides (atoms that emit radiation as they undergo radioactive decay) released during the first nuclear weapons tests in 1945 in the US. These particles have

scattered across the globe and become a part of the Earth’s soil, water, plants and glaciers, leaving permanent human imprints on the planet. Plastic—an all-pervasive human invention—is being proposed as another marker of the Anthropocene.

In 2018, scientists from the University of Leicester, UK proposed the “broiler chicken” as the marker of the human impacts on the

planet to be used for declaring the Anthropocene. Their study published in the *Royal Society Open Science* journal found that the broiler chicken does not have any connection to its ancestors, the jungle fowl that originated in India and spread across the planet.

“Until now, no individual taxa have been suggested as distinct and characteristic new morphospecies representing this change. Here we show that the domestic broiler chicken is one such potential marker,” their research paper said, adding, “Human-directed changes in breeding, diet and farming practices demonstrate at least a doubling in body size from the late medieval period to the present in domesticated chickens, and an up to fivefold increase in body mass since the mid-twentieth century. Moreover, the skeletal morphology, pathology, bone geochemistry and genetics of modern broilers are demonstrably different to those of their ancestors. Physical and numerical changes to chickens in the second half of the twentieth century, i.e. during the putative Anthropocene Epoch, have been the most dramatic, with large increases in individual bird growth rate and population sizes. Broiler chickens, now unable to survive without human intervention, have a combined mass exceeding that of all other birds on Earth; this novel morphotype symbolizes the unprecedented human reconfiguration of the Earth’s biosphere.”

But “the stratigraphic evidence overwhelmingly indicates a time-transgressive Anthropocene with multiple beginnings rather than a single moment of origin,” says a May 2019 article in the journal *Nature*, quoting Matt Edgeworth, an archaeologist at the University of Leicester, UK, and a member of AWG. Naming a new epoch based on the radionuclide signal alone “impedes rather than facilitates scientific understanding of human involvement in Earth system change,” the article quotes him. In November 2022, AWG will endorse the list of markers for the Anthropocene.

THERE ARE TWO SIGNS THAT OCCUR BEFORE AN EXTINCTION PHASE SETS IN: LOSS IN POPULATION AND SHRINKING OF ITS DISTRIBUTION AREAS. THESE TWO SIGNS ARE QUITE EVIDENT AMONG ALL SPECIES, EXCEPT HUMANS, RIGHT NOW

NATURAL BREAKDOWN HUMAN IMPACTS HAVE CAUSED NATURE TO FAIL AT ITS MOST CRUCIAL TASK: SUPPORTING THE QUALITY OF LIFE

Scientists have identified 18 categories of contributions—cleaning air and water, sequestering carbon, pollinating crops—that nature makes to ensure quality of life for humans. In the last 50 years, nature is not able to fulfil its role in 80 per cent of these categories. “Biodiversity and nature’s contributions to people are our common heritage and humanity’s most important life-supporting ‘safety net’. But our safety net is stretched almost to breaking point,” says Sandra Díaz, a professor of ecology at the National University of Córdoba, Argentina, who also contributed to IPBES assessment. “The diversity within species, between species and of ecosystems, as well as many fundamental contributions we derive from nature, are declining fast, although we still have the means to ensure a sustainable future for people and the planet.”

We are yet to know all the species that live on our planet. Scientists discover new species every day, and are yet to make a “final” list.

Peer-reviewed papers estimate that the total number of species ranges from 3 million to over 100 million. According to IPBES documents, every year around 10,000 to 15,000 new species are described. For its 2019 assessment, IPBES used an estimate of 8.1 million animal and plant species put forth by scientists in 2011. Of these, science has described and classified 1.7 million species.

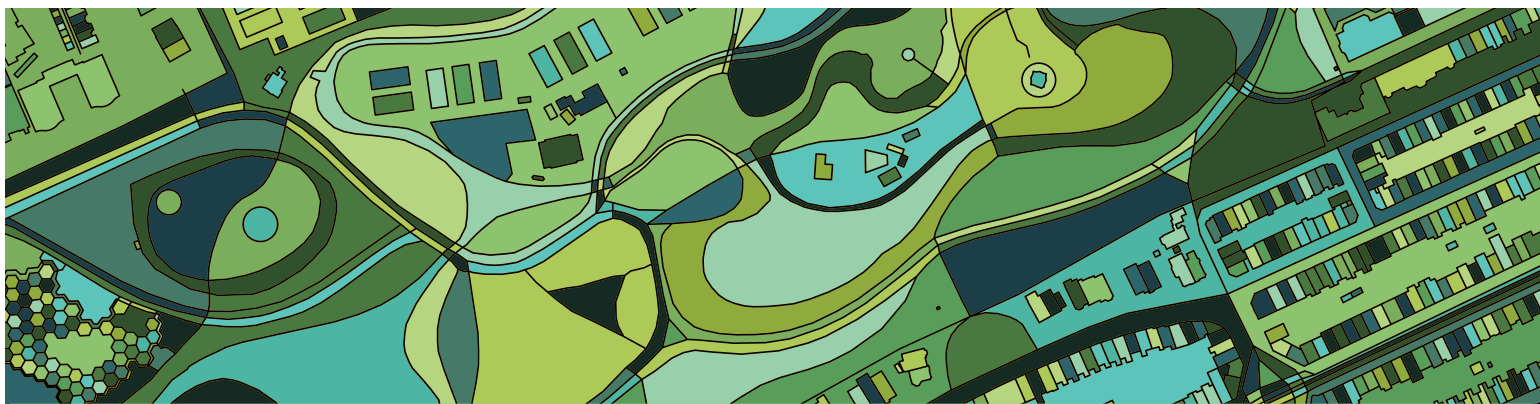
Since the year 1500, some 900 species have gone extinct, according to IUCN. There are two signs that occur before an extinction phase sets in: loss in population and shrinking of its distribution areas. These two signs are quite evident among all species, except humans, right now. Since the 16th century, 680 vertebrate species have been pushed into extinction; 9 per cent of all domesticated breeds of mammals used for food



C-GINS

Compendium of Green Infrastructure Network systems

<https://www.cseindia.org/c-gins/home>



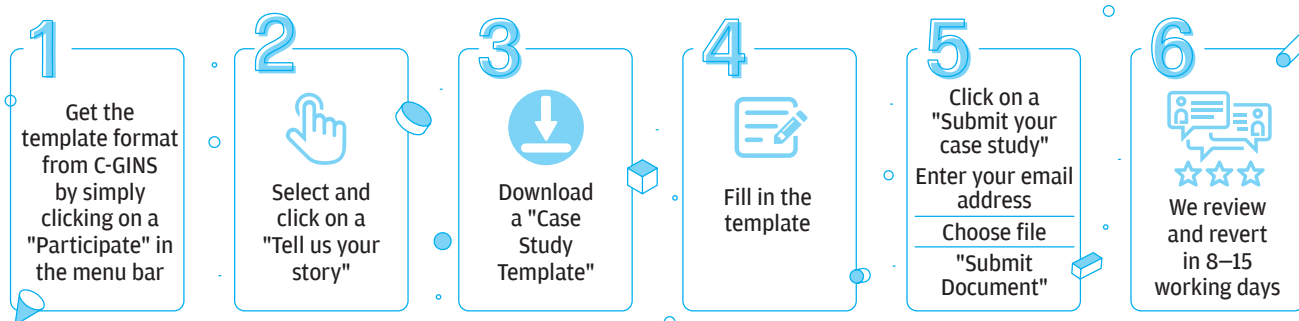
What is C-GINS?

C-GINS (Compendium of green infrastructure network systems) is the repository for best practices, projects and approaches in support of Green Infrastructure (GI) and Water Sensitive Urban Design and planning (WSUDP) principles. C-GINS is an open platform where the latest thinking on natural capital, ecosystem services and nature-based solutions is brought together.

It provides a knowledge marketplace, which showcases case examples of GI and WSUDP to simplify how we share, obtain and create knowledge to better manage our urban environment. Each of the case examples provides an overview of the intervention, timeline, authorities/ stakeholders involved in the project, outcomes and learnings tips for user education. The preference for sustainable technologies is mainly due to CSE's continuous motivation towards usage of sustainable and environmentally harmonious interventions.

How can you contribute?

Becoming a contributor is a great way to share knowledge! If you are a practitioner working in the urban water sector and would like to exhibit your work on Blue-Green Infrastructure OR wish to submit an implemented case study, tell us and we will feature it on C-GINS, it gets updated every three months!



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and agriculture went extinct by 2016, says the IPBES assessment. In addition, some 1,000 more such domesticated breeds are under threat of extinction.

“Almost 33 per cent of reef-forming corals and more than a third of all marine mammals are threatened,” says the assessment. “Ecosystems, species, wild populations, local varieties and breeds of domesticated plants and animals are shrinking, deteriorating or vanishing. The essential, interconnected web of life on Earth is getting smaller and increasingly frayed,” Josef

Settele, professor at the Helmholtz Centre for Environmental Research, Germany, who co-chaired the assessment, had said at the time. “This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world,” he added.

On the human-induced loss in ecosystems, the assessment is precise. Three-quarters of land-based environment and about two-thirds of the marine environment have been significantly altered by human actions. Nearly 75 per cent of all freshwater resources are now used for crop and livestock rearing activities. The impacts are scary. For example, productivity in 23 per cent of global land has reduced due to land degradation.

“Up to US \$577 billion in annual global crops are at risk from pollinator loss and 100-300 million people are at increased risk of floods and hurricanes because of loss of coastal habitats and protection,” says the assessment. It adds that this decline would continue till 2050.

The world may miss the UN Sustainable Development Goals (SDG) targets by a wide margin if the human civilisation does not pull up its socks and promptly acts to protect the natural order. Close to 80 per cent (35 of 44) assessed targets under the goals will remain unmet. Biodiversity loss will impact the SDGs related to poverty, hunger, health, water, cities, climate, oceans and land. The current trajectories used for conserving nature and achieving sustainability, such as those embodied in the Aichi Biodiversity Targets and the 2030 Agenda for Sustainable Development, cannot be met. Although there has been progress in the implementation of various policies and actions to conserve nature and manage it more sustainably, they are not sufficient to stem the direct and indirect drivers of nature deterioration.

The Anthropocene is a strange phase in the geological scale where the dominant species fundamentally alters the ecosystem, and its biggest preoccupation now would be to look for ways to fix it as well. Here comes the tussle between *Homo sapiens* and the rest of the species on the planet. [DTE](#) [@richiemaha](#)



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Organic boost

Farmer producer organisations can help organic farming initiatives overcome marketing hindrances

ABHAY KUMAR SINGH AND NOOPUR SHARMA, DELHI

THE CONTRADICTION defies logic. Organic farming is highly productive, cost-effective and sustainable. Its multiple benefits on human health and the environment are also well established (see 'Natural option', *Down To Earth*, 16-28 February, 2022). Yet, data with the Union Ministry of Agriculture and Farmers Welfare shows that as of 2018-19, only 2 per cent of the country's 140 million hectares (ha) of net sown area is under organic farming. A September 2020 report titled "State of Organic and Natural Farming in India: Challenges and Possibilities", published by Delhi-based Centre for Science and Environment (CSE), says only 1.3 per cent of 146 million farmers in the country practise it.

The Union and state governments have for two decades promoted organic farming through various schemes and policy incentives. This includes certification of organic produce through the National Programme for Organic Production or NPOP (since 2000) and the Participatory

Members of the Suraksha Farmer Producer Company Limited in Siddipet, Telangana, are trained in agro-economic practices to boost income

PHOTOGRAPH: NOOPUR SHARMA / CSE

Guarantee System or PGS (since 2015). But CSE's recent analysis shows farmers still hesitate to take it up due to an ineffective marketing mechanism.

Santuram Netam, a small farmer in Ulera village, Khadgaon district, Chhattisgarh, shifted to organic farming in 2012. "Even after diligently following organic practices and obtaining the PGS certification, I was unable to get better prices for my organic rice and black gram," he says. Netam has now reverted to conventional farming. Vinod Gajananad Kshirsagar, a farmer from Vivra village in Akola district, Maharashtra, faces similar obstacles. "Inter-state retailers do not recognise my fruits and vegetables as organic because they are not aware of PGS certification and only trust NPOP."

The situation is not much different for larger farmers. Narendra Tyagi of Siana *tehsil* in Bulandshahr district, Uttar Pradesh, says, "I am unable to sell my organic mangoes at a higher price as I do not have access beyond the local market."

CSE's assessment shows farmer-producer organisations (FPOs) can help overcome this final hurdle. FPOs are small business units led and run by farmers that develop practices to improve agricultural output and sales, connect and negotiate with larger markets. They are set up under Section 581C of the Companies (Amendment) Act. CSE has analysed the experiences of five FPOs in three states. These are Suraksha Farmer Producer Company Ltd in Siddipet and Sahaja Aharam Producer Company Ltd in Secunderabad, Telangana; Pudukkottai Organic Farmer Producer

Company Ltd in Tamil Nadu; and Ajivika Bhoomika Producer Company Ltd at Saraikela Kharasawan and Neem Phool Producer Company Ltd at Ranchi in Jharkhand. While these provide valuable help, they are impeded by institutional hurdles.

EXTRACT MORE VALUE

Most organic farmers are unaware of or unable to obtain organic certification. They usually have little business skills. FPOs step in to provide advice and training on not just certification, but also on building capacity with better agronomic practices, aggregation,

CERTIFICATION ALONE HAS NOT SUFFICED TO PROMOTE ADOPTION OF ORGANIC FARMING. THERE IS A NEED TO FACILITATE SALES THROUGH BETTER MARKETING MECHANISMS

processing, packaging and branding. For instance, Ajivika Bhoomika, Pudukkottai Organic and Sahaja Aharam focus on rice, millets and pulses. Women members of these FPOs use the produce to make cold pressed oils, spice powders, snacks, pickles, soaps, hand-pounded rice, pulses and personal care products.

However, the level of training needs constant upgradation. The lack of skilled humanpower and limited infrastructural facilities also pose challenges.

TAP MORE MARKETS

FPOs help farmers in remote areas sell their produce beyond local markets. Members of Pudukkottai Organic now sell over 70 per cent of their produce to bulk buyers. A

Ramu, a farmer-member, says "I get ₹60 per kg for organic *thooyamalli* (a traditional rice variety) in larger markets as against ₹40 per kg earlier." Similarly, Ajivika Bhoomika has connected farmers with aggregators in the National Capital Region and facilitated supplies of vegetables for midday meals at schools and *anganwadis*.

Sahaja Aharam, a federation of 23 organic and inorganic FPOs, sources raw and processed organic produce from them to sell at its retail outlets in Secunderabad and Hyderabad. Farmer Mohammed Babumiya says, "After joining the federation, I sell drumstick leaves at ₹150 per kg, up from ₹90 a kg earlier. This income helped me re-purchase the land had I sold earlier."

However, FPOs are still a small part of the value chain. "They still struggle to sell inter-state and need more dedicated support to widen reach," says A Adhappan, director of Rural Organisation for Social Education (ROSE), a Tamil Nadu-based non-profit that supports FPOs.

FINANCIAL CONNECT

FPOs accord legitimacy that allows farmers to leverage funds. Members of Pudukkottai Organic have raised ₹36.5 lakh from ROSE and ₹97 lakh from state grants to set up a warehouse and seed processing unit, a paddy processing unit, an oil expeller and a boiling unit. Sahaja Aharam has helped over 6,000 farmers obtain grants and loans from non-banking financial companies.

Even though FPOs are eligible for priority lending, banks hesitate to lend to these early-stage high-



Women members of the Pudukkottai Organic Farmer Producer Company Limited in Tamil Nadu make a range of products with organic crops

risk entities. The Centre's provision of equity grants that matches shareholders' contribution on a 1:1 basis, has a cap of ₹15 lakh. "Access to working capital is the biggest concern. Moreover, FPOs are not exempted from paying GST," says G V Ramanjaneyulu, executive director at Hyderabad-based Centre for Sustainable Agriculture.

EXPERT ADVICE

Farmers require hand-holding while setting up FPOs. Several non-profits, private firms, research bodies and cooperatives work in this field. The "Policy & Process Guidelines for Farmer Producer Organisations" published by the Union agriculture ministry in 2013, tasks them with identifying

farm clusters, mobilising farmers and resources, developing management systems and auditing.

But Ramanjaneyulu raises doubts on capacity of such entities. "The organic sector in the country is not growing at the desired pace. Therefore these groups have still not gained necessary experience to promote organic FPOs," he says.

NEED MORE SUPPORT

The Centre has implemented national schemes mandating development of FPO-based farm clusters, leading to the formation of nearly 200 such organic farming groups. In 2019-20, the Centre introduced a scheme, "Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)" to develop more units by 2027-28. Of

these, 1 per cent will be organic. The latest development in 2020-21 was the launch of the PM Formalisation of Micro Food Processing Enterprises Scheme that follows a "one district, one product" approach so farmers can reap benefits from procurement, avail services and market organic produce.

But these do not suffice. Regions identified as hubs for organic produce must be prioritised for new FPOs. There is also a need for a dedicated administrative body that can aid in conceptualisation and rollout of subsidies, access to working capital, training, leveraging technology, market linkage and public procurement. Development of an online marketplace will facilitate sales of organic produce. [DTE](#) [@down2earthindia](#)

PHOTOGRAPH: NOOPUR SHARMA / CSE

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ITS ENABLED BRTS

Bizarre patent tussles over a COVID-19 jab

Moderna's many intellectual property disputes over its vaccine highlight the need for a patent-free regime to fight the pandemic

IN THE Byzantine world of US pharmaceutical intellectual property (IP) rights, which has a model that is exported to and imposed in most parts of the world, the twists and turns in the case of Moderna's patent claims on its vaccine are riveting. Moderna is one of two startups—the other being BioNTech of Germany that has tied up with Pfizer—to have developed the new-tech messenger RNA or mRNA vaccines against SARS-COV-2. During the pandemic, these companies have become the stars of the fight against the lethal virus, even though AstraZeneca's traditional vaccine has done most of the heavy lifting.

But Moderna's COVID-19 vaccine has been caught up in controversies and, now, lawsuits over its patents. One reason for this is the huge helping hand it received from

government scientists of the National Institutes of Health (NIH), in getting both the technology rights as well as the funds running into billions of dollars. Yet it excluded NIH scientists as co-inventors when it sought four patents on the vaccine (see 'Moderna's brazen patent grab on COVID-19 jab', *Down To Earth* 1-15 December 2021).

It is also accused of using a critical technology called lipid nanoparticles (LNP) that was developed by a small biotech firm, Arbutus Biopharma, to wrap and deliver genetic material such as mRNA in its COVID-19 vaccine. The story of how LNP itself came to be owned by Arbutus is a convoluted tale of rivalry between scientists, duplicity, corporate sellouts and lawsuits, in which the discoverer of the technology was neither recognised nor compensated at all. But that story will hold for another time since it is not pertinent to Moderna's COVID-19 jab but serves to expose the underbelly of the American patent system. What is relevant is that Moderna's attempt to overturn Arbutus's patents failed three months ago when the US court of appeals rejected the pharma giant's lawsuit filed in 2018. Now Arbutus has sued Moderna for infringing its LNP technology. For Moderna, this is a serious setback since the COVID-19 vaccine is the only product it has launched so far. Media hype and adulatory pieces on its CEO Stéphane Bancel, a French billionaire businessman, allowed the company to raise billions from the market even before it had much to show by way of commercial products.

In the tangle of patent disputes, the speedy resolution of one case could have a significant bearing on wider access to vaccines in poorer countries—the disagreement between



Moderna and NIH. During the US' COVID-19 Dialogue for ministers of health from across the world, held in early March, there was a surprise announcement. Top US health officials said they will offer several technologies to the World Health Organization's COVID-19 Technology Access Pool (C-TAP) for the benefit of low- and middle-income countries. C-TAP was set up in the wake of the pandemic to act as a "global one-stop shop" where pharma companies could share their IP, which is then passed on to the UN-supported Medicines Patent Pool for potential licensing to suitable drug companies worldwide to increase access to much-needed therapies against SARS-COV-2.

Although US officials did not specify which technologies they are willing to share, there is a hint that the know-how for the Moderna vaccine would be included—if NIH wins co-ownership of the patents. US President Joe Biden's top medical advisor Anthony Fauci was quoted as saying that "in principle—and you can take from it what you will—that in principle we have offered to license NIH-owned technologies to C-TAP". While speculation continues on what exactly Fauci was trying to convey, the outlook is not all that salutary. NIH and Moderna were in talks for over a year on patent ownership before the company filed its patent claims. By all accounts, the case is headed for the courts; this means a clear outcome could be several years away.

More disquieting at the moment is Moderna's application for patents in South Africa and elsewhere. The claims filed in February are for patents related to both the COVID-19 vaccine and Moderna's platform technology. This has set the alarm bells ringing in Africa, which has just celebrated a landmark achievement—a South African consortium's breakthrough in making a generic version of the Moderna vaccine (see 'South Africa's vaccine advance brings hope', *Down To Earth* 1-15 March, 2022). Although the US company has again reiterated that it will not enforce its patents for the duration of the pandemic, humanitarian organisations such as

Médecins Sans Frontières are not sanguine about the future.

The worrying question is what happens when COVID-19 is declared endemic. If Moderna goes ahead and enforces its patents thereafter, it could derail all the work WHO and African scientists have put into building vaccine manufacturing capacity on the continent, fear some 60 Africa-based organisations who have raised concerns about this. A Moderna spokesperson says the company is committed to equitable access to vaccines and can confirm its IP will not create a barrier to COVID-19 vaccine distribution in the designated 92 low- and middle-income countries now or in the future. Bancel, though, is leaving the matter open-ended, saying the company has not yet decided about IP rights in such countries after the pandemic ends. What will happen to the

African technology that is aimed at encouraging local production of critical therapies?

Everything appears to hinge on how quickly the pandemic is redefined as endemic. These uncertainties once again highlight the barriers patents and other forms of IP constitute to the proliferation of local manufacturing units that can produce drugs and vaccines at affordable rates. In Africa, this is

a pressing need since the lack of domestic manufacturing capacity compels it to import nearly all of its required vaccines. The limited technology transfers do not meet the needs of the continent in the long term.

The COVID-19 pandemic has shone the light on the egregious inequities in access to vaccines, with rich countries taking up the bulk of global supplies and immunising more than 70 per cent of their population, while just about 10 per cent of Africans have been vaccinated.

The World Trade Organisation's continuing stupor on the proposal to waive IP rights is only helping to perpetuate this grotesque state of affairs. What is clear is that the policy design of IP protection is completely out of sync with the policy requirements of dealing with a pandemic and public health crises. [DTE](#) [@ljishnu](#)

The result of Moderna's patent claims in the US and Africa could have a bearing on wider vaccine access in developing countries

A **DownTo Earth** ANNUAL

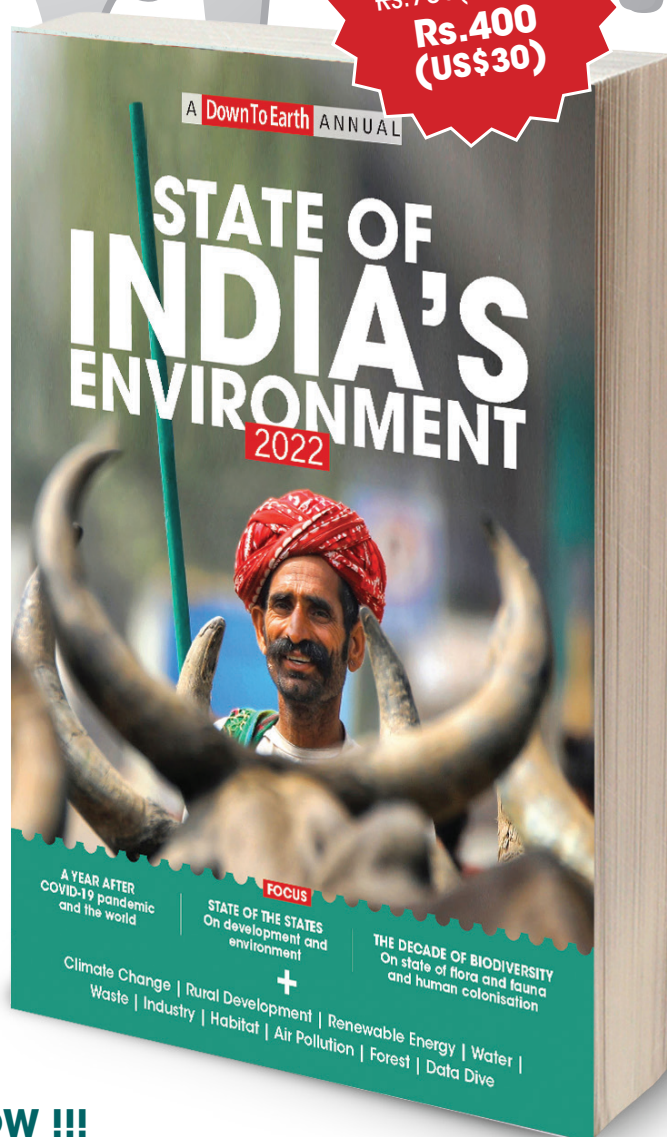
STATE OF INDIA'S ENVIRONMENT 2022

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Palette

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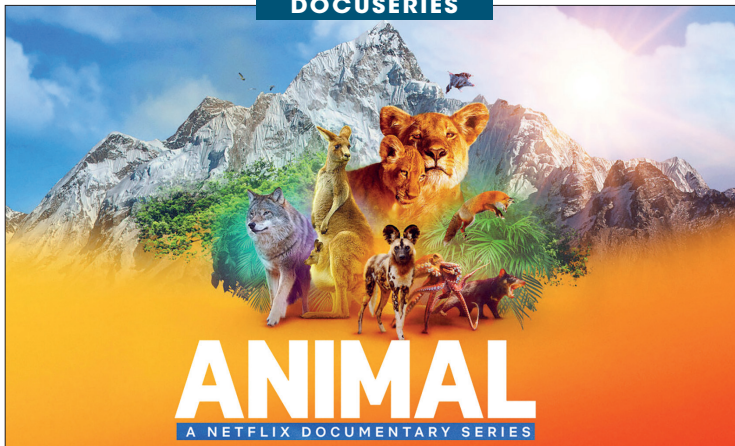
India tops the world in groundwater extraction **P54**

The culture of Great Andamanese tribes through stories, songs **P56**

Centre has shifted away from rights-based development **P58**

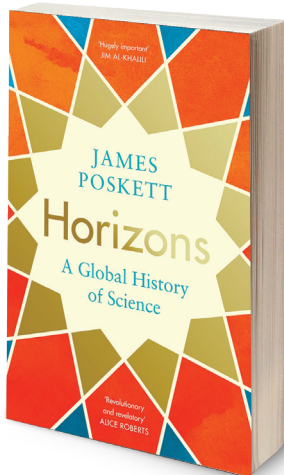
RECOMMENDATIONS

DOCUSERIES

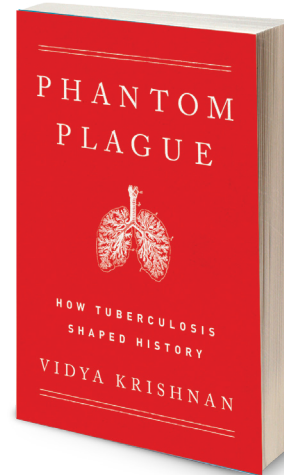


Humans have always been on the outside looking in when it comes to understanding the behaviour of other species. There have always been gaps in our deciphering of how other animals play, react to danger, or even communicate and work with each other. Last year, *Netflix* original series *Animal* shined a light on some such hidden aspects, such as the collaborative nature of cats and the ferocious survival instincts of dogs. The series will return for Season 2 on March 18, to reveal some more unexpected behaviours through never-before-seen immersive footage and engaging voice-overs by known personalities.

BOOKS



The evolution of science is often associated with names like Isaac Newton, Charles Darwin and Albert Einstein. However, these pioneers did not work in isolation, but rather relied on the theories and discoveries of philosophers from faraway regions that lived much before their time. In *Horizons: A Global History of Science*, British academic James Poskett explores the work of scientists in Asia, Africa and the Americas whose contributions have been forgotten or overlooked by the world.

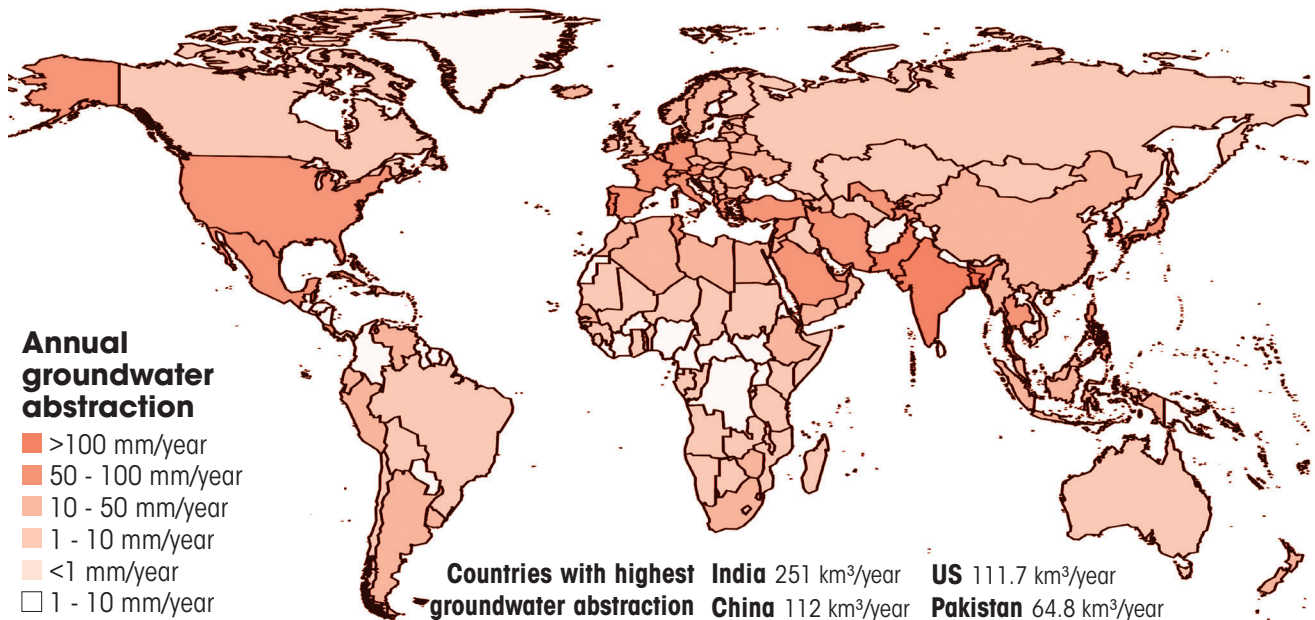


Tuberculosis is one disease that has stood the test of time and hit both the rich and the poor. People continue to succumb to it globally, despite the myriad remedies available in folklore, traditional medicine and allopathy. Is this because of "medical apartheid"? In *Phantom Plague: How Tuberculosis Shaped History*, journalist Vidya Krishnan traces the journey of the disease from the 19th century New York to modern-day Mumbai to understand how and why we fail to control it.

STRESS SIGNS

Three of the world's top five groundwater-extracting countries are in Asia, with India leading the list. At least 10 states in the country have districts that overexploit groundwater

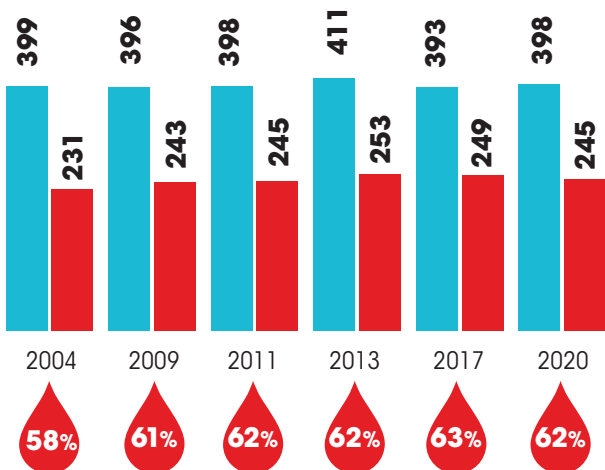
RAJIT SENGUPTA AND PULAHA ROY NEW DELHI



Misleading picture

India's overall stage of groundwater extraction levels mask the district-level crisis

■ Annual extractable groundwater resource (groundwater recharge minus allocation for natural discharge)
■ Annual groundwater extraction (In billion cubic metres)

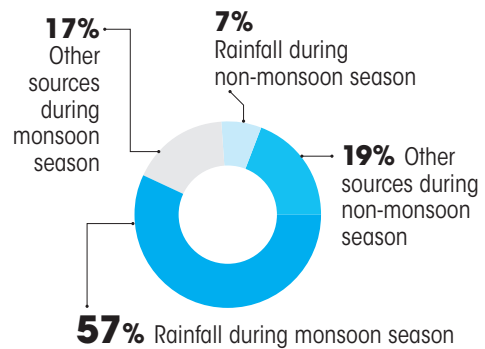


Stage of groundwater extraction (ratio of annual groundwater extraction and annual extractable groundwater resource)

Groundwater cycle

Groundwater is one of the primary sources of drinking water and irrigation

HOW IT GETS RECHARGED



HOW IT GETS DEPLETED



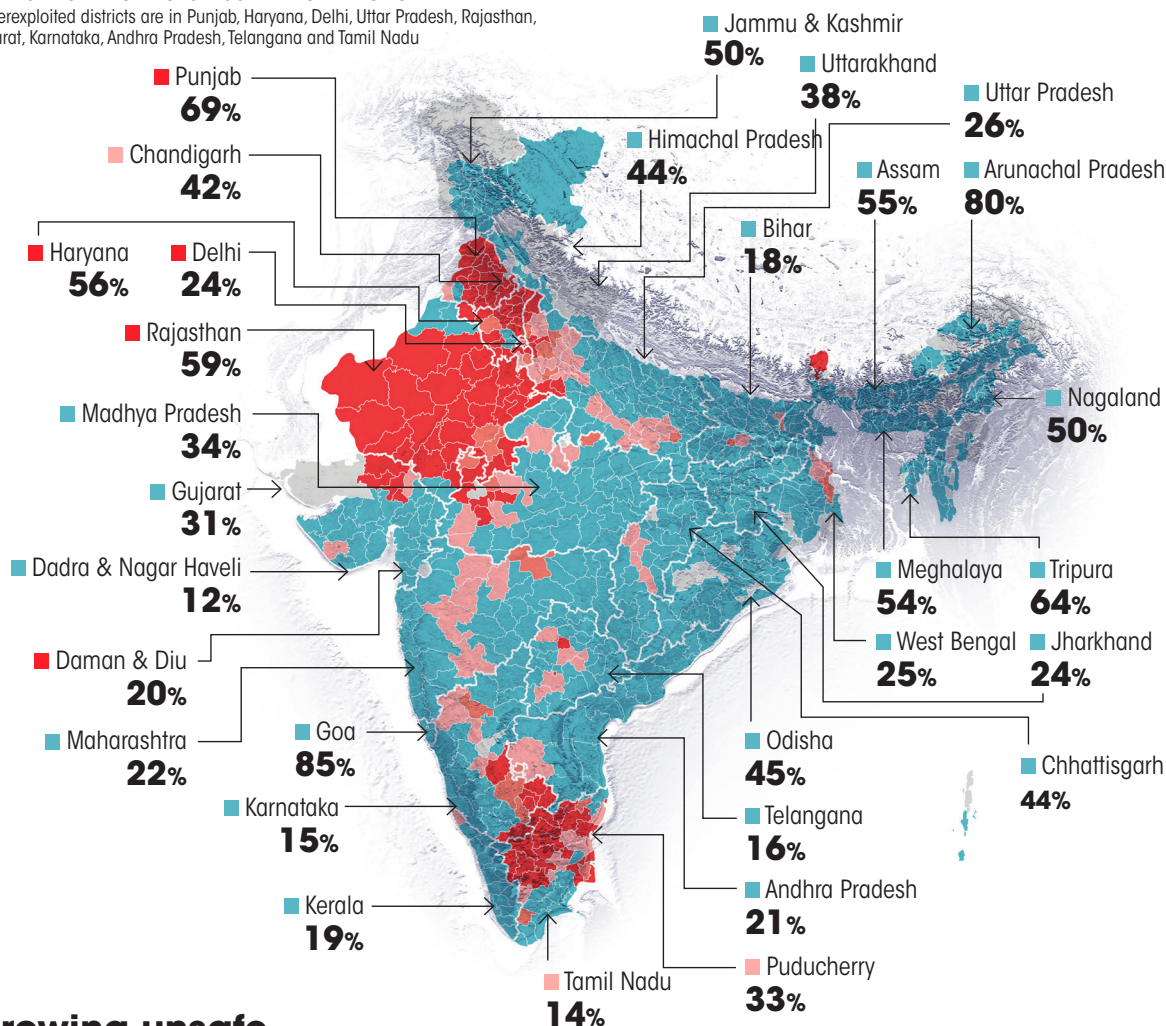


STAGE OF GROUNDWATER EXTRACTION

■ Overexploited# (>100%) ■ Critical (>90% and 100%) ■ Semi-critical (>70% and 90%) ■ Safe (70% or less)

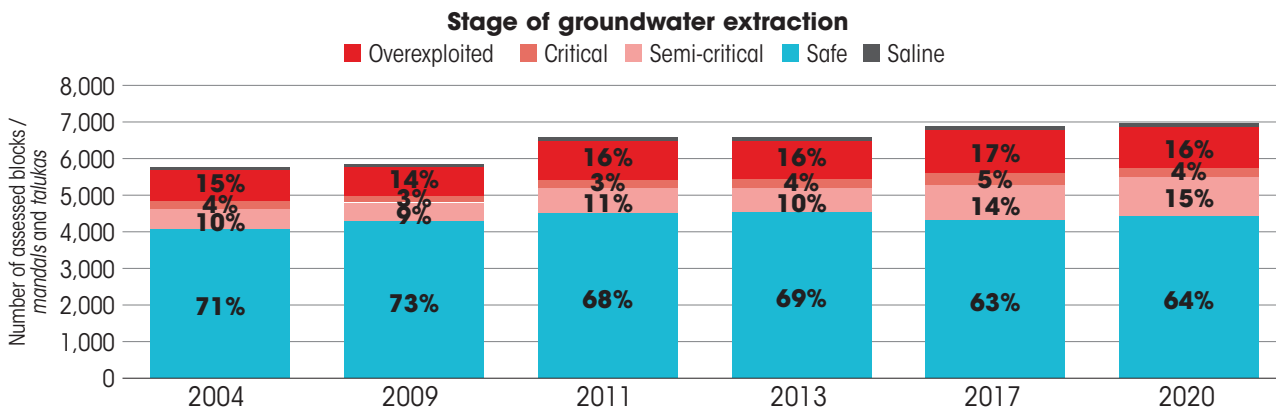
00 Share of monitoring wells that reported fall in water levels in November 2021, compared to the decadal average for the month of November in 2011-2020

#Overexploited districts are in Punjab, Haryana, Delhi, Uttar Pradesh, Rajasthan, Gujarat, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu



Growing unsafe

Number of blocks with safe groundwater extraction levels has substantially reduced since 2004



Note: Groundwater resources assessment as on 2013 has been considered for West Bengal; for all other states it is 2020; actual groundwater extraction data will be higher for Karnataka, Punjab, Uttar Pradesh and Maharashtra as groundwater extraction for industries is either not available or partially available for these states

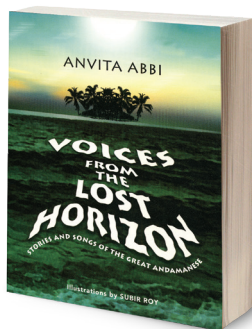
Sources: International Groundwater Resources Assessment Centre database, updated on October 27, 2020, and Union Ministry of Jal Shakti data released on July 2021 and February 2022

GRAPHICS: SANJIT KUMAR, MUKESH KUMAR SINGH / CSE

Tales for posterity

VOICES FROM THE LOST HORIZON ENCAPSULATES THE WORLDVIEW OF THE GREAT ANDAMANESE TRIBE THROUGH ITS STORIES AND SONGS, CAPTURING A CULTURE THAT IS NOW EXTINCT

RAJAT GHAI



Voices from the Lost Horizon

By [Anvita Abbi](#)

Publisher: Niyogi Books

Pages: 176

Price: ₹995

56 DOWN TO EARTH 16-31 MARCH 2022

IN NOVEMBER 2018, media in India and the world were agog with news of how John Allen Chau, a US missionary, had been killed after he illegally went to North Sentinel Island in the Andaman and Nicobar Islands to preach the Gospel "to the heathen inhabitants".

Those "heathens" were the Sentinelese, one of the four Negrito groups of the Andamans. The others are the Onge, the Jarawa and the Great Andamanese, the last tribe being the subject of Anvita Abbi's book. These four tribes are the result of the first human migration out of Africa 70,000 years ago, as Abbi notes in the book. But "civilisation" has not

been kind to them.

Ever since the British established a penal settlement at Port Blair in 1789, the tribes have been exposed to epidemics to which they had no natural immunity. Their populations are now extremely reduced.

The Great Andamanese, the subject of the book, are actually further divided into 10 sub-tribes—four in North Andaman, four in Middle Andaman and two in South Andaman. Each tribe had their own language but they were "mutually intelligible" or understood by the other tribes.

However, the central and southern varieties became extinct in the 1930s. The speakers of the

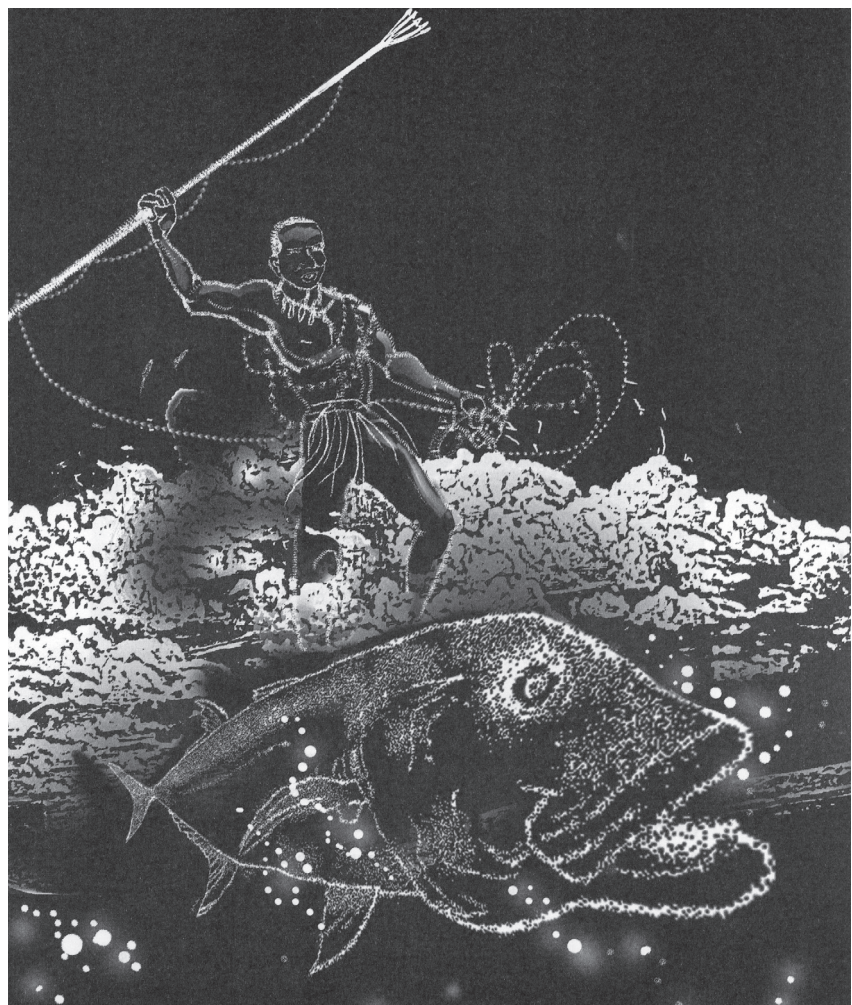


ILLUSTRATION: SUBIR ROY / NIYOGI BOOKS

four remaining northern varieties—Bo, Jeru, Khosa and Sare tribes—were forcibly located by the Indian government to Strait Island in 1970. The speakers intermarried and the result was a type of "Koine" or lingua franca known as Present-day Great Andamanese (PGA).

Abbi, a Padma Shri and a retired professor of linguistics at the Jawaharlal Nehru University, New Delhi, was motivated to work in the Andamans because of the state of PGA. The language was "moribund", which means it was not being used by the present speakers to converse, nor being passed onto the new generation. Both generations were more fluent in Andamanese Hindi, a pidgin variety of Hindi spoken in the Andamans, than their own language.

Abbi was to start her work in December 2004, which is when the Indian Ocean tsunami struck. She eventually was able to start in March 2005. Her project, financed by a grant from the School of Oriental and African Studies in London was to "prepare a multilingual dictionary, write an extensive ethnolinguistic grammar, document the language in audio and video formats, document indigenous knowledge about the forest, sea and life pattern, and if possible, to elicit songs and stories."

Contacting the Great Andamanese was quite challenging, writes Abbi, who not only had to negotiate the tough terrain—travelling between islands by ferry, crossing creeks inhabited by sea snakes and saltwater crocodiles, living at Strait Island which had no infrastructure for guests—but also officialdom.

She was finally able to make



The book carries QR codes to access audio-visual recording of songs in the Great Andamanese language. Scan the code on the left to listen to a song that describes the day a tsunami struck the island on December 26, 2004. The code on the right plays a lullaby that describes the to-and-fro motion of a bamboo cradle.

contact with the Great Andamanese, which resulted in this book—a commendable attempt in that it records a culture that is today extinct. Two people who helped Abbi the most, a tribesman named Nao Junior and a tribeswoman named Boa Senior, are now dead. Boa was the last speaker of the Bo language and died in 2010. Nao, who recounted nine of the 10 stories in the book, died in 2009.

The book consists of 10 folk tales and 46 songs in the Great Andamanese language. At the beginning of each folk tale, Abbi gives the context in which the story was told to her by Nao or Bo, followed by a running translation of the story in English.

The appendix of the book also has a line-by-line translation of several, but not all stories. At the end of each story, there is a QR code by which some of the audio-visual recordings can be accessed.

The stories, Abbi writes in the beginning of the book, encapsulate the worldview of the Great Andamanese. These were and are a largely hunter-gatherer and seafarer people, and their evolution is thus very different from agrarian and pastoral societies, writes Abbi.

The stories deal with various themes: creation myths, cannibalism and headhunting,

adultery and honour killing, domestic violence and murder and hunting and fishing.

There are several revelations. For instance, the first folktale, *The Great Narrative of Phertajido*, tells us that the first human and man, Phertajido, was born from the mouth of a bamboo stalk. He created Kaut, the first woman, from Kaut, a type of soil used in making clay pots.

Maya Jiro Mithe is a delightful story which tells that most endemic birds of the Andamans are ancestors of the Great Andamanese. It is accompanied by a visual representation of these birds with their local and scientific names. The story also tells why the tribe does not hunt the Bol, a type of sea fish.

The Water God May-Kobo and Jire tells why the tribe does not hunt at night and *When we hunted Dugong: A real story* describes a Great Andamanese dugong hunt.

The stories and songs thus describe the tribe's inextricable connection with the environment. As Abbi herself says: "Linguistics maintain that there is an inextricable link between language and environment...the death of a language signifies the closure of the link it (culture) had with ancient heritage and knowledge-base."

Perhaps this is the reason the coming generations will thank Abbi and others associated with this work. As humanity hurtles towards monolingualism, it is good to remember what Wade Davis, professor of anthropology at the University of British Columbia, says, as quoted in the book: "Each language is an old growth forest of the mind, a watershed of thought, an entire ecosystem of spiritual possibilities." [📖](#) [🐦](#) [down2earthindia](#)

Banking on welfare votes

BY THE end of the elections to the Uttar Pradesh Legislative Assembly, a new class of voters emerged—the *labharthi varg*. This new group of voters is the beneficiary of various flagship welfare schemes. The ruling Bharatiya Janata Party (BJP) claimed that the welfare schemes in the state were so impeccably implemented that this *varg* would vote for it *en masse*, ensuring its victory. The results of the poll (expected on March 10) will tell us exactly how this group voted and deliver a verdict on this claim of the ruling party.

In an election that witnessed religious and caste polarisation, the emergence of welfare schemes as a decisive electoral factor is certainly a piece of enlightening news. The *labharthi varg* are beneficiaries of the BJP-led Union government's flagship schemes, each having the "Prime Minister" or "Pradhan Mantri" (PM) prefix—the PM Awas Yojana, PM Ujjawala Yojana, PM Jan Dhan Yojana, PM Kisan Nidhi Yojana, PM Mudra Yojana and the PM Jeevan Suraksha Yojana. They also got free ration under the pandemic relief scheme. Uttar Pradesh has a total of 150 million voters, and a quick calculation shows that altogether, these schemes have 130 million beneficiaries. If this *varg* votes for BJP, the ruling government would be back in power with a historic mandate. The votes of even a fraction of this group will still give BJP a comfortable electoral benefit.

This strategy of targeting beneficiaries as a block of loyal voters has been a hallmark of BJP since the last state Assembly elections in 2017. BJP's victory at the time was attributed to the PM Ujjawala Yojana, among other factors. This strategy was also used in the Lok Sabha elections in 2019, when this *varg* was often talked about. The core of the strategy is to create a *thali* of welfare schemes, each addressing a basic need: a subsidised house, a tapwater connection, a toilet, a gas connection, cheap ration, employment guarantee and cash support for agriculture. Prime Minister

Narendra Modi's office is known to closely monitor this *thali*. A back-of-the-envelope calculation shows that overall, the government transfers close to ₹3 lakh per household.

This marks a change in the country's approach to welfare. For more than a decade, India had been legislating various basic needs as rights given to people through schemes. This includes the laws that guarantee 100 days of employment and facilitate access to education. Even compensation for land acquired was termed a fair right. This approach made the people right-holders, with some qualifiers; for example, one has to be a rural resident to access guaranteed 100 days' work.

But the recognition of the new *varg* has made right-holders beneficiaries. This

In Uttar Pradesh, emergence of a new class of voters that benefits from welfare schemes signals a shift from rights-based development

automatically makes them obliged recipients of a government scheme that takes care of a basic need. This is the giver-receiver matrix

of development. But it has a huge electoral connect. For instance, the schemes mentioned above benefit individuals. Thus their promotion solicits individual loyalty to the "giver" and also makes a direct connection with each voter.

Former prime minister Indira Gandhi championed such an approach to welfare. She introduced the slogan, *garibi hatao*, and backed it with many welfare schemes directly funded by the Union government. She also used each of them as her personal response to people's needs. As a result, India at one point had more than 1,000 Centrally-sponsored schemes. It is said that she nurtured her personal connection with the mass using this approach.

Modi is following this path, junking the rights approach to development. Pre-fixing all Central schemes with "PM" is one way of establishing that direct connection with loyal "receivers", who just happen to be voters in a democracy. **DTE**

 @richiemaha

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Reflecting on this, CSE is organizing a four days training programme on "NCAP: Developing air quality management plan for industrial areas". The aim of the programme is to build capacity of the participants on methodology of preparing action plan to reduce air pollution from industrial sources to achieve an overall objective of clean air. The course will stress on step by step methodology from identification of issues, to inventorisation of pollution sources, sector specific best practices, role of small and medium scale industries, learning skills to conceive phase-wise action plans using data-points and strategies for its implementation.

COURSE COORDINATOR

ANUBHA AGGARWAL, Programme Officer, Industrial Pollution Unit

For any queries email at anubha.aggarwal@cseindia.org
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