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## TIME FOR A 'SPONGE CITIES' MISSION IN INDIA

Relevant for: Environment | Topic: Disaster and disaster management

Unpredictable nature, unbridled avarice and untrammelled urbanisation are back in currency, this time, in the wake of [torrential rains in the third week of October in Hyderabad](#). Over 50 people died. Hundreds of riverbed hutments were flushed away. Thousands of homes remain submerged two weeks after the flood. The scale of destruction has been unprecedented. This experience is not unique to the city of Hyderabad but something that cities across India have been experiencing in recent years. Barely five years ago, it was Chennai that saw a massive flood costing much damage and lives; Gurugram over the past few years comes to a complete standstill during the monsoon months, and for Mumbai, the monsoon has become synonymous with flooding and enormous damages.

Almost 10 years ago, scientists from the Potsdam Institute for Climate Impact Research, Germany, [built climate change adaptation tools for Hyderabad](#). However, the Hyderabad Metropolitan Development Authority of that time did not use it. [Such tools](#) are held in trust by many civil society organisations across the country in many of our cities. Anticipating significant increases in rainfall, they offered tools to build solutions. So what was it that really brought us down to our knees?

Ground Zero | [The revenge of the lakes in Hyderabad](#)

Our persistence in using these cliched expressions year after year also restitutes a profoundly disabling account of the world. After all, what can one do against such trans-historic forces? Let us examine these claims closely.

The first is unprecedented rainfall. On September 21, 2016, breaking a 16-year record, [Hyderabad received 16 cm of rain in a single day](#); in [September 2017](#), the city witnessed a 450% increase compared to the average rainfall it receives during this month; in September 2019, the [rainfall was the highest in 100 years](#), while in October it was in 62% in excess. The rainfall received in 2020 has been the [highest for the month of October in a century](#). Every year, the rains bring something unprecedented with them. But our constant, unwavering attention to the rainfall levels draws our attention away from our inability to manage the city's drainage systems. The floods of October 2020 occurred because we did not discharge the water in time. And when we did discharge the water, we did it in a sudden, uncontrolled manner. To put it bluntly, first our sluices did not open and then our bunds breached.

The second is antiquated infrastructure. Hyderabad's century-old drainage system (developed in the 1920s) covered only a small part of the core city. In the last 20 years, the city has grown at least four times its original built-up area.

But the areas that suffered from the [floods of 1908](#), 2001, and 2005 have not been hit by the 2020 floods. The narrative of antiquated infrastructure conceals the fact that the city has grown rapidly, and into areas where there was no drainage infrastructure to begin with. And as the city grew beyond its original limits, not much was done to address the absence of adequate drainage systems.

Government pronouncements, media representations and public protests have all focused repeatedly on factors which by their very description fall outside our capacity to influence. So what is to be done? The manner in which we talk about recurring floods in the city often reduces the problem to simple dichotomies of public versus private property and individual conduct

versus faceless governmental action. This means that we neglect the issues of incremental land use change, particularly of those commons which provide us with necessary ecological support — wetlands. This framing also disavows the role of local communities in managing local ecosystems — people with traditional rights for fishing and farming. This is a lesson that has been learnt by others around the world. We need to start paying attention to the management of our wetlands by involving local communities. The risk is going to increase year after year with changing rainfall patterns and a problem of urban terrain which is incapable of absorbing, holding and discharging water.

Also read | [How lake encroachments and official inaction led to floods in Hyderabad](#)

Urban floods of this scale cannot be contained by the municipal authorities alone. Nor can they be dealt with by the State government. They cannot be managed without concerted and focused investments of energy and resources. Such investments can only be done in a mission mode organisation with active participation of civil society organisations at the metropolitan scale. In Hyderabad, this can be done by the Hyderabad Metropolitan Development Authority, but all metropolitan areas have similar organisations with constitutional mandates via the metropolitan planning committee. So what should the mission objectives be?

We need a mission that mitigates flood risk and provides a pathway to water security. The most promising idea across the world at this time appears to be the idea of “sponge cities”. The idea of a sponge city is to make cities more permeable so as to hold and use the water which falls upon it. Sponge cities absorb the rain water, which is then naturally filtered by the soil and allowed to reach urban aquifers. This allows for the extraction of water from the ground through urban or peri-urban wells. This water can be treated easily and used for city water supply. In built form, this implies contiguous open green spaces, interconnected waterways, and channels and ponds across neighbourhoods that can naturally detain and filter water. It implies support for urban ecosystems, bio-diversity and newer cultural and recreational opportunities, These can all be delivered effectively through an urban mission along the lines of the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), National Heritage City Development and Augmentation Yojana (HRIDAY) and Smart Cities Mission. On a top priority, such a mission should address the following.

Also read | [‘Sponge city’, sharing the Shenzhen experience](#)

The first subject is wetland policy. In most of our lakes, the shallow ends, which often lie beyond the full tank level, have disappeared. These shallow ends are best characterised as wetlands; sometimes owned by private individuals, other times existing as ecological commons. Regardless of ownership, land use on even this small scale needs to be regulated by development control.

Watershed management and emergency drainage plan is next. This should be clearly enunciated in policy and law. Urban watersheds are micro ecological drainage systems, shaped by contours of terrain.

Detailed documentation of these must be held by agencies which are not bound by municipal jurisdictions; instead, we need to consider natural boundaries such as watersheds instead of governance boundaries like electoral wards for shaping a drainage plan. The Metropolitan Development Authorities, National Disaster Management Authority, State revenue and irrigation departments along with municipal corporations should be involved in such work together.

Also read | [How a city can tackle floods](#)

Ban against terrain alteration is third. Lasting irreversible damage has been done to the city by builders, property owners, and public agencies by flattening terrain and altering drainage routes.

Without doubt, terrain alteration needs to be strictly regulated and a ban on any further alteration of terrain needs to be introduced. Our cities are becoming increasingly impervious to water, not just because of increasing built up but also because of the nature of materials used (hard, non-porous construction material that makes the soil impervious). To improve the city's capacity to absorb water, new porous materials and technologies must be encouraged or mandated across scales. Examples of these technologies are bioswales and retention systems, permeable material for roads and pavement, drainage systems which allow storm water to trickle into the ground, green roofs and harvesting systems in buildings. These not only reduce run-off and the load on infrastructure, but also help keep water in the city for later use.

Acknowledging the role of different actors for the city can create a practical space to begin this work. Doing so will not just help control recurring floods but also respond to other fault lines, provide for water security, more green spaces, and will make the city resilient and sustainable. The constant search for a scapegoat to blame, while a few people try what they can, limits our capacities and only creates cycles of devastation.

We must not allow nature, human conduct, and urbanisation to be mystified and rendered as trans-historic villains. We can learn to live with nature, we can regulate human conduct through the state and we can strategically design where we build. We need to urgently rebuild our cities such that they have the sponginess to absorb and release water without causing so much misery and so much damage to the most vulnerable of our citizens, as we have seen.

*Kabeer Arora is an urbanist working with Hyderabad Urban Lab. The views expressed are personal*

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# COMMISSION FOR AIR QUALITY MANAGEMENT: THE POTENTIAL AND THE PITFALLS - EDITORIALS - HINDUSTAN TIMES

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

Nov 02, 2020-Monday

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[Noida](#), [Gurgaon](#), [Bengaluru](#), [Hyderabad](#), [Bhopal](#), [Chandigarh](#), [Dehradun](#), [Indore](#), [Jaipur](#), [Lucknow](#), [Patna](#), [Ranchi](#)

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Last week, the Centre issued an ordinance to put in place a new anti-pollution agency to tackle the crisis in the Delhi-National Capital Region area. The Commission for Air Quality Management (CAQM) will have the power to formulate rules, set emission standards and impose fines up to 1 crore or send violators to prison for up to five years. CAQM will have members from the Centre, Delhi, Haryana, Punjab, Uttar Pradesh and Rajasthan, and non-governmental organisations. By setting up CAQM, the Centre has acknowledged that air pollution is indeed a major challenge; it has health, economic and political implications; and the problem of multiplicity of authorities was a key reason why it could not be tackled effectively.

Many have raised questions — rightly so — about the way the ordinance was passed with no consultation, and the possible overriding powers the Centre may have; whether a top-down implementation approach (without third-party monitoring and citizen-driven enforcement) will work; and the lack of a time-bound commitment to clean the air. The Centre could also have come up with the framework before this year's pollution season began rather than wait for judicial prodding.

While CAQM is welcome, it alone cannot clean the air. Its success will depend on how it tackles different interest groups; outlines a time-bound commitment to achieving the set standards; ensures adequate personnel and funds for pollution control bodies, and stricter monitoring systems. All of this will require tremendous political will and support.

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## VULTURE CONSERVATION PLAN TARGETS DRUG

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

Drugs make their way into the vulture's system as they feed on carcasses.

The National Board for Wildlife (NBWL) has cleared a plan for conserving vultures. Saliiently, the drugs that are used to treat cattle and known to poison vultures will be banned by the Drugs Controller General of India. Diclofenac, a drug used to treat cattle, was linked to kidney failure in vultures and a decline in the bird's population. Though the drug was banned in 2006, it is reportedly still available for use.

A study by the Bombay Natural History Society (BNHS) and the Royal Society for the Protection of Birds' Centre for Conservation Science found that along with Diclofenac, there were several other drugs that were potentially toxic to vultures being used by vets for treating cattle. The drugs make their way into the vulture's system as they feed on carcasses.

The long-billed vulture ( *Gyps indicus* ) and the slender-billed ( *G. tenuirostris* ) had declined by 97%, while the white-rumped ( *G. bengalensis* ) declined nearly 99% between 1992 and 2007, according to an earlier estimate by the BNHS.

The 'Action Plan for Vulture Conservation 2020-2025' also proposes to establish Vulture Conservation Breeding Centres in Uttar Pradesh, Tripura, Maharashtra, Karnataka and Tamil Nadu. There would also be a conservation breeding programme for the red-headed vulture and Egyptian vulture, and at least one "Vulture Safe Zone" in every State for the conservation of the remnant populations.

There would be four rescue centres in different geographical areas: Pinjore in north India, Bhopal in central India, Guwahati in northeast India and Hyderabad in south India, as well as regular surveys to track population numbers, the plan envisages.

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## STATES TO GET AIR POLLUTION FUNDS BASED ON MEETING 'PERFORMANCE TARGETS'

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

Union Minister of Environment, Forest and Climate Change Prakash Javadekar. File | Photo Credit: [MV](#)

The Central government's decision to release only half of its budgetary allotment for combating air pollution was because of its plan to link the money disbursed to the States achieving certain 'performance targets'.

In February, Finance Minister Nirmala Sitharaman said, "In large cities having population above one million, polluted air is a matter of concern... Allocation for this purpose is 4,400 crore for 2020-2021 and parameters for the incentives would be notified by the Ministry of Environment, Forests and Climate change."

On Monday, however, the Centre, based on the recommendations of the 15th Finance Commission, released exactly half — 2200 crore—to 15 States. The States, in turn, have to release money to local municipal bodies in 42 cities to take steps to monitor and mitigate air pollution.

A senior official in the Environment Ministry, who declined to be identified, said the funds were being disbursed by the Ministry of Housing and Urban Affairs and the Environment Ministry's role was to set the performance parameters. These would be decided by the month-end. "The second instalment would be released in January 2021 against performance-based outcomes in terms of year-on-year improvement in air quality."

In July, officials of the Environment Ministry, as well as the steering committee of the National Clean Air Programme (NCAP), deliberated on the steps to be taken on the disbursement of funds, a person who was a part of the meeting told *The Hindu*. "Subsequently, it was decided that the funds would be given based on certain performance targets being met."

The NCAP envisages 102 of India's most polluted cities reducing air pollution by 20-30% by 2024 with a reference year of 2017. The States, where these cities are located, have submitted a road map on how they would go about this reduction. The first step, according to Environment Ministry officials, would be to improve the measurement. Unlike Delhi, which has nearly 37 automatic air quality monitors that continuously measure particulate matter, many cities have barely a handful.

Sachidanand Tripathi, Professor, Indian Institute of Technology, Kanpur, and Coordinator, NCAP, told *The Hindu*, "In several cities, we don't know the source apportionment, or how much of a city's pollution is from neighbouring regions. I believe improving monitoring and having trained personnel at the municipal body-level will be an important part of how these funds are used."

Maharashtra and Uttar Pradesh were the recipients of the largest tranches—of 396 crore and 357 crore respectively.

Non-attainment cities are those which were found to be consistently violating the National Ambient Air Quality Standards (NAAQS) from 2011-2015.

Minister of State for Environment Babul Supriyo told Parliament in September that 224.74 crores had been released to State pollution control boards for components sanctioned under the NCAP during 2019-20. Sixty percent of funds, i.e. 172.86 crore, had been released to 90 cities, including 7 cities of the Northeast and the remaining had been disbursed to 43 cities.

The activities that the money would be spent would include installing and commissioning continuous ambient air quality monitoring systems, creating green buffer zone along the roads, mechanical street sweepers, mobile enforcement units, water sprinklers, public awareness and capacity-building activities.

At the State-level, the NCAP envisages a steering committee headed by the Chief Secretary, a monitoring committee headed by principal secretary (environment) and an implementation committee headed by either district magistrate or commissioner of the municipal corporation.

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# RICH NATIONS FALL SHORT ON CLIMATE FINANCE PLEDGE

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

Wealthy countries are falling short on a decade-old promise come due to ramp up climate finance for the developing world, according to a semi-official report released Friday.

Even those numbers may be inflated, watchdog groups warned.

The 2009 UN climate summit in Copenhagen mandated that poorer nations -- historically blameless for global warming, but most at risk -- were to receive \$100 billion (85 billion euros) annually starting from 2020 to help curb their carbon footprint and cope with future climate impacts.

But where the money was to come from and how it would be allocated were not spelt out, which has made tracking progress toward that goal both difficult and disputed.

As of 2018, the last year for which data is available, money from all sources earmarked for climate-related projects totalled \$78.9 billion, up about 11% from the year before, the Organisation for Economic Co-operation and Development (OECD) said in a detailed report, its third since 2015.

Public climate finance from developed countries -- almost evenly split between bilateral and multilateral sources -- accounted for the lion's share, some \$62.2 billion, with another \$2 billion is government-backed export credits.

The rest, some \$14.6 billion, came from private investment.

How these figures align with the UN-back pledge, renewed in the 2015 Paris Agreement, is subject to interpretation, and the OECD makes a point of not drawing conclusions one way or the other.

## 'Mounting threat'

If climate finance in 2019 and 2020 ramped up at the same pace as from 2017 to 2018, the \$100 billion target would be within grasp this year.

But the rate at which money was mobilised had already slowed sharply going into 2018, and the impact of the coronavirus pandemic is still unknown.

"Climate finance is a lifeline for communities facing record heatwaves, terrifying storms and devastating floods," said Tracy Carty, co-author of an in-depth "shadow report" on climate finance compiled by experts at global NGO Oxfam.

"Even as governments struggle with Covid-19, they must not lose sight of the mounting threat of the climate crisis."

According to Oxfam, donors reported only \$120 billion dollars in climate finance across 2017 and 2018, some \$30 billion shy of the OECD estimate for those two years combined.

Less contested but even more controversial is the form that aid has taken, and the countries to which has been allocated.

According to the OECD, nearly three-quarters of public finance given in 2018 was in the form of loans, few of them "concessional", or at below-market interest rates.

Only a fifth were the out-right grants that developing countries have consistently demanded.

For Oxfam, once loan repayments and interest is stripped out of the calculation, only about \$20 billion of "true support" remained in 2018.

### **'An overlooked scandal'**

"The excessive use of loans in the name of climate assistance is an overlooked scandal," said Carty, arguing that the world's poorest countries "should not be forced to take out loans to respond to a climate crisis not of their making."

The worst offender in this category according to Oxfam was France, which provided almost 97% of its bilateral climate aid as loans and other non-grant instruments.

By contrast, the vast majority of aid from Sweden, Denmark and Britain was in the form of grants.

However much climate assistance was doled out in 2018, very little of it went to the countries most in need, the OECD and Oxfam reports agree.

Some 14% went to nations in the Least Developed Countries category, and two percent to developing small island nations, whose very existence is threatened by rising seas, according to the OECD.

Nearly 70% went to middle-income countries.

The OECD report does not cover domestic public climate finance, or so-called "South-South" assistance between developing countries.

Another long-standing complaint from poorer nations is how funds are split between helping countries cut emissions (mitigation) and cope with climate impacts already in the pipeline (adaptation).

OECD reports that 70% of 2018 finance went to mitigation, with only 21% allocated for adaptation. Oxfam's breakdown was roughly the same.

Last month, more than 500 civil society groups called on G20 finance ministers to cancel debts in poorer countries in the wake of the Covid-19 pandemic. Debt repayments were suspended for six months.

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# ECOLOGICALLY AND CULTURALLY RICH DESERTS, SWAMPS AND GRASSLANDS MUST NOT BE LABELLED 'WASTELANDS'

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

Camels in the Banni grasslands of Kutch | Photo Credit: [Vijay Soneji](#)

Speckled with flecks of dark green verging on grey, Kalo Dungar rises incongruously over the Great Rann of Kutch. The Black Hill towers over the glistening, patchy, white desert and rises like a lighthouse above a sea of sand and salt. The flatland extends as far as the eye can see along the border between India and Pakistan. Its overwhelming vastness and immense stillness belie the hyperactive and contentious borders of our collective imagination.

A little after sunset, bells chime at the Dattatreya temple atop Kalo Dungar, breaking the eerie silence of the hilltop surrounded by thorny scrub forests and the ubiquitous invasive mesquite (*Prosopis juliflora*) that the locals call *gando baval* (mad tree). The bells beckon wildlife to gather around a small cylindrical slab, a feeding spot of sorts. The temple priest heads down with a bucket of food and dumps it on the slab. As darkness descends, silhouettes of four-legged critters appear. Initially there's a hierarchy: the first to feed are golden jackals; then a trio of wild boars; next, two Indian crested porcupines amble in. The rather unusual assortment of mammals feeds, more or less amicably, before disappearing into the surrounding shrub forest. A rich diversity of wildlife on one rocky hillock.

## Camel herds

The Maldharis of Kutch have traditionally been nomadic pastoralists, traversing the region as seasons change with the ebb and flow of the grasslands on which their cows and buffaloes, goats, sheep and camels graze. The communities, although distinct in cultures and husbandry, are united in their knowledge of native wildlife and vegetation. Their lives revolve around livestock. The Rabari community of camel herders has a saying: *maal che to mobo che*, which loosely translates as 'if one has animals, one has dignity'.

As I set up trail cameras to understand the distribution of mammals in the Banni grasslands in Kutch, I see the arid land morph into lush grassland after the monsoons, the life blood for pastoralists, their livestock, and for a rich diversity of wildlife. The bane of the otherwise enjoyable task of setting up camera traps is navigating the thorny maze of *Prosopis*, an invasive plant that has spread like wildfire through the region — the consequence of an attempt at 'greening' the desert and reshuffling the socio-ecological dynamics of the Banni. While it has spawned livelihoods and a parallel economy that runs on charcoal, it has also ruined the grasslands, impacting pastoralists and the fauna of the area.

## Colonial misnomer

What we often forget is how unique deserts and grasslands are as habitats that support human communities, wildlife, and vegetation. Ill-informed attempts to modify these landscapes are the legacy of colonialism, when many such lands were considered wasteland because they did not generate revenue. Monocultures and plantations were considered productive while wetlands, deserts, and grasslands were not. This categorisation persists, and these landscapes are thus vanishing.

It's not just the Banni — as much as 17% of India is classified as wasteland, according to *Wastelands Atlas of India 2019*. This includes not just seasonal grasslands and deserts, but also riverine and coastal sandy areas, wetlands, mangroves (as areas affected by salinity or alkalinity), ravines, scrubland, glaciers, and areas under snow cover.

“The term ‘wasteland’, a colonial construct, obsesses with the monetary benefits that a piece of land may or may not provide,” says Abi Vanak, Senior Fellow and Convenor of the Centre for Biodiversity and Conservation, Ashoka Trust for Research in Ecology and the Environment. “The classification ignores the social, cultural and historical links of the inhabitants, as well as the ecology and ecosystems of these places. The only true ‘wastelands’ on earth stem from human industrial activities that render land lifeless.” Areas deemed wastelands — grasslands, deserts, rocky outcrops and sand dunes — are actually “rich ecosystems teeming with unique biodiversity and human cultures finely attuned to the dynamics of such landscapes,” he says.

The *Wastelands Atlas* indicates that grasslands and waterbodies are under consideration for reclassification, although the exact process seems unclear. These landscapes are home to not just endangered megafauna but also plants and invertebrates, several of which we depend on. We see history repeating itself in initiatives such as the Compensatory Afforestation Programme and Management Authority and Green India Mission. Land for these ‘greening’ drives, which seek to compensate for land used for development activities, comes from those misclassified as ‘wastelands’.

### **Sky islands**

About 11% of Gujarat is categorised as wastelands with large swathes of Kutch falling under this classification. On the other side of the country, the floodplains of the Ganga and Brahmaputra along the Terai arc are not only one of the most biodiverse parts of the subcontinent, supporting rare species such as the endangered greater one-horned rhinoceros that thrives in the tall elephant grass, but are also among the most densely populated parts of the country thanks to the fertile river plains. But parts of this region too are classified as wastelands. For instance, Assam has approximately 11% of its total area classified as such, while Arunachal Pradesh and Sikkim, renowned biodiversity hotspots, have 16% and 46%.

At the country's southern tip, the biodiversity hotspot that is the Western Ghats is home to the rare Shola grasslands of the sky islands; these natural grasslands are the last refuge for several endemic species of birds, amphibians, reptiles, and mammals, including the Nilgiri tahr, and unique flora such as the neelakurinji that blossoms every 12 years and gives the Nilgiris its name. Parts of this ecosystem too come under the umbrella term ‘wastelands’.

As do parts of the central Indian grasslands, the last refuge of the tiger. Over 12% of Madhya Pradesh, which has national parks such as Kanha, Pench, and Panna, is categorised as scrub forest, degraded pastures, etc. Large chunks of the Himalaya and its foothills, with their cold deserts and montane grasslands, the strongholds of the snow leopard, are similarly classified. As much as 79% of Jammu and Kashmir, 41% of Himachal Pradesh, and 23% of Uttarakhand, are considered wastelands.

The Asiatic cheetah that once roamed India's grasslands is already extinct, as is the pink-headed duck that once thrived in the Gangetic swamps. A grassland denizen, the great Indian bustard, once in the running for national bird status, is critically endangered today. If we scramble now, we might still be able to save it and other species from disappearing forever. The first step to ensure that these creatures and their habitats are not wiped out is to stop ill-informed initiatives that ignore the socio-ecological dimensions of development.

Many pastoralists are poets at heart. One of the best-known storytellers of the grasslands was Salim Node (called Mama by everyone), the wise *agyavan* (pastoralist leader) of Sargu village in Kutch, not far from the foothills of Kalo Dungar. Pastoralists from near and far would flock to him for advice, remedies, and treatments for their livestock.

One of the folktales Salim Mama narrated is an apt metaphor for the 'wastelands'. It was monsoon and a female baya weaver was sitting in her nest, ready to lay eggs. During a heavy downpour, a lion arrived for refuge under the tree. The protective bird rebuked the lion for choosing this spot of all others in the forest, and the lion left to find another tree. But immediately, a troop of monkeys landed on the very branch from which the weaverbird's nest was dangling. Salim Mama's tale ended there. He wanted us to know that these ecosystems are always shared spaces, always teeming with life.

*The writer is an ecologist who moonlights as a science communicator.*

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## COVID-19, CLIMATE AND CARBON NEUTRALITY

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

History is divided into two periods: Before the Common Era or BCE and Common Era or CE. But given our experience this year, BCE could well stand for Before the [COVID-19 Epidemic](#) and CE for the COVID-19 Epidemic. To say that 2020 has been cataclysmic is to state the obvious and actually make an understatement. Our lives have been turned upside down. The COVID-19 crisis and its aftermath can be seen either as a longish pause on the button of economic growth or as an opportunity for reset, recalibration and rethink.

COVID-19 is undoubtedly a public health catastrophe and certainly calls for enhanced investments in research and development that impinges directly on public health. But more fundamentally, the pandemic reflects fundamental ecological disequilibrium. Evidence has accumulated that loss of biodiversity and ever-increasing human incursions into the natural world have contributed heavily to the outbreak and spread of epidemic diseases. Understanding the three Es — evolution, ecology and the environment — will be key to identifying potential pandemics. COVID-19 also reinforces the need to pay far greater attention to the biosciences that underpin agriculture, health and the environment that are going to be profoundly impacted by the current pandemic.

Also read | [COVID-19 is alarm bell for climate change, more outbreaks may follow: science historian](#)

There is also now robust scientific evidence to show, for instance, how air pollution exacerbates the impacts of COVID-19. Public health science and environmental science are two sides of the same coin. In fact, I have been saying for over a decade now that our environmental problems — such as air pollution, water pollution, chemical contamination, deforestation, waste generation and accumulation, land degradation and excessive use of pesticides — all have profound public health consequences both in terms of morbidity and mortality and hence demand urgent actions. The traditional 'grow now, pay later' model is not only unsustainable in the medium- to long-term but also dangerous to public health in the short term.

We live in a world where climate change is a reality. No longer can we argue about uncertainties in the monsoon, the frequency of extreme events, the retreat of the Himalayan glaciers and the increase in mean sea levels. A recent report of the Ministry of Earth Sciences called 'Assessment of climate change over the Indian region' is an excellent and up-to-date analysis that deserves wider debate and discussion. It also points to the need for making our future science and technology strategy in different areas anchored in an understanding of the impacts of climate change caused by continued emissions of greenhouse gases. This scientific understanding is essential for what may be a solution at one point of time but becomes a problem at another point and may even become a threat in a different context. Take the example of HFCs, or hydrofluorocarbons, that were at one time seen as the panacea to fix the depletion of the ozone layer. The depletion of the ozone layer has been fixed more or less, but HFCs are a potent threat from a climate change perspective since their global warming potential is a thousand times that of carbon dioxide.

In September 2018, the American State of California — the world's fifth largest economy in itself — was the first to commit itself to carbon neutrality. The aim was to achieve this by 2045. In December 2019, a few weeks before the world became aware of the COVID-19 catastrophe, the European Union followed California's example but with the year 2050 in mind. In September 2020, China stunned the world by declaring its goal of carbon neutrality by 2060. And just a few

weeks ago, Japan and South Korea joined the club by announcing their intention to do so by 2050, like the EU. India too has to begin thinking very seriously about its level of ambition in this regard, especially since this will have public health consequences as well. We cannot always hide behind the fact that our per capita emissions will continue to be low — that is obvious given the continued increase in the denominator. At the Paris climate change conference in December 2015, we committed to having 40% of our electricity-generating capacity from non-fossil fuel sources by the year 2030. I have no doubt that we will reach this level.

Also read | [Flattening the climate curve](#)

However, carbon neutrality is something different. Definitions vary but in simple terms — and I am deliberately not getting into complications introduced by instruments like offsets — it should mean that for a country, carbon emissions are equal to absorptions in carbon sinks, of which forests are one. Both sides of the equation are important and have to be addressed simultaneously. At Paris in December 2015, we made a commitment on carbon sequestration through forests but I have serious doubts on its credibility. To my mind, this is a matter of overriding priority. We will definitely become a \$5 trillion economy in a few years. That is an arithmetical inevitability — give or take a few years. Carbon neutrality, on the other hand, is a far bolder and worthwhile goal, the attainment of which has to be consciously engineered. It will involve massive scientific invention and technological innovation especially when it comes to removing greenhouse gases from the atmosphere. But let me add one note of caution here based on our disappointing experience with nuclear energy: there is simply no silver bullet waiting for human ingenuity to harness. Every solution being put forward these days, the most recent of which is what we refer to as geo-engineering, is riddled with complications that are not easy to resolve. Of course, renewables are an integral part of the solutions we seek but they have to be seen as more than just devices: they open up avenues for re-architecting systems as a whole. This has happened, for instance, in the German electricity sector over the past decade and a half.

Also read | [U.N. climate report urges governments to put more money into early-warning systems](#)

The post-COVID-19 world is an opportunity for us to switch gears and make a radical departure from the past to make economic growth ecologically sustainable. Much of the infrastructure we need for the future is still to be put in place — one estimate widely quoted that something like 70% of the infrastructure required in India by the year 2050 is waiting to be established. GDP growth must, without doubt, revive and get back to a steady 7%-8% growth path. However, in this post-COVID-19 world, we should make efforts to ensure that the 'G' in GDP is not 'Gross' but 'Green'. In fact, some years back, Sir Partha Dasgupta, Professor at Cambridge University and one of the world's greatest environmental economists, had prepared a fairly detailed framework for this. India can and should show to the world how the measurement of economic growth can take place while taking into account both ecological pluses and minuses.

*Jairam Ramesh is an MP (Rajya Sabha) and a former Union Minister*

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## THE COST OF CLEARING THE AIR

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

In February, Finance Minister Nirmala Sitharaman announced a 4,400 crore package for 2020-21 to tackle air pollution in 102 of India's most polluted cities. The funds would be used to reduce particulate matter by 20%-30% from 2017 levels by 2024 under the National Clean Air Programme (NCAP) though it isn't clear what the budgetary outlays for subsequent years are likely to be.

Though it was the largest-ever yearly allocation by a government to specifically tackle air pollution, the fine print revealed that only half the money was finally allotted to 15 States (and 42 cities in them) in November. The rest will be given in January based on how cities achieve certain 'performance parameters' that are still being worked out by the Centre.

It is unclear if this amount is adequate to handle the task of improving air quality. For one, the scale of the problem is unknown. Delhi, after being the epitome of pollution for at least two decades, has only in the last two years managed to firmly install an extensive network of continuous ambient air quality monitors — about 37 and the highest in the country — managed by several government or allied bodies. There are several organisations with their own networks. It has also managed to conduct source apportionment studies and now, though still contested, has the minimum data to determine the degree of pollution that is contributed by its own activities (construction, road dust, vehicle movement) and that brought on from external sources such as stubble burning. Several research studies and numerous hours of litigation have contributed to establishing this and the actual taxpayer money that has actually gone into it far exceeds allocations that find mention in the Centre and State government's budgeting books.

Several of the States with the most polluted cities that have been allotted NCAP funds are expected to spend a substantial fraction in the act of measurement. Maharashtra and U.P., by virtue of their size, got the maximum funds: close to 400 crore.

An analysis by research agencies Carbon Copy and Respirer Living Sciences recently found that only 59 out of 122 cities had PM 2.5 data available. Historically, cities have used manual machines to measure specified pollutants and their use has been inadequate. Only three States, for instance, had all their installed monitors providing readings from 2016 to 2018. Prior to 2016, data aren't publicly available making comparisons of reduction strictly incomparable. Now manual machines are being replaced by automatic ones and India is still largely reliant on imported machines though efforts are underway at institutions such as the Indian Institute of Technology, Kanpur to make and install low-cost ones.

The funds don't account for the trained manpower and the support system necessary to effectively maintain the systems and these costs are likely to be significant. Then comes the all-important aspect of cleaning up. A Right to Information disclosure sourced by the research agencies revealed that for four cities in Maharashtra 40 crore had been assigned. Pollution clean-up activities have been assigned 50% of this budget and another 11 crore are allotted for mechanical street sweepers. Depending on the specific conditions in every city, these proportions are likely to change. Therefore budgetary allocations alone don't reflect the true cost of stemming air pollution.

Also, money alone doesn't work. In the case of the National Capital Region, at least 600 crore was spent by the Ministry of Agriculture over two years to provide subsidised equipment to farmers in Punjab and Haryana and dissuade them from burning paddy straw. Yet this year,

there have been more farm fires than the previous year and their contribution to Delhi's winter air woes remain unchanged. A clear day continues to remain largely at the mercy of favourable meteorology. While funds are critical, proper enforcement, adequate staff and stemming the sources of pollution on the ground are vital to the NCAP meeting its target.

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# NO FIREWORKS: ON NGT BAN ON SALE AND USE OF FIRECRACKERS

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

In the year of the COVID-19 pandemic, it should surprise no one that the [National Green Tribunal has prohibited the sale and use of firecrackers during Deepavali](#) in the National Capital Region of Delhi and in urban centres that recorded poor or worse air quality in November last year. The directions expand on Supreme Court orders issued in the past, and provide some concessions to cities and towns that have moderate or better air quality, by allowing “green crackers” and specified hours for bursting. These stipulations are to extend to Christmas and New Year if the ban continues beyond November. The NGT took note that Odisha, Rajasthan, Sikkim, Chandigarh, the Delhi Pollution Control Committee and the Calcutta High Court had already responded to deteriorating environmental conditions by banning firecrackers this year. The tribunal’s reasoning giving primacy to the precautionary principle in sustainable development over employment and revenue losses is understandable. As the impact of COVID-19 became clear in March, and there were fears of a case surge during the winter, it was incumbent on the Centre to work with States and resolutely prevent the burning of farm stubble [ahead of Deepavali](#). This annual phenomenon unfailingly fouls the air across northern and eastern India, and imposes heavy health and productivity costs. In the absence of pollution from agricultural residue, there might have been some room for a limited quantity of firecrackers, although climatic conditions at this time of year, of low temperature and atmospheric circulation, would still leave many in distress. Only damage control is possible now, including steps to address the concerns of the fireworks industry.

Even without the risk of a COVID-19 surge, it should be evident to policymakers that their measures under the National Clean Air Programme, which seeks to reduce particulate matter pollution by 20% to 30% by 2024, must be demonstrably effective. By the government’s own admission, there were 148 days of poor to severe air quality during 2019 in the NCR, down from 206 days the previous year. Many other cities have a similar profile, but get less attention. With 40% of all pollution-linked deaths attributed to bad air quality in leading emerging economies and some evidence from the U.S. on higher COVID-19 mortality in highly polluted areas, it is time governments showed a sense of accountability on the right to breathe clean air. Tamil Nadu, where 90% of firecrackers are produced, has legitimate concerns on the fate of the industry this year, which, producers claim, represents about 2,300 crore worth of output. A transparent compensation scheme for workers, and suitable relief for producers may be necessary, although the longer-term solution might lie in broad basing economic activity in the Sivakasi region, reducing reliance on firecrackers.

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# COMMISSION FOR AIR QUALITY REVIEWS AIR QUALITY SCENARIO IN NATIONAL CAPITAL REGION AND ADJOINING AREAS.

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

The members of Commission for Air Quality Management(CAQM)in National Capital Region and adjoining Areas met and reviewed the air quality scenario in the region, actions taken by various agencies so far and further steps to be taken for improving the air quality.

The Commission noted that future action will necessitate consultation with various stakeholders. However, at this stage the Commission stressed the need to strictly enforce existing laws, rules, guidelines, directions and standard operating procedures to minimize air pollution on an emergency basis.

The Commission also felt that active public involvement is critical in the abatement of air pollution and identified the following major immediate measures:

1. Minimize use of personalized transport to the extent possible
2. Restrict travel unless absolutely essential
3. Encourage work from home
4. Strict enforcement of laws and rules regarding dust control measures including at construction sites
5. Strict enforcement to prevent burning of municipal solid waste and biomass
6. Intensify water sprinkling particularly in dust prone areas
7. Use of anti-smog guns at pollution hotspots specially at construction sites
8. Strict implementation of extant rules, Courts and Tribunal orders regarding stubble burning and use of fire crackers
9. Seek co-operation from civil society and public spirited citizens to report air pollution incidents on the Sameer App
10. Encourage coal using industries in NCR to minimize the use of coal in the coming months.

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## GLACIERS IN CHINA'S QILIAN MOUNTAINS MELTING AT 'SHOCKING' PACE

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

A combination of satellite images of the Laohugou No. 12 glacier, in the Qilian mountains, Gansu province, China, September 20, 2018 (top) and in July 5, 2020. | Photo Credit: [MAXAR TECHNOLOGIES](#) via [REUTERS](#)

Glaciers in China's bleak Qilian mountains are disappearing at a shocking rate as global warming brings unpredictable change and raises the prospect of crippling, long-term water shortages, scientists say.

The largest glacier in the 800-km mountain chain on the arid northeastern edge of the Tibetan plateau has retreated about 450 metres since the 1950s, when researchers set up China's first monitoring station to study it.

The 20-square kilometre glacier, known as Laohugou No. 12, is criss-crossed by rivulets of water down its craggy, grit-blown surface. It has shrunk by about 7% since measurements began, with melting accelerating in recent years, scientists say.

Equally alarming is the loss of thickness, with about 13 metres of ice disappearing as temperatures have risen, said Qin Xiang, the director at the monitoring station.

"The speed that this glacier has been shrinking is really shocking," Qin told *Reuters* on a recent visit to the spartan station in a frozen, treeless world, where he and a small team of researchers track the changes.

The Tibetan plateau is known as the world's Third Pole for the amount of ice long locked in the high-altitude wilderness. But since the 1950s, average temperatures in the area have risen about 1.5 Celsius, Qin said, and with no sign of an end to warming, the outlook is grim for the 2,684 glaciers in the Qilian range.

Across the mountains, glacier retreat was 50% faster in 1990-2010 than it was from 1956 to 1990, data from the China Academy of Sciences shows.

"When I first came here in 2005, the glacier was around that point there where the river bends," Qin said, pointing to where the rock-strewn slopes of the Laohugou valley channel the winding river to lower ground. The flow of water in a stream near the terminus of the Laohugou No. 12 runoff is about double what it was 60 years ago, Qin said.

Further downstream, near Dunhuang, once a major junction on the ancient Silk Road, water flowing out of the mountains has formed a lake in the desert for the first time in 300 years, state media reported.

Global warming is also blamed for changes in the weather that have brought other unpredictable conditions. Snowfall and rain has at times been much less than normal, so even though the melting glaciers have brought more runoff, farmers downstream can still face water shortages for their crops of onions and corn and for their animals.

Large sections of the Shule river, on the outskirts of Dunhuang, were either dry or reduced to

murky patches of pool, isolated in desert scrub when *Reuters* visited in September.

The new fluctuations also bring danger.

“Across the region, glacial melt water is pooling into lakes and causing devastating floods,” said Greenpeace East Asia climate and energy campaigner Liu Junyan. “In spring, we're seeing increased flooding, and then when water is needed most for irrigation later in the summer, we're seeing shortages.”

For Gu Jianwei, 35, a vegetable farmer on the outskirts of the small city of Jiuquan, the changes in the weather have meant meagre water for his cauliflowers this year.

Gu said he had been able to water his crop just twice over two crucial summer months, holding up a small cauliflower head that he said was just a fraction of the normal weight.

The melting in the mountains could peak within a decade, after which snow melt would sharply decrease due to the smaller, fewer glaciers, China Academy of Sciences expert Shen Yongping said. That could bring water crises, he warned.

The changes in Qilian reflect melting trends in other parts of the Tibetan plateau, the source of the Yangtze and other great Asian rivers, scientists say.

“Those glaciers are monitoring atmospheric warming trends that apply to nearby glaciated mountain chains that contribute runoff to the upper Yellow and Yangtze Rivers,” said Aaron Putnam, associate professor of earth sciences at the University of Maine. The evidence of the withering ice is all too clear for student researcher Jin Zizhen, out under a deep-blue sky checking his instruments in the glare of Laohugou No. 12. “It's something I've been able to see with my own eyes.”

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On Monday, Centre, based on recommendations of 15th Finance Commission, released exactly half — 2200 crore—of allocation to 15 States

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## NEWLY DISCOVERED PRIMATE IN MYANMAR 'ALREADY FACING EXTINCTION'

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

In this undated handout photo released by the German Primate Center (DPZ) on November 11, 2020, the newly discovered primate named Popa langur (*Trachypithecus popa*) is seen on a tree branch on Mount Popa, Myanmar. | Photo Credit: [AFP](#)

In a rare find, scientists have identified a new species of primate, a lithe tree-dweller living in the forests of central Myanmar with a mask-like face framed by a shock of unruly grey hair.

The Popa langur — named for an extinct volcano home to its largest population, some 100 individuals — has been around for at least a million years, [according to a study detailing the find](#), published Wednesday in *Zoological Research*.

But with only 200 to 250 left in the wild today, experts will recommend that the leaf-eating species be classified as “critically endangered”.

“Just described, the Popa langur is already facing extinction,” said senior author Frank Momberg, a researcher at Flora & Fauna International (FFI), in Yangon.

Throughout its range, the lithe monkey with chalk-white rings around its eyes is threatened by hunting and habitat loss, he said in a statement.

The first evidence of the new species was found not in the wild but the backrooms of the London Natural History Museum, where genetic analysis revealed that specimens gathered more than a century ago when Burma was a British colony were something new.

Samples of Popa poop collected by Momberg and his colleagues in the forest matched those from the museum, and showed that the previously unknown langur was still roaming the wild.

The reclusive monkeys were finally captured on film in 2018, revealing their distinctive fur colouration and markings.

*Trachypithecus popa*, or *T. popa* for short, has a grey-brownish and white belly, with black hands and wrists that look a bit like gloves. Its agile tail — at nearly a metre — is longer than its body, with the creature weighing about eight kilograms.

“Additional field surveys and protection measures are urgently required and will be conducted by FFI and others to save the langurs from extinction,” said Ngwe Lwin, a primatologist with FFI's Myanmar programme.

There are more than 20 species of langur in the world, several of them critically endangered.

At least two dozen primates have been discovered since the beginning of the century, many through genetic analysis revealing that species similar in appearance were in fact distinct.

Primates are divided into two suborders. Strepsirrhines — from the Greek for twisted-nose — includes lemurs and lorises. The second suborder, haplorhines, or “dry-nosed” primates, includes the tarsier, apes and langurs.

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Scientifically called *Nasikabatrachus sahyadrensis*, it is listed as endangered in the IUCN Red List of Threatened Species

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## NEW GENUS OF TREE FROG DISCOVERED, FOUND IN ANDAMANS AND NORTHEAST INDIA

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

The new genus *Rohanixalus* is named after the Sri Lankan taxonomist Rohan Pethiyagoda. | Photo Credit: [Twitter/ @SDBiju1](https://twitter.com/SDBiju1)

*(Subscribe to Science For All, our weekly newsletter, where we aim to take the jargon out of science and put the fun in. [Click here.](#))*

Scientists and researchers from the University of Delhi and the Zoological Survey of India have discovered a genus of tree frog found in the Andaman islands and the northeast.

Named after Sri Lankan taxonomist Rohan Pethiyagoda, the frogs of the new genus *Rohanixalus* are characterised by a rather small and slender body (size about 2 to 3 cm long), a pair of contrastingly coloured lateral lines on either side of the body, minute brown speckles scattered throughout the upper body surfaces, and light green coloured eggs laid in arboreal bubble-nests. Based on DNA studies, the new genus is also revealed to be a distinct evolutionary lineage from all previously known tree frog genera.

### New marine ornamental shrimp species discovered in Lakshadweep

“The scientists studied multiple aspects, such as the external morphology of adults and tadpoles, phylogeny, calls and breeding biology of several tree frog species widely distributed across South, Southeast and East Asia and confirmed that they represent a new genus,” said S.D. Biju of the University of Delhi, who led the study. Prof. Biju is India’s leading amphibian taxonomist and has discovered several species, genera and families of amphibians.

The details of the discovery were published in paper titled [‘New insights on the systematics and reproductive behaviour in tree frogs of the genus \*Feihyla\*, with description of a new related genus from Asia \[Anura, Rhacophoridae\]’](#) in the current issue of *Zootaxa*, a scientific peer reviewed journal for animal taxonomists. Scientists from Indonesia, Thailand and China have also contributed to the study.

### New coral species discovered on seabed marked for deep-sea mining

Prof. Biju said the *Rohanixalus* is the 20th recognised genus of the family Rhacophoridae that comprises 422 known Old World tree frog species found in Asia and Africa. He said there are eight frog species in this genus *Rohanixalus*, which are known to inhabit forested as well as human-dominated landscapes right from the northeast, the Andaman islands, Myanmar, Thailand, Malaysia, Indonesia, Vietnam, Laos, and Cambodia, up to southern China.

Another interesting aspect is that the first member of the tree frog family, *Rohanixalus vittatus* (Striped Bubble-nest frog), is reported from the Andaman islands. Researchers said though the amphibian fauna of the Andamans has been frequently surveyed in the recent years, this family was so far not reported, despite being commonly found in wayside areas of north and middle Andaman Islands.

### New butterfly species seen in Visakhapatnam district

“Our discovery of a treefrog member from Andaman Islands is unexpected and again highlights the importance of dedicated faunal surveys and explorations for proper documentation of biodiversity in a mega diverse country like India. This finding also uncovers an interesting new distribution pattern of tree frogs that provides evidence for faunal exchange between Andamans and the Indo-Burma region,” Prof. Biju said.

The genus has several unique behavioural traits including maternal egg attendance where the female (mother) attends the egg clutches until hatching and assists in release of the tadpoles into the water. During the first three days after egg laying, the female sits over the eggs and produces a gelatinous secretion with which she glazes the egg mass through clock-wise movement of her legs. This behaviour provides necessary moisture to the eggs laid on exposed leaf surfaces and protects them from insect predation.

Researchers during the field studies found a large number of egg clutches (over 50) of different developmental stages on a single leaf or plant. Multiple females usually attend such clutches in a behaviour termed as ‘community’ egg attendance. Frogs of the new genus along with the unique nesting behaviour also reported to display territorial behaviour and frequent male-male combats involving pushing, kicking and dislodging to successfully mate with a female.

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About 20% of pups in a group are sired by males from opposing groups, DNA analysis showed.

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## KABARTAL BECOMES BIHAR'S FIRST RAMSAR SITE

Relevant for: Environment | Topic: Environmental Conservation, Sustainable Development, and EIA

The Ramsar Convention is an international treaty for the conservation and wise use of wetlands.  
| Photo Credit: [Twitter/ @PrakashJavdekar](#)

Kabartal in Bihar's Begusarai district has been recognised as a wetland of international importance — the first such wetland in the state — under the Ramsar Convention, according to the Union Environment Ministry.

The Ramsar Convention is an international treaty for the conservation and wise use of wetlands. It is named after the Iranian city of Ramsar, on the Caspian Sea, where the treaty was signed on February 2, 1971.

“Pleased to inform that Bihar has got its first Ramsar site. Kabartal in Begusarai becomes wetland of International importance,” Union Environment Minister Prakash Javadekar tweeted. “It is an important wetland of the Central Asian Flyway for the population of migratory birds & biodiversity. With this now India has 39 Ramsar sites.”

The 39 Ramsar sites in India include

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## AN INDEPENDENT REGULATORY AGENCY WITH POWERS TO PENALISE POLLUTION CAN HELP

Relevant for: Environment | Topic: Environmental Pollution - Air, Water, Soil & E-waste

Every year as air pollution spikes in northern India around Diwali, the media is full of it. Various arms of the government and judiciary take notice and announce a flurry of activity. By February, the media attention disappears. It seems that nothing is achieved, pollution gets worse every year, and is not a solvable problem.

Actually, some progress has been made as a result of public and media attention and government actions, just not enough yet. And pollution is very much a solvable problem. It just cannot be solved on an emergency basis. It has to be dealt with firmly and gradually. If this is done, it can be brought down to developed-country levels within a few years.

Why gradually? Because there are many sources of pollution and it would be prohibitively costly to stop them or even significantly reduce them all at once (as the economic [recession](#) triggered by the [pandemic](#) and lockdowns has demonstrated). Although crop-burning and fireworks grab attention at this time of year, they are seasonal phenomena. The pollution during the entire winter and the lower but still deadly levels that persist through the summer are due to less seasonal sources. According to a comprehensive study by Chandra Venkataraman of IIT-Mumbai and other scientists, the biggest sources nationally are cooking fires, coal-fired power plants, various industries, crop residue burning, and construction and road dust. Vehicles are further down on the list. Cooking fires are the single largest source. Since particles diffuse with the air and are carried by winds, they do not stay in kitchens; they contribute to pollution throughout the country.

**Opinion | [Siddharth Singh, Hardik Siroha write: Without empowered footsoldiers, India cannot beat back air emergency](#)**

Dealing with all these sources will require a gradual replacement of existing technologies with new technologies. Smoky firewood, dung and crop residues that are burnt in kitchens all over rural India and some urban slums must be replaced with LPG, induction stoves, and other electric cooking appliances. Old coal power plants must be closed and replaced with wind and solar power and batteries or other forms of energy storage, while newer plants must install new pollution control equipment. No new coal-fired power plants should be built — with renewables being cheaper, coal is obsolete for power generation. Other industries that use coal will have to gradually switch over to cleaner fuel sources such as gas or hydrogen while becoming more energy efficient at the same time. Farmers will have to switch crops or adopt alternative methods of residue management. Diesel and petrol vehicles must gradually be replaced by electric or hydrogen fuel cell vehicles running on power generated from renewables.

The problem is that investments in all these technological changes, although hugely beneficial for the country as a whole, are often not privately profitable at present. Businessmen, farmers, or even people deciding on their choice of cooking fuel, can't make their business or everyday decisions based on "national interest". The good news is it is easy for governments to make clean investments more profitable and dirty investments less profitable. All that needs to be done is to tax polluting activities and subsidise clean investments.

Our existing laws do not allow the central and state pollution boards to levy pollution fee or cess based on pollution emissions. Instead, they have to issue regulations, and then close down

industries that don't comply. Since closing down an industry is a drastic step, it almost never happens.

**Explained: [As pollution peaks in Delhi, a look at pollutants you should be worried of](#)**

The judiciary is more powerful but has far less scientific and technical competence. It does not have even the few scientific and technical staff available to our under-funded pollution control boards — it has no capacity to conduct pollution monitoring or scientific studies or even evaluate the results. It tends to act only during crises and focus on past mistakes rather than planning to prevent new ones.

One great advantage of having a regulatory agency (let us call it an Environmental Protection Agency or EPA) that can levy pollution fee or cess, is that the regulatory decision need not be an all-or-nothing decision. Pollution fees can start small, and the EPA can announce that they will rise by a certain percentage every year. This gives businesses time to adjust — they will then find it profitable to make new investments in non-polluting technologies.

Fees should be levied where the production chain is most concentrated. For example, a fee on plastic production at refineries (refunded if plastic is recovered, that is, a fee on non recycled plastic), since it is very costly to monitor small producers and retailers of plastic bags; a fee on fly ash or sulphur dioxide emitted by coal power plants, and a fee on coal use (to cover small coal users whom it is not cost-effective to monitor individually), a fee on diesel at refineries (since it is not practical to monitor pollutants from individual vehicles and pumpsets), etc.

The EPA has to be given some independence — a head appointed for a five-year term removable only by impeachment, a guaranteed [budget](#) funded by a small percentage tax on all industries, and autonomy to hire staff and to set pollution fees after justification through scientific studies. Otherwise, its announcement of a gradually rising pollution fee will not be believed and won't spur investment in new clean technologies. The revenue from the fee should be paid to the government that can use it any way it likes, perhaps by paying it out to affected industries so that they can upgrade their technologies. EPA independence will mean that political lobbying by affected industries to stop pollution fees won't work. Instead, political lobbying will be diverted to getting a piece of the pollution fee revenue.

**Editorial | [Dealing with bad air during pandemic will call for concerted effort by Delhi and neighbouring states, not band-aid solutions](#)**

A major attraction of an independent EPA for politicians in power is that they can pass on the blame for decisions on pollution fees to the EPA. A second major attraction is that pollution fees raise revenue for the government. If the law establishing an independent EPA is written to require that changes to pollution fees and regulations must be published in advance, and cannot involve abrupt changes, then nasty surprises are avoided and industry opposition will be muted, especially if industry gets a piece of the revenue to invest in new technologies.

The PM Ujjwala Yojna that increased LPG access has made a big difference to the pollution from cooking fires although there is still a long way to go. The BS-VI regulations will reduce vehicular pollution over the next decade. We need to create the institutions that will multiply these successes. Our pollution problem has taken decades to grow into the monster that it is. It can't be killed in a day. We need the scientific and technical capacity that only a securely funded independent EPA can bring to shrink pollution down to nothing.

***This article first appeared in the print edition on November 16, 2020 under the title 'How to end pollution'. The writer is Professor, Economics and Planning Unit Head Centre for***

research on the Economics of Climate, Food, Energy, and Environment at the Indian Statistical Institute

Editorial | [A new body is no silver bullet to clear Delhi's air. Without measures at ground level, it could mean more of the same](#)

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# LONAR LAKE, SUR SAROVAR DECLARED AS RAMSAR SITES

Relevant for: Environment | Topic: Environmental Conservation, Sustainable Development, and EIA

The Lonar Lake was created by meteorite impact. | Photo Credit: [Special Arrangement](#)

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India has 41 wetlands, the highest in South Asia, with two more added to the list of recognised sites of international importance under the treaty of Ramsar Convention.

The Lonar lake in Maharashtra and Sur Sarovar, also known as Keetham lake, in Agra, have been added to the list of recognised Ramsar sites.

The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat is a treaty for conservation and sustainable use of such sites. It is named after Ramsar, the Iranian city where the treaty was signed in 1971, and places chosen for conservation under it are given the tag 'Ramsar site.'

Happy to note that India has added two more Ramsar sites.

Lonar lake in Maharashtra, the only crater lake of Country.

Sur Sarovar, also known as Keetham lake, in Agra.

Wetlands are the world's natural water filters & one of the most productive ecosystem on the planet. [pic.twitter.com/SCSJypHusB](https://pic.twitter.com/SCSJypHusB)

Recently, [Kabartal in Bihar's Begusarai district was recognised as a wetland of international importance](#), the first such wetland in the State, under the Ramsar Convention, according to the Union Environment Ministry.

The Asan Conservation Reserve in Dehradun, the first wetland from Uttarakhand to be recognised by Ramsar convention, was added to the list in October this year.

The other 38 Ramsar sites in India include

The convention, signed in 1971 in the Iranian city of Ramsar, is one of the oldest inter-governmental accord for preserving the ecological character of wetlands.

Lonar lake in Maharashtra's Buldhana district turned pink due to 'Haloarchaea' microbes: probe

Also known as the Convention on Wetlands, it aims to develop a global network of wetlands for conservation of biological diversity and for sustaining human life. Wetlands provide a wide range of important resources and ecosystem services such as food, water, fibre, groundwater recharge, water purification, flood moderation, erosion control and climate regulation.

Over 170 countries are party to the Ramsar Convention and over 2,000 designated sites

covering over 20 crore hectares have been recognised under it.

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Ornamental fish industry to get a boost

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# GREENLAND'S LARGEST GLACIERS LIKELY TO MELT FASTER THAN FEARED: STUDY

Relevant for: Environment | Topic: Environmental Degradation - GHGs, Ozone Depletion and Climate Change

In this Aug. 16, 2019 file photo, icebergs float away as the sun rises near Kulusuk, Greenland. | Photo Credit: [AP](#)

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The three largest glaciers in Greenland — which hold enough frozen water to lift global sea levels some 1.3 metres — could melt faster than even the worst-case warming predictions, research published Tuesday showed.

Until 2000, the main driver of sea level rise was melting glaciers and the expansion of ocean water as it warms. But over the last two decades, the world's ice sheets atop Greenland and Antarctica have become the single largest source of sea level rise.

**Also read:** [Record melt: Greenland lost 586 billion tonnes of ice in 2019](#)

A team of researchers based in Denmark and Britain used historical images and a host of other data to estimate how much ice had been lost from Greenland's Jakobshavn Isbrae, Kangerlussuaq Glacier and Helheim Glaciers in the 20th century.

They found that Jakobshavn Isbrae lost more than 1.5 trillion tonnes of ice between 1880-2012, while Kangerlussuaq and Helheim lost 1.4 trillion and 31 billion tonnes from 1900–2012, respectively.

The ice melt has already contributed more than eight millimetres to global sea levels, the researchers wrote.

Shfaqat Abbas Khan, a researcher at the Technical University of Denmark, said using photographs taken before the satellite era was another tool to help recreate the last century's ice loss. "Historical measurements over the 19th and 20th century may hide important information that can significantly improve our future projections," he told *AFP*.

Ice loss to add 0.4 degrees Celsius to global temperatures: study

The UN's climate science advisory panel, the IPCC, has forecast sea level rise from all sources of between 30-110 centimetres by 2100, depending on emissions. Under the IPCC's high emissions pathway, known as RCP8.5, nothing is done to curb carbon pollution throughout the 21st century, leading to a climate more than 3 degrees C hotter than pre-Industrial levels.

Models ran under RCP8.5 for the three glaciers featured in Tuesday's study predict a sea-level rise of 9.1-14.9 mm by 2100.

But [the paper](#), published in *Nature Communications*, pointed out that the high-emissions pathway temperature increase was more than four times larger than during the 20th Century, when the three glaciers already added 8 mm to seas. "The worst-case scenario is underestimated. Ice loss may be anywhere from three or four times larger than previous

predicted for the three glaciers considered in this study,” said Khan.

A *Nature* study published in September found that if greenhouse gas emissions continued unabated, ice sheets in Greenland will shed some 36 trillion tonnes this century, enough to lift the global waterline some 10 centimetres.

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# **NATIONAL DISASTER RESPONSE FORCE (NDRF) FULLY PREPARED FOR CYCLONIC STORM "NIVAR"**

Relevant for: Environment | Topic: Disaster and disaster management

Cyclonic Storm "NIVAR" is centred about 380 km East-Southeast of Puducherry and 430 km Southeast of Chennai. Cyclone "NIVAR" is very likely to intensify further into a severe cyclonic storm during the next 12 hours and is very likely to cross Tamil Nadu and Puducherry coasts between Karaikal and Mamallapuram around Puducherry during late evening of 25th November, as a severe cyclonic storm, with a wind speed of 100-110 kmph gusting to 120 kmph.

A close watch is being kept over the system. National Disaster Response Force (NDRF) HQ and Commandants of battalions located at Tamil Nadu and Andhra Pradesh are in coordination with the respective state authorities. In view of the India Meteorological Department (IMD) forecast and requirements projected by the state authorities, 22 teams (12 teams in Tamil Nadu, 03 teams in Puducherry and 07 teams in Andhra Pradesh) have been pre-positioned at likely affected areas. Teams have been kept reserve at Guntur (Andhra Pradesh), Thrissur (Kerala) and Mundli (Odisha) to meet additional requirements.

All teams have reliable wireless and satellite communications, tree cutters/ pole cutters for post landfall restoration, if need arises. In view of the current COVID-19 scenario, NDRF teams are equipped with appropriate PPEs.

NDRF is working in close coordination with district and local administrations. Awareness programmes are being conducted for all citizens in the form of information about cyclones, do's and don'ts and information about COVID-19 in affected areas and prevention measures. All deployed teams are assisting the local administration in evacuation of people from areas that are likely to be affected by the cyclone. NDRF is spreading a sense of security amongst the communities that teams are available at their service and will remain present in the area until the situation returns to normal, so that the public does not panic.

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## **NW/RK/PK/AD/DDD**

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# STORM WARNINGS: THE HINDU EDITORIAL ON WEATHER FORECAST

Relevant for: Environment | Topic: Disaster and disaster management

[Cyclone Nivar](#) raised fears of another epic disaster for millions of coastal residents in the south, but its [passage overland near Puducherry](#) early on November 26 was less destructive than anticipated. The reported [loss of at least three lives](#) is a relatively low toll for such a large-scale weather system, although property and agriculture have suffered considerable damage from the fierce winds and massive volume of rain it dumped in Tamil Nadu and Puducherry. Citizens and the government were fearful of a deluge that could be a repeat of the [2015 flood](#) — which killed a few hundred people — and they overcame COVID-19 fatigue to prepare for the worst. There was also a welcome emphasis on periodic alerts and warnings. The [IMD has been getting better at forecasting](#) slow-moving, linear tropical cyclones in the Bay of Bengal, and multiple satellites now provide cyclone data. The [deployment of over two dozen NDRF teams](#) and disaster management equipment along the coast reassured civic agencies. Not everyone escaped Nivar with a minor penalty, however, and for suburban Chennai, the peak one-day rainfall of 31 cm in Tambaram wrought destruction mirroring what happened five years ago; smaller inland towns have also suffered inundation and severe losses. The aftermath now presents an opportunity to make a full assessment not just for distribution of relief but also to understand the impacts of extreme monsoon weather.

The Tamil Nadu government has shown alacrity in handling the acute challenge of a severe weather event, which has occurred in the run-up to the Assembly election due early next year. Chief Minister Edappadi K. Palaniswami made field visits, and in parallel, the DMK, as the lead Opposition, mounted its own relief operations. What must worry the two major parties is that periodic papering of the cracks does not offer a sustainable solution to Chennai's evident civic decay. There is extensive documentation on the [loss of its floodplains, lakes and peri-urban wetlands](#) to encroachment, a key factor that is exacerbating monsoon flooding. This land grab is made possible by the benign indulgence of successive governments. What is more, governments have not shown the rigour to collect and publish data on annual flooding patterns, and measure the peak flows in the neglected rivers and canals to plan remedies. Appalling indifference to land use norms has spawned an amorphous housing sector characterised by inflated, speculative prices but no foundation of civic infrastructure. To keep Tamil Nadu competitive, governments and local bodies should hardwire urban planning and invest heavily for a future of frequent disruptive weather.

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