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# GROSS GREEN VIOLATIONS IN SUNDARBANS: CAG

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

A view of Ghoramara island after high tide. File photo

A recent audit report of the Comptroller and Auditor General (CAG) has pointed out illegal construction and violations of environmental norms in two Ramsar sites in West Bengal, the East Kolkata Wetlands (EKW) and the Sunderbans.

“There were illegal constructions in the EKW and Coastal Regulation Zone area in Sunderbans. However, such violations even in these ecologically fragile areas were rarely found to have been penalised; on a couple of rare occasions, (when) they were done, it was in compliance with the Kolkata High Court’s orders,” the CAG report said.

The report was made public in the last week of March before the West Bengal Legislative Assembly. The EKW, a unique peri-urban ecosystem that lies on the eastern fringes of Kolkata, covers an area of about 12,500 hectares. It is spread over 37 *mouzas* of the State’s South and North 24 Parganas districts. The CAG report pointed out that failure to delineate boundaries of the EKW and uncontrolled transfer of land resulted in its change of character and lack of effective action by the EKWMA (East Kolkata Wetland Management Authority).

“In absence of effective measures by EKWMA, waterbodies were dried up and filled illegally. Since 2007, EKWMA has identified 357 cases of violation, out of which 101 cases were identified between December 2015 and March 2020,” the audit said .

## Hovercraft station

The CAG has also raised a red flag about a hovercraft station in Frazerganj in South 24 Parganas district. “Indian Coast Guard applied (September 2017) for setting up a hovercraft station in Frazerganj,” the CAG stated. According to the site plan, ICG would construct a guard room, officer’s mess and accommodation, park, fuel bunk, sailors’ institute, holiday home and a play ground.

“CRZ notification disallows construction of residential buildings in the No Development Zone. CRZ clearances by the West Bengal State Coastal Zonal Management Authority for constructions of buildings ... was against the notification,” the report stated. The audit report points at a delay in the coastal zone management plan (CZMP), construction of multi-purpose cyclone shelters without clearances of CRZ norms and construction of three helipads and VIP rest houses in ecologically sensitive areas in the Sunderbans.

The CAG report has highlighted serious violations of CRZ norms in the Sunderbans particularly for an ecotourism project at Jharkhali. “The West Bengal government had undertaken (October 2015) a project of an ecotourism hub after clearing 69 acres of mangrove. Even the river channel, breeding place of crocodiles, was claimed by the project,” the report said.

There were illegal constructions in the EKW and Coastal Regulation Zone area in Sunderbans. However, such violations even in these ecologically fragile areas were rarely found to have been penalised.

CAG report

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# DRY SPELL SPARKS WILDFIRES ACROSS HIMACHAL

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

Tough to control: Smoke rises from a forest fire on a hill near Dharamshala in Himachal Pradesh. APAP

The prolonged dry spell coupled with unusually high temperatures in recent days has triggered many wildfires in Himachal Pradesh, destroying several hectares of forest cover across many parts of the hill State.

The early onset of summer this year in the hills posed a major challenge to the State government's efforts to control forest fires and with dry weather conditions and high temperatures expected to continue, the task has become more difficult.

## 719 incidents

According to government data, till April 28 this year, as many as 719 incidents of forest fires have been reported across the State, affecting close to 5,662 hectares under forest circles of Shimla, Chamba, Bilaspur, Dharamshala, Hamirpur, Kullu Mandi, Rampur, Nahan and the Great Himalayan National Park at Shamshi in the Kullu region. The estimated loss so far has been pegged at around Rs. 1.40 crore.

In 2018-19, the State witnessed as many as 2,544 forest fire incidents while in 2019-20 the figure was down to 1,445. In 2020-21, there were 1,045 forest fire incidents and in 2021-22 as many as 1,275 fire instances were reported.

"We are witnessing a prolonged dry spell this year; there's hardly any moisture in the soil. High atmospheric temperature and dryness offer favorable circumstances for a fire to start in the forest. The unusually warm weather is a big reason for the spurt in fires," Ajai Srivastava, Principal Chief Conservator Forest with the Forest Department told *The Hindu*.

"The maximum number of forest fires are human-generated — many accidental but a few deliberate ones. In several areas, there is a practice of burning the pasture lands to get rid of the dry leaf litter to ensure fresh grass growth for livestock. Usually, when there is intermittent rainfall, such fires do not go out of control but when there's prolonged dry weather, many of these fires go out of control," Mr. Srivastava explained.

"We are taking all necessary steps to curb fire incidents. The challenge is big in the hills as the mountainous terrain makes it very difficult to control fires. Reaching the site of forest fires which are often away from a roadhead is a difficult task, but at most places where the fire incidents have occurred, the situation is under control. We regularly sensitise people and seek their help in forest fire control and management," he said.

## Rains unlikely

Immediate relief from the raging fires and billowing smoke is unlikely as the dry weather is expected to continue prevailing for at least the next fortnight. According to India Meteorological Department (IMD), the maximum and minimum temperatures have been hovering appreciably above normal in most parts of the State and the trend is unlikely to change anytime soon.

"Since mid-March, the average maximum temperature has been 4-5 degrees Celsius above

normal while the average minimum temperature has been 2-3 degrees Celsius above normal at many places of Himachal Pradesh. This trend is expected to continue in the coming days as well. Both the maximum and minimum temperatures have been abnormally higher this year over a month," said Surinder Pal, director at IMD, Shimla.

"There's no chance of a widespread rainfall in the next fortnight at least. Scattered thundershowers are expected but dry conditions would prevail and largely the temperature is likely to be above normal," he said.

Himachal Pradesh spans 55,673 sq km, of which 37,033 sq km are classified as forest — about 66% of the geographical area of the State.

These forests are broadly classified into coniferous and broad-leaved forests. Forests of pines are very prone to fires, especially during the summer due to the shedding of highly inflammable pine needles.

### **Vulnerable areas**

"Around 15% of area across the State is vulnerable to forest fires and pine forests are more susceptible," said Anil Sharma, Chief Conservator of Forest with the State Forest Department.

According to a recent Parliamentary Committee report on 'Forest Fires and its effect on environment, forests, biodiversity and wildlife and remedial-preventive measures', in Himachal Pradesh, the forests are sometimes also burnt to conceal illicit felling and illicit resin tapping and encroaches and poachers also cause forest fires.

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## EXPLAINED

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

A man cools off from tap water during a hot summer day, on the outskirts of Jammu on April 30, 2022. | Photo Credit: PTI

The story so far: India is in the throes of an [unusually long series of heatwaves](#) that [began in the end of March](#) and scorched north India for most of April. The India Meteorological Department (IMD) said [April was the hottest](#) in northwest India in 122 years. It has also been an unusually hot April— with temperatures touching above 40 degree Celsius – in large parts of Bihar, Jharkhand and West Bengal.

Records from IMD suggest that the average maximum temperature till April 27 was 35.7 degree Celsius, the highest in five years for this month. In Madhya Pradesh, Rajasthan, Punjab, and Gujarat, the average maximum temperature in April 2022 so far has been the highest since 1951; while it has been the second highest in Delhi, Uttar Pradesh, and Haryana. In most of these States, the temperature has been consistently above 42 degree Celsius and around 5-6 degrees above normal for this time of the year.

Latest IMD forecasts say heat wave conditions prevail in many parts of Punjab, northwest Rajasthan and Vidarbha, Maharashtra. It's also unusually hot in parts of Himachal Pradesh, west Madhya Pradesh, Jharkhand, Bihar, Gangetic West Bengal and Odisha. Maximum temperatures were 43-46 degree Celsius over most parts of Rajasthan, Vidarbha, Madhya Pradesh and east Uttar Pradesh, in many parts of Gujarat and interior Odisha; in some parts of Madhya Maharashtra and in isolated pockets of Bihar, Jharkhand, interior Gangetic West Bengal and 40-43 degree Celsius over most parts of Haryana-Delhi, Punjab and in isolated pockets of west Uttar Pradesh, Chhattisgarh, Marathwada, Telangana and Rayalaseema.

These scorching conditions are expected to continue until the middle of next week until, the agency says, a western disturbance from West Asia brings rain to parts of north and north-western India. While it is not unusual for the latter half of April to be dry and hot in most of north, west and central India, this year is unusual in that this follows the warmest March in 121 years with the maximum temperature across the country nearly 1.86 degree Celsius above normal.

A heatwave is declared when the maximum temperature is over 40 degree Celsius and at least 4.5 notches above normal. A severe heatwave is declared if the departure from normal temperature is more than 6.4 degrees, according to the IMD. Based on absolute recorded temperatures, a heatwave is declared when an area logs a maximum temperature of 45 degree Celsius. A severe heatwave is declared if the maximum temperature crosses 47 degrees.

The heat-trapping consequences of global warming imply that climate extremes such as heatwaves are expected to rise in frequency. Instances of extreme rainfall, as well as longer rainless spells are expected, according to assessments by the Intergovernmental Panel on Climate Change.

The main reason for the scorching heat in the northern parts of the country is lack of rainfall. Usually, periods of high temperature are punctuated by periodic episodes of rain but this was largely absent during March and April. Ironically, April also saw maximum instances of extreme rainfall since 2018 though it was concentrated in the south and north-eastern India. The rain-bearing western disturbances originate because of temperature gradients between the northernmost parts of the globe and the latitudes passing through West Asia. Weaker gradients

mean weaker rains. This March and April, cooler than normal conditions in the Pacific Ocean failed to aid rainfall in north India.

Research through the years shows that the number of [heatwave days in India](#) is increasing every decade. From 413 in 1981-90 to 575 in 2001-10 and 600 in 2011-20, the number of days that see extremely hot days is persistently increasing at 103 weather stations. Some parts along eastern India, such as Andhra Pradesh, Telangana and Odisha, also register higher humidity along with high temperatures, leading to a rise in a condition called 'wet bulb' temperature, that at its mildest can cause extreme discomfort and at its worst cause dehydration and death.

Heatwaves have killed more than 17,000 people in 50 years in India, according to a research study by IMD scientists. However, the intensity and length of heatwaves don't have a direct connection to India's monsoon that sets in over Kerala in June.

Over the years, forecast systems have improved that allow heatwave warnings to be disseminated via electronic channels and phones instantaneously. Many State governments across the country have declared school holidays; some have highlighted the dangers of working outdoors during the day. Many State governments award monetary compensation for deaths linked to heatwaves.

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# CLIMATE CHANGE MAY INCREASE RISK OF NEW INFECTIONS

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

Over 3,000 mammal species might migrate and share viruses for next 50 years, if the world warms by 2°C. | Photo Credit: Getty Images

Climate change will result in thousands of new viruses spread among animal species by 2070 and that is likely to increase the risk of emerging infectious diseases jumping from animals to humans, according to a new study.

This is especially true for Africa and Asia, continents that have been hotspots for deadly disease spread from humans to animals or vice versa over the last several decades, including the flu, HIV, ebola and COVID-19.

Researchers, who published their findings on April 28 in the journal *Nature*, used a model to examine how over 3,000 mammal species might migrate and share viruses over the next 50 years if the world warms by 2°C, which recent research shows is possible.

They found that cross-species virus spread will happen over 4,000 times among mammals alone. Birds and marine animals were not included in this study.

Researchers said that not all viruses will spread to humans or become pandemic like the scale of the coronavirus but the number of cross-species viruses increases the risk of spread to humans. The study highlights two global crises, climate change and infectious disease spread.

Previous research has looked at how deforestation, extinction and wildlife trade lead to animal-human disease spread, but there is less research about how climate change could influence this type of disease transmission., the researchers said at a media briefing on Wednesday.

“We don’t talk about climate a lot in the context of zoonosis — diseases that can spread from animals to people,” said study co-author Colin Carlson, an assistant professor of biology at Georgetown University. “Our study brings together the two most pressing global crises we have,” he said.

Daniel R. Brooks, a biologist at University of Nebraska State Museum and co-author of the book *The Stockholm Paradigm: Climate Change and Emerging Disease*, said the study acknowledges the threat posed by climate change in terms of increasing risk of infectious diseases.

“This particular contribution is an extremely conservative estimate for potential emerging infectious disease spread caused by climate change,” said Brooks.

Aaron Bernstein, a pediatrician and interim director of The Centre for Climate, Health, and the Global Environment at Harvard T.H. Chan School of Public Health, said the study confirms long-held suspicions about the impact of global warming on infectious disease emergence.

“The study indicates that these encounters may already be happening with greater frequency and in places near where many people live,” Bernstein said.

Study co-author Gregory Albery, a disease ecologist at Georgetown University, said that

because climate-driven infectious disease emergence is already happening, the world should be doing more to learn about and prepare for it.

Jaron Browne, organising director of the climate justice group Grassroots Global Justice Alliance, said the study highlights climate injustices experienced by people living in African and Asian nations.

"African and Asian nations face the greatest threat of increased virus exposure, once again illustrating how those on the frontline of the crisis have very often done the least to create climate change," Browne said.

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## MINT

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

In the next 50 years, we are likely to witness over 15,000 new cases of mammals transmitting viruses to other mammals - the reason is climate change! A recently published article in the scientific journal [Nature](#) analyses global warming will shift wildlife habitats and increase encounters between species capable of swapping pathogens

The COVID-19 pandemic probably started when a previously unknown coronavirus passed from a wild animal to a human. The experts now warn that a predicted rise in viruses jumping between species could trigger more outbreaks, posing a serious threat to human and animal health alike.

"Climate change is "creating innumerable hotspots of future zoonotic risk - or present day zoonotic risk - right in our backyard. We have to acknowledge that climate change is going to be the biggest upstream driver of disease emergence, and we have to build health systems that are ready for that," pointed out the study's co-author Colin Carlson, a global change biologist, as quoted by Nature.

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## EXPLAINED

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

Photo for representation | Photo Credit: Getty Images/iStockphoto

**The story so far:** Astronomers and sky enthusiasts marked the 2022 International Dark Sky Week from April 22-30. Hundreds of events were conducted across the globe where participants came together to learn astrophotography, take night walks, and observe the night sky without light pollution and learn how it negatively impacts our ecosystem.

The International Dark Sky Week is an annual event hosted by the International Dark-Sky Association (IDA).

“International Dark Sky Week provides a wonderful opportunity for people to discover value and beauty in the dark. It’s a great time to connect with the night and learn about what is at stake if light pollution continues to increase,” IDA’s communications manager Lauren Scorzafava said.

The event aims to raise awareness about the negative impact of light pollution and celebrate the night sky.

According to IDA, outdoor artificial lighting at night can disrupt wildlife, impact human health, waste money and energy, contribute to climate change, and block views of the universe — when used indiscriminately. Light pollution is increasing at twice the rate of population growth and 83% of the world’s population lives under the light-polluted sky, the organisation added.

Here are a few glimpses of how sky enthusiasts celebrated the International Dark Sky Week.

A post shared by Babak Tafreshi (@babaktafreshi)

A post shared by Southland | New Zealand (@southland.nz)

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## MINT

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

The most worrying weather measurement is not the heat typically reported in forecasts but the wet-bulb temperature

New Delhi feels like it is on fire. The heat comes off the road in blistering waves, and the water that flows from the cold tap is too hot to touch. Daytime temperatures have hit 44 degrees Celsius (111 Fahrenheit) and often do not fall below 30 in the night. A giant landfill on the outskirts of the capital spontaneously combusted a week ago, and the 17-story high dump that contains millions of tons of garbage continues to smolder, worsening the city's already dangerously polluted air.

Daily power outages driven by a surge in demand for electricity have resulted in blackouts as long as eight hours in some parts of India, while coal stocks — the fuel that accounts for 70% of the country's electricity generation — are running low, prompting warnings of a fresh power crisis. The northern wheat crop is scorched. It was the the hottest March in 122 years. Spring just didn't happen, and those extreme temperatures continued into April and May (though they are predicted to ease this week). Still, it's not until June that the monsoon is expected to arrive and provide any kind of relief.

What's most alarming about this [heatwave](#) is that it's not so much a one-time ordeal as a taste of things to come as the effects of global warming push India and its neighbors to levels where the climate is a core threat to human health.

The most worrying weather measurement is not the heat typically reported in forecasts but the wet-bulb temperature, which combines heat and humidity to indicate how much evaporation can be absorbed into the air. At wet-bulb temperatures above 35 degrees Celsius, we become unable to reduce our temperature via sweating and will suffer potentially fatal heatstroke after only a few hours, even with shade and water. Similar effects can result for those working outdoors when wet bulb temperatures exceed 32 degrees, and measures as low as 28 degrees caused tens of thousands of deaths in the European and Russian heatwaves of 2003 and 2010.

Humidity falls as temperature rises, so such events were once thought to be extraordinarily rare. One 2018 study concluded that the most severe temperatures of close to 35 degrees "almost never occur in the current climate." In fact, closer analysis of data from weather stations done in 2020 suggests they're already happening relatively frequently, particularly in the heavily populated belt from the Persian Gulf through Pakistan and northwest India.

Just 12% of India's 1.4 billion citizens have access to air conditioning, which means hundreds of millions of people are simply unable to cool themselves when their bodies reach the point of heatstroke. It's a situation mirrored in neighboring Pakistan, which is experiencing similarly catastrophic heatwave conditions. Daily wage earners, who toil in the fields, work in factories and construction, sweep streets and build roads, have no escape.

Multiple regions of India have already been edging close to critical wet-bulb temperatures over the past week, according to government data, though the maximum humidities haven't necessarily been occurring at the same time as the peak temperatures. In the eastern Odisha state, peak temperatures and humidities in parts of the capital Bhubaneswar on Sunday would have produced wet-bulb temperatures of 36.6 Celsius if they happened at the same time, the

data show. Kolkata, a city larger than Los Angeles or London, also saw conditions last Friday that would have hit 35 Celsius if simultaneous.

The risk is that, even if the most hazardous levels are avoided in the current heatwave, each hot season is a fresh roll of the dice on whether a freak event will occur that will lead to vast numbers of deaths. The odds lengthen with each passing year. The world is currently in the grip of a La Nina climate cycle, which typically brings cooler summer weather to India. When that next flips to El Nino, the risks will ramp higher still.

That the government hasn't declared a national disaster and rolled out an appropriate response will come as no surprise to those who lived through the nation's deadly Covid-19 epidemic.

India does have a "National Action Plan on Heat Related Illnesses," and the federal government on May 1 issued an advisory to states urging them to ensure hospitals were ready to deal with an expected surge in demand. But given that the India Meteorological Department (which started collecting nationwide records in 1901) has been raising the alarm with heat wave warnings on April 25, it all feels a little underdone. Recommended measures such as whitewashing roofs to cool building interiors would be insufficient to deal with a major heatwave. Advice to ensure secure power supply to health centers won't help if heat and the load from millions of air conditioners cause the power grid to fall over when it's most needed.

A year ago, India was reeling from a deadly Covid-19 wave as citizens took to social media to beg for oxygen and hospitals turned away critically ill people gasping for breath while the underfunded health system collapsed under the weight of decades of government neglect. The World Health Organization estimates at least 4 million Indians died in that carnage, way beyond the official figure of just under 524,000 fatalities. (The government of Prime Minister Narendra Modi disputes that finding, even though it has been replicated by other experts.)

We'll never know, as the majority of deaths aren't recorded in the world's largest democracy. So many of those who expire from the heat, dying on the baking pavements they sleep on or in the unbearably hot slums on the city's fringes, will similarly go uncounted. That means governments, state and federal, will never properly plan for heatwaves, nor will they invest in the infrastructure and systems needed to provide relief and help reduce the intensity of these climate change-driven disasters. With a warming planet and the increasing intensity of extreme weather events, that has to change.

*This column does not necessarily reflect the opinion of the editorial board or Bloomberg LP and its owners.*

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## MINT

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

Experts at the Kenya-based United Nations Environment Programme (UNEP) has raised an alarm marking the worrisome rate at which sand is getting depleted from the face of Earth.

Sand is deemed the most-extracted solid material in the world, and the second-most used global resource behind water. However, sand's use is largely unregulated.

Unregulated extraction of sand has created a huge gap in the utilisation and generation process. Sand takes thousands of years of geological processes to form and its consumption has been faster than that.

"We now find ourselves in the position where the needs and expectations of our societies cannot be met without improved governance of sand resources," Sheila Aggarwal-Khan, director of the Economy Division at UNEP said in the report's foreword. "If we act now, it is still possible to avoid a sand crisis."

Sand is globally used in glass, concrete and construction materials. Reports suggest the consumption has almost tripled in the past two decades. It has reached 50 billion tonnes a year, or about 17 kilogrammes per person each day, confirmed the reports.

This over consumption has resulted in harming rivers and coastlines and even wiping out small islands.

### Formation of Sand

According to National Oceanic and Atmospheric Administration (NOAA) of the US Department of Commerce, sand forms when rocks break down from weathering and eroding over thousands, and even millions of years. Rocks take time to decompose, especially quartz (silica) and feldspar.

Often starting thousands of miles from the ocean, rocks slowly travel down rivers and streams, constantly breaking down along the way, the NOAA said.

The tan colour of most sand beaches is the result of iron oxide, the agency added.

### Importance of Sand

Sand is the most used material in the world. Whether it's about building concrete structures, walls of even glass, sand is used everywhere. Due to increased consumption, riverbeds and beaches are being stripped of sand, resulting in an environmental crisis.

Sand performs key role in regulating the environment - by protecting from storm surges, acting as a habitat for a number of species and even protecting against erosion.

Unregulated use of sand will disturb ecologically sensitive areas and put stress on biodiversity.

### UNEP report on Sand shortage

The report, released last week, called for urgent action to avert a "sand crisis," including a ban

on beach extraction.

UNEP's Pascal Peduzzi who coordinated the report written by 22 authors said that some of the impacts of over-exploitation were already being felt. In the Mekong River - the longest in Southeast Asia - sand extraction was causing the delta to sink, leading to salinisation of previously fertile lands.

In a Sri Lankan river, sand removal had reversed the water flow, meaning that ocean water was heading inland and bringing salt-water crocodiles with it, he told journalists.

Finally, removing sand from coastal areas can make coastlines more vulnerable to the impact of climate change, such as more powerful storms, according to the report.

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# SMOG TOWERS NOT FINAL SOLUTION TO POLLUTION, SAYS CENTRAL POLLUTION CONTROL BOARD OFFICIAL

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

Delhi's second smog tower launched near the Anand Vihar metro station. File | Photo Credit: MOORTHY RV

Technologies such as smog towers are interventions that are still being tested and are not a final solution to the problem of pollution, Prashant Gargava, Member Secretary, Central Pollution Control Board (CPCB), said at a webinar on Wednesday.

The ultimate solution to pollution would be controlling it at source. Technological interventions would at best give insight on how long these could be used to address pollution spikes, he stated.

To address Delhi's exorbitant winter level pollution, smog tower — that consists of a large fan, housed in a tower to suck in polluted air and then have it pass through multiple particulate matter filters, was proffered as a solution.

A pilot project worth 20 crore was commissioned in Delhi following a Supreme Court order and was inaugurated by Delhi Chief Minister Arvind Kejriwal on August 23, 2021. Initial reports by the Delhi government claimed a reduction of as much as 80% in pollution but several experts have since measured and reported that the pollution reductions are half that and that too only in the immediate proximity of the tower.

While the Delhi government has committed to monitoring its performance every month, no reports have so far been made public. Experts from the Indian Institute of Technology Mumbai are studying the tower's efficiency at different distances and are expected to report numbers to the Delhi government.

Mr. Gargava noted that only after certain technologies were proven to be demonstrably successful would decisions be made on scaling them or deploying in other cities.

The Central government has a National Clean Air Programme that covers 132 cities, which do not meet the prescribed national ambient air quality standards (NAAQS). These cities have been identified based on the ambient air quality data obtained during the 2011-2015 period under the National Air Monitoring Programme.

Delhi is expected to get over 18 crore from the Centre under the NCAP to cater to critical gaps in air pollution management.

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# PRIME MINISTER ADDRESSES INAUGURAL SESSION OF FOURTH EDITION OF THE INTERNATIONAL CONFERENCE ON DISASTER RESILIENT INFRASTRUCTURE

Relevant for: Environment | Topic: Disaster and disaster management

The Prime Minister, Shri Narendra Modi addressed the inaugural session of the fourth edition of the International Conference on Disaster Resilient Infrastructure via video message today. The session was also addressed by the Hon. Scott Morrison MP, Prime Minister of Australia, H.E. Nana Addo Dankwa Akufo-Addo, President of Ghana, Hon. Fumio Kishida, Prime Minister of Japan and H..E. Andry Nirina Rajoelina, President of Madagascar.

At the outset, Prime Minister Modi reminded the gathering that the solemn promise of the Sustainable Development Goals is to leave no one behind. "That is why, we remain committed to meeting the needs of the poorest and the most vulnerable by building the next generation infrastructure to realize their aspirations", he said. The Prime Minister said that infrastructure is about people and providing them high quality, dependable, and sustainable services in an equitable manner. "People must be at the heart of any infrastructure growth story. And, that is exactly what we in India are doing", he said.

As India is scaling-up the provision of fundamental services in India in the areas of education, health, drinking water, sanitation, electricity, transport and much more, said the Prime Minister, "We are also tackling climate change in a very direct way. That is why, at COP-26 we have committed to attain 'Net Zero' by 2070, in parallel with our developmental efforts."

The Prime Minister talked about the importance of infrastructure in unleashing the human potential and said that damage to infrastructure leads to lasting damage for generations. In the context, the Prime Minister asked "with modern technology and knowledge at our disposal, can we create resilient infrastructure that is built to last?" Recognition of this challenge under-pins the creation of the CDRI, he said. He also noted that the coalition has expanded and made valuable contributions. He mentioned the initiative on 'Infrastructure for Resilient Island States' that was launched at COP-26 and CDRI's work on Resilient Airports studying 150 airports around the world. The 'Global Assessment of Disaster Resilience of Infrastructure Systems' that is being led by CDRI will help create global knowledge that would be immensely valuable, Shri Modi informed.

The Prime Minister said that in order to make our future resilient we have to work towards a 'Resilient Infrastructure Transition'. Resilient infrastructure can also be the centrepiece of our wider adaptation efforts. "If we make infrastructure resilient, we prevent disasters not only for ourselves but for many future generations", he added.

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DS/ST

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# OVER 1 LAKH TREES TO BE FELLED FOR COAL MINING IN ODISHA

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

An important issue flagged by the inspection team was the threat to animals, especially elephants. BISWARANJAN ROUT

The Union Coal Ministry has sought to rush through the forest diversion process for proposed opencast coal mining in Angul district of Odisha which would require the felling of more than one lakh standing trees in a reserve forest and cause significant disturbance to the elephant herds.

Singareni Collieries Company Limited (SCCL), a joint venture company of the Government of India and Telangana, has proposed to mine coal at the Naini mine in Chhendipada tahasli of the district.

The total requirement of land for the project is 912.799 hectares, of which 643.095 hectares is reserve forestland and 140.18 hectares is village forestland. The remaining is non-forestland.

The SCCL is waiting for environment and forest clearance before diverting 783.275 hectares of forestland for the coal field, which is in the south-eastern corner of the lower Gondwana basin within the Mahanadi Valley.

According to the site inspection report submitted by the Angul Divisional Forest Officer, 1,05,092 trees would have to be felled in the Chhendipda reserve forest, 1,087 in a revenue forest and 327 in non-forestland.

The company has, however, been allowed to create compensatory afforestation over 1,083 hectare of degraded forest.

The important issue flagged by the site inspection team was the threat to wild animals, especially elephants. Though the area for coal mining is not a part of any national park, wildlife sanctuary or biosphere, movement of wild elephants is often witnessed in the northern and southern parts of the lease area. The division wanted a plan for safe passage to elephants.

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# IS LA NINA A FAIR WEATHER FRIEND OF OUR COUNTRY?

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

In most years, meteorologists consider the La Nina to be a friend of India. The phenomenon associated with below normal sea surface temperatures in the eastern and central Pacific Ocean, makes the summer monsoon wetter and the winter colder unlike its evil twin, the El Nino, or a warming phenomenon that frequently dries up monsoon rains over India.

This year, however, the La Nina is being blamed for worsening perhaps the longest spell of heatwaves from March to April in north, west and Central India.

Formally known as the El Nino Southern Oscillation (ENSO), the La Nina-El Nino phenomenon follows a periodic pattern that roughly lasts three years.

During a La Nina winter, a north-south pressure pattern sets up over India and normally this influences the trade winds that bring rains to India. However, because the La Nina didn't peak, the sea surface temperatures continued to be cold and this drove hot westerly winds and blasts of hot air from the Middle East into Pakistan and India.

"The north-south pressure pattern has been persisting over India, with La Nina extending its stay over the Pacific. This has definitely impacted the weather over India, which has been seen even during 1998-2000 when La Nina had persisted for three years," Raghu Murtugudde, Professor, Department of Atmospheric and Oceanic Science, University of Maryland told Climate Trends, a communications firm that specialises in climate and environment.

While land temperatures over India begin rising in March, they are usually punctuated by western disturbances, or moisture from the Mediterranean region that fall as rain over north and western India. For these currents to make it as far as India, they need a significant difference in temperature between Europe and the latitudes over India. "Partly due to La Nina, this temperature difference was absent and so the western disturbances that came to India were weak with hardly any rain," M. Ravichandran, Secretary, Ministry of Earth Sciences and climate scientist, told *The Hindu*.

According to a 2021 report by the Ministry of Earth Sciences, 'Assessment of Climate Change over the Indian Region', all India averaged frequency of summer heatwaves is expected to rise to about 2.5 events per season by the mid-21st century, with a further slight rise to about 3.0 events by the end of 21st century under current trajectory of greenhouse gas emission.

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# FUTURE LOOMS DARK FOR 48% OF BIRD SPECIES

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

Loss of natural habitat is a key threat to biodiversity. K. K. Mustafah

Humans eat 14% of the world's surviving species of birds. However, this is not the only reason why 48% of the extant bird species are undergoing population decline, a study by nine renowned avian experts and conservationists has revealed.

*The State of the World's Birds*, an annual review of environmental resources published on May 5, has attributed the threat to almost half of the 10,994 recognised extant species of birds to the expanding human footprint on the natural world and climate change.

The degradation and loss of natural habitats as well as direct overexploitation of many species are the key threats to avian biodiversity, the study led by the Manchester Metropolitan University (MMU) says.

The use of 37% of the surviving bird species as common or exotic pets and 14% as food are examples of direct overexploitation, the report indicates.

The review found that 5,245 or about 48% of the existing bird species worldwide were known or suspected to be undergoing population decline. While 4,295 or 39% of the species had stable trends, about 7% or 778 species had increasing population trends. The trend of 37 species was unknown.

The study underlines birdwatching, a global pastime involving millions of people, as a form of avian conservation but warns of "local negative impacts" of bird feeding valued at \$5-6 billion per year and growing by 4% annually. It reviewed changes in avian biodiversity using data from the International Union for Conservation of Nature's Red List to reveal the changes in fortunes of all the global bird species.

The caution is for some non-provisioned species via trophic cascades, an "ecological phenomenon triggered by the addition or removal of top predators and involving reciprocal changes in the relative populations of predator and prey through a food chain, which often results in dramatic changes in ecosystem structure and nutrient cycling".

"Avian diversity peaks globally in the tropics and it is there that we also find the highest richness of threatened species. We know a lot less about the fortunes of tropical bird species than we do about temperate ones, but we are now witnessing the first signs of a new wave of extinctions of continentally-distributed bird species, which has followed the historic loss of species on islands like the dodo," said MMU's Alexander Lees, the lead author of the study.

## Use of data

The study, which involved scientists from Manchester Metropolitan, Cornell University, Birdlife International, the University of Johannesburg, Pontifical Xavierian University and the India-based Nature Conservation Foundation (NCF), reviewed changes in avian biodiversity using data from the International Union for Conservation of Nature's Red List to reveal the changes in fortunes of all the global bird species.

Apart from tropical forests, the threat of natural grasslands has been particularly worrying for North America, Europe and India.

“If unique ecosystems like grasslands are to retain their diverse birdlife, governments and research groups must prioritise such landscapes and their inhabitants for conservation and ensure that they do not become plantations or woodlands,” NCF’s Ashwin Viswanathan said.

“After documenting the loss of nearly 3 billion birds in North America alone, it was dismaying to see the same patterns of population declines and extinction occurring globally,” Ken Rosenberg of Cornell University said.

Because birds are highly visible and sensitive indicators of environmental health, we know their loss signals a much wider loss of biodiversity and threat to human health and well-being, he added.

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## SHRI BHUPENDER YADAV LEADS INDIAN DELEGATION TO THE 15TH SESSION OF THE CONFERENCE OF THE PARTIES (COP15) OF THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (UNCCD) AT ABIDJAN, CÔTE D'IVOIRE

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

The Indian delegation led by Union Minister for Environment, Forest and Climate Change Shri Bhupender Yadav has reached at Abidjan, Cote D Ivoire to attend the Conference of Parties, 15<sup>th</sup> meeting of the United Nations Convention on Combating Desertification (UNCCD COP15) from 9th to 20th May 2022.

Landed in Abidjan, Côte d'Ivoire to attend UNCCD (United Nations Convention on Combating Desertification) COP15.

Despite the pandemic, India as president of [@UNCCD](https://twitter.com/UNCCD) COP14 contributed significantly to bringing nations together for halting further land degradation. [pic.twitter.com/9RxL6anvSy](https://pic.twitter.com/9RxL6anvSy)

India had hosted the fourteenth session of Conference of Parties of United Nations Convention to Combat Desertification from 2nd to 13th September 2019, at New Delhi and is the current president of the same.

At COP 14, Prime Minister Shri Narendra Modi announced that “India would raise its ambition of the total area that would be restored from its land degradation status, from twenty-one million hectares to twenty-six million hectares between now and 2030”. The Prime Minister had then stated that, “...this will be focused on restoring land productivity and ecosystem services of 26 million hectares of most degraded and vulnerable land, with emphasis on the degraded agricultural, forest and other wastelands by adopting a landscape restoration approach.”

Despite the covid-pandemic, India during its presidency made significant contributions in bringing the nations together towards the global goal of halting and reversing land degradation.

A High-level Dialogue of United Nations General Assembly held on 14th June 2021 on desertification, land degradation and drought, was addressed by Prime Minister of India, Shri Narendra Modi wherein he highlighted the success stories and initiatives taken by India to combat land degradation.

In another significant development during India's presidency, G-20 leaders recognizing the importance of combating land degradation and creating new carbon sinks, put up an aspirational

goal to collectively plant 1 trillion trees, urging other countries to join forces with G20 to reach this global goal by 2030.

Also, for the first time, an Intergovernmental Working Group (IWG) on effective policy and implementation measures for addressing drought under the United Nations Convention for Combatting Desertification (UNCCD) was established by decision 23/COP.14. A draft report has been prepared and will be discussed during the current session of COP15.

The fifteenth session of the Conference of the Parties (COP15) of the United Nations Convention to Combat Desertification (UNCCD) at Abidjan, Côte d'Ivoire, from 9 to 20 May 2022, will bring together leaders from governments, the private sector, civil society and other key stakeholders from around the world to drive progress in the future sustainable management of land and will explore links between land and other key sustainability issues.

These issues will be discussed during the high-level segment on 9-10 May 2022, including a Heads of States Summit, high-level roundtables and interactive dialogue sessions, as well as numerous other special and side events.

Drought, land restoration, and related enablers such as land rights, gender equality and youth empowerment are among the top items on the Conference agenda. Through its decisions adopted by UNCCD's 197 Parties, COP15 is expected to galvanize sustainable solutions for land restoration and drought resilience, with a strong focus on future-proofing land use.

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BY/IG

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# A ONE-MAN RESCUE MISSION FOR WILD ORCHIDS IN ASSAM

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

Mithu Gogoi with orchids at his garden at Titabor in Jorhat. Special Arrangement

In spring, Mithu Gogoi from Titabor in Jorhat, Assam, has some 40 visitors at home every day. During the Bihu season last month, there were days when he and his wife, Bonti Gogoi, hosted up to 400 a day.

These visitors are not his friends or relatives. They are strangers — tourists and students — who want to see his personal orchid collection. Spread over less than one acre, this garden, which is set in his family home, blooms with a staggering 9,000 orchid plants, and is open to all at no cost. In April, when they are in full bloom, the space is especially pretty: you may have seen it captured on camera by enamoured Instagrammers by now.

“Most of them are rescued from forest fires due to *jhum* cultivation or from trees that were axed for road widening,” Mr. Gogoi says. “The forests of upper Assam have beautiful wild orchids that are fast disappearing due to deforestation. Around 90% of Assam’s orchids have disappeared. I wanted to save them for future generations; otherwise, they will only see them in photos.”

## Legal blooms

As a farmer, Mr. Gogoi takes pride in being able to grow this breed aplenty in his home garden. Orchids usually grow wild and it is illegal to grow some varieties at home, as per the Biodiversity Act, 2002, because they are categorised as an endangered species. Hence, he has ensured that his collection consists of only legal blooms.

His personal collection – which bursts with shades of yellow, pink, purple, white and orange – includes a number of Foxtail orchids or *Kopou phool* (*Rhynchostlis retusa*), the State flower of Assam. He also has orchid breeds such as *Rhynchostlis retusa* white, *Dendrobium lituiflorum* yellow, *Vanda ampullacea*, to name a few.

He grows orchids in flower pots, tree barks and on A-grade wood (a soft variety that does not rot and is resistant to termites). Orchids need a moist climate for the roots to grow. Caring for them is like nurturing a child he says; one has to devote close to two hours every day watering, pruning and checking the condition and growth of roots.

Now a renowned orchid conservationist, Mr. Gogoi began his tryst with the flowers when his family’s land was cleared for a tea plantation in 2007. As the trees were felled, he carefully collected the orchids and brought them home, setting up an environment they could thrive in. “I became obsessed with them,” he says.

“When I travelled around Northeast India, I also started to learn about orchids. I am part of the Orchid Protection Society in Jorhat, a 47-member society.”

So far, the society has been able to rescue more than 100 plants by networking with orchids research centres from different States of the Northeast, he says, adding, “We rescue roadside plants, put some back in their natural habitat and plant some at home so that the breed — no matter how common — survives.”

Around 90% of Assam's orchids have disappeared. I wanted to save them for future generations

Mithu Gogoi

Orchid Conservationist

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## 'HUNGER RISK FROM CLIMATE THREAT'

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

**Bleak outlook:**The number of Indians at risk from hunger in 2030 is expected to be 73.9 million.R.V. Moorthy

India's food production could drop 16% and the number of those at risk for hunger could increase 23% by 2030 due to climate change, says a report by the International Food Policy Research Institute (IFPRI) on climate change and food systems.

These projections are part of a model that was used to evaluate the impact of climate change on aggregate food production, food consumption (kilocalories per person per day), net trade of major food commodity groups, and the population at risk of going hungry. IMPACT, as the model is called, simulates national and international agricultural markets.

It was developed with inputs from scientists from the Consortium of International Agricultural Research Centers (CGIAR) and other leading global economic modelling efforts, the report notes.

The number of Indians at risk from hunger in 2030 is expected to be 73.9 million in 2030 and, if the effects of climate change were to be factored in, it would increase to 90.6 million. The aggregate food production index will, under similar conditions, drop from 1.6 to 1.5.

On a positive note, climate change will not impact the average calorie consumption of Indians and this is projected to remain roughly the same at 2,600 kcal per capita per day by 2030 even in a climate change scenario.

Baseline projections indicate that global food production will grow by about 60% over 2010 levels by 2050 in the context of climate change. Production and demand are projected to grow more rapidly in developing countries due to projected growth in population and incomes.

However, the long-term impacts of COVID-19 and other current geopolitical factors have not yet been incorporated in these projections. Diets are also shifting toward higher-value foods, including more fruits and vegetables, processed foods, and animal-source foods, outside of high-income countries. Meat production is projected to double in South Asia and West and Central Africa by 2030 and triple by 2050. Despite this growth, per capita consumption levels in developing countries will remain less than half of those in developed countries.

However, regional differences in access to food mean that nearly 500 million people are projected to remain at risk of going hungry. Globally, about 70 million more people will be at risk from hunger because of climate change, including more than 28 million in East and Southern Africa, the report added.

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## SCIENCE FOR ALL

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

*This article forms a part of the Science for All newsletter that takes the jargon out of science and puts the fun in! [Subscribe now!](#)*

The vaquita porpoise is the world's smallest marine mammal and is believed to be on the brink of extinction, with 10 or fewer still living in Mexico's Gulf of California, their sole habitat. The biggest threat to the species is not habitat loss or genetic factors but illegal "gillnet" fishing.

The porpoises, which range from 4 to 5 feet in length, often become entangled and die in the large mesh gillnets used by poachers hunting the totoaba, an endangered fish highly valued in some countries for its perceived medicinal properties. While Mexico has outlawed totoaba fishing and made the use of these nets in the vaquitas' habitat illegal, many say the bans are not always enforced.

A team of researchers analysed the genomes of 20 vaquitas that lived between 1985 and 2017 and conducted computational simulations to predict the species' extinction risk over the next 50 years. They concluded that if gillnet fishing were to end immediately, the vaquita had a very high chance of recovery, even with inbreeding. Often species with few members tend to be susceptible to genetic diseases from inbreeding.

But because the vaquitas have always been a small population in a very small habitat in the northern tip of the gulf, their genetic make-up is unlikely to be threatening.

Of 12 marine mammal species analysed -- including vaquitas -- the porpoises had the fewest number of potentially harmful mutations.

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# STATEMENT MADE BY INDIA ON THEMATIC ISSUES, MIGRATION, GENDER, SAND AND DUST STORM AT COP15 UNCCD

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

Following is the statement made by India on thematic issues-Migration, Gender, Sand and Dust storms at the 15<sup>th</sup> Session of the Conference of Parties of United Nations Convention to Combat Desertification (UNCCD) in Cote d'Ivoire, today:

## Migration

Desertification, land degradation and drought (DLDD) act as one of the drivers that cause migration. Other factors include climate and environmental changes. Promotion of sustainable agriculture and its associated value chains offer promising avenues to stop out-migration of rural population. Linking urban-rural communities and developmental actions to addresses migration was insisted in decision 22/COP.14. ICCD/COP(15)/18 concludes that in rural areas affected by DLDD, livelihood opportunities through land restoration activities should be ensured. Integrated land-use planning together with enhancing green and blue infrastructure for sustainable development should be prioritised. A stronger symbiotic urban-rural linkage targeting vulnerable groups that include women, rural youth, refugees, and internally displaced person be provided with on-farm and off-farm employment. Youth are most likely to face migration and engaging youth is vital to restoration efforts for resilient and sustainable food systems. Office of the Registrar General & Census Commissioner under Ministry of Home Affairs is the designated authority in India that compiles information on migration based on the data compiled during national census that usually takes place at a gap of ten years' time interval.

Reducing the extent of human migration is one of the pronounced achievements of watershed development programmes being implemented by Department of Land Resources, Ministry of Rural Development, Govt. of India. About 60% of the amount spent in each watershed goes for labour component which generates substantial employment for the local landless, small and marginal farming community people. Use of machinery in watershed activities is kept to the minimum so that employment opportunities are kept intact which minimize human migration from the watershed project areas. Convergence with MGNREGS and other related schemes is an added advantage for watershed programmes to generate employment and minimize migration.

***Watershed Development Component – Pradhan Mantri Krishi Sinchai Yojana (WDC-PMKSY) has generated more than 37.73 Million man-days of employment which also contributed to the reduction in migration in the treated areas, especially, during pandemic period. It has further acted as an enabler of reverse migration, when labour force was reverted to their native places and engaged with the watershed workforce.***

## Gender

The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive Principles. The Constitution not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favour of women. Within the framework of a democratic polity, our laws, development policies, Plans and programmes have aimed at women's advancement in different spheres. From the Fifth Five Year Plan (1974-78) onwards has been a marked shift in the approach to women's issues from welfare to development. In recent years, the empowerment of

women has been recognized as the central issue in determining the status of women. The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women. The 73rd and 74th Amendments (1993) to the Constitution of India have provided for reservation of seats in the local bodies of Panchayats and Municipalities for women, laying a strong foundation for their participation in decision making at the local levels.

The goal of National Policy for the Empowerment of Women, 2001 is to bring about the advancement, development and empowerment of women.

Empowerment of women is an integral part of PMKSY in India. Representation of women has been envisioned in the Watershed Committees involved in planning, implementation and maintenance of watershed interventions. Women-based community organizations such as Self-Help Groups, User Groups and farmer producer organizations are formed and nurtured while implementing the watershed programs.

The issues pertaining to gender in India is addressed by two ministries, namely, Ministry of Women and Child Development, and Ministry of Health and Family Welfare. Gender equality is also a major sustainable development goal (SDG 5). In this context, India had proposed its National Action Plan to improve statistics on gender.

The SDG-5 and the basic premise for considering gender as a thematic area is directed towards phasing out gender discrimination from all sectors. The Government of India has taken steps to address this issue at the most fundamental level through the “*Beti Bachao, Beti Padhao*”. The scheme allows a girl child to be self-sustainable with regard to her own education. To increase participation of women in scientific innovation, the Gender Advancement for Transforming Institutions (GATI) programme has been initiated by the Department of Science Technology, Government of India.

Decision 12/COP.14 emphasized on raising awareness amongst women with regard to land degradation. With respect to this, the Indian Council of Agricultural Research (ICAR) has been conducting knowledge exchange programs with women farmers residing in drought-prone areas. However, as far as SDG-5 is concerned, there is scope for ample progress to be made especially in the areas of women participation in labour.

### **Sand and Dust storms**

Sand and dust storms (in short SDS) are of common occurrence in arid and semi-arid regions both in Asia and Africa and affects 11 of the 17 SDGs. SDS adversely impact environment and quality of life. India highly appreciates that United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is supporting regional cooperation for issues related to SDS.

Decision 25/COP(14) requested UNCCD to finalise and publish Sand and Dust Storms Compendium to provide information and guidance on assessing and addressing the risks related to SDS.

India acknowledges and fully supports that the UNCCD secretariat has been assisting countries in regional planning and policy framework on combating SDS. Several pilot projects were implemented in central and northeast Asia including China, Korea and Russia to formulate national SDS plans.

In India, work on monitoring of SDS is primarily done by the Indian Meteorological Department (IMD).

ICCD/COP(15)/16, para 23 highlights about major gaps in monitoring, risk assessment, impact assessment and emergency response measures while addressing issues related to the SDS.

Anthropogenic SDS source mitigation is lacking in most of the countries and there is a lack of required data and information to address SDS related issues.

Capacity building of parties to address SDS through SDS toolbox and decision support system was envisaged. The first SDS Toolbox will be made available by mid-2022. Usually, these Toolbox provide methodology to integrate available information in a scientific way to address envisaged problems at a coarser scale.

India can designate appropriate remote sensing agency (such as SAC/ NRSC) to develop GIS layers at finer scale to integrate indicator layers to test its applicability on ground for further improvement. This would address the issues in a more pragmatic way.

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**BY**

Following is the statement made by India on thematic issues-Migration, Gender, Sand and Dust storms at the 15<sup>th</sup> Session of the Conference of Parties of United Nations Convention to Combat Desertification (UNCCD) in Cote d'Ivoire, today:

### **Migration**

Desertification, land degradation and drought (DLDD) act as one of the drivers that cause migration. Other factors include climate and environmental changes. Promotion of sustainable agriculture and its associated value chains offer promising avenues to stop out-migration of rural population. Linking urban-rural communities and developmental actions to addresses migration was insisted in decision 22/COP.14. ICCD/COP(15)/18 concludes that in rural areas affected by DLDD, livelihood opportunities through land restoration activities should be ensured. Integrated land-use planning together with enhancing green and blue infrastructure for sustainable development should be prioritised. A stronger symbiotic urban-rural linkage targeting vulnerable groups that include women, rural youth, refugees, and internally displaced person be provided with on-farm and off-farm employment. Youth are most likely to face migration and engaging youth is vital to restoration efforts for resilient and sustainable food systems. Office of the Registrar General & Census Commissioner under Ministry of Home Affairs is the designated authority in India that compiles information on migration based on the data compiled during national census that usually takes place at a gap of ten years' time interval.

Reducing the extent of human migration is one of the pronounced achievements of watershed development programmes being implemented by Department of Land Resources, Ministry of Rural Development, Govt. of India. About 60% of the amount spent in each watershed goes for labour component which generates substantial employment for the local landless, small and marginal farming community people. Use of machinery in watershed activities is kept to the minimum so that employment opportunities are kept intact which minimize human migration from the watershed project areas. Convergence with MGNREGS and other related schemes is an added advantage for watershed programmes to generate employment and minimize migration.

***Watershed Development Component – Pradhan Mantri Krishi Sinchai Yojana (WDC-PMKSY) has generated more than 37.73 Million man-days of employment which also***

***contributed to the reduction in migration in the treated areas, especially, during pandemic period. It has further acted as an enabler of reverse migration, when labour force was reverted to their native places and engaged with the watershed workforce.***

## **Gender**

The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive Principles. The Constitution not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favour of women. Within the framework of a democratic polity, our laws, development policies, Plans and programmes have aimed at women's advancement in different spheres. From the Fifth Five Year Plan (1974-78) onwards has been a marked shift in the approach to women's issues from welfare to development. In recent years, the empowerment of women has been recognized as the central issue in determining the status of women. The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women. The 73rd and 74th Amendments (1993) to the Constitution of India have provided for reservation of seats in the local bodies of Panchayats and Municipalities for women, laying a strong foundation for their participation in decision making at the local levels.

The goal of National Policy for the Empowerment of Women, 2001 is to bring about the advancement, development and empowerment of women.

Empowerment of women is an integral part of PMKSY in India. Representation of women has been envisioned in the Watershed Committees involved in planning, implementation and maintenance of watershed interventions. Women-based community organizations such as Self-Help Groups, User Groups and farmer producer organizations are formed and nurtured while implementing the watershed programs.

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**BY**

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## MINT

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

As severe heatwave grappled most parts of the country, NASA's Jet Propulsion Laboratory recently released images that show "heat islands" in and around the national capital Delhi.

The US space agency has deployed a satellite instrument called Ecosystem Spaceborne Thermal Radiometer Experiment On Space Station (ECOSTRESS), which measures temperatures of the ground from space. It was used to record temperatures in the city and same was later released on social media. The heat islands are marked in red.

Cities are often markedly warmer than the countryside, and that's critical in a heat wave. This image, taken by [@NASA](#)'s ECOSTRESS instrument on the [@Space Station](#), shows "heat islands" in and near Delhi, India, with nighttime temps up to 102° F (40° hotter than nearby fields). [pic.twitter.com/yjzkdjDYev](https://pic.twitter.com/yjzkdjDYev)

In a press note, [NASA](#) said, this image, taken shortly before local midnight on May 5, shows urban areas and agricultural lands northwest of Delhi (the large red area in the lower right) that are home to about 28 million people. The image covers about 4,800 square miles (12,350 square kilometers).

Cities are usually markedly warmer than the surrounding countryside due to human activities and the materials used in the built environment. The image clearly delineates these urban "heat islands." Nighttime temperatures in Delhi and several smaller villages were above 95 degrees Fahrenheit (35 degrees Celsius), peaking at about 102 degrees F (39 degrees C), while the rural fields nearby had cooled to around 60 degrees F (15 degrees C), it added.

This means city dwellers are experiencing considerably higher temperatures than the average temperatures reported for their regions.

NASA's Jet Propulsion Laboratory in Southern California built and manages the ECOSTRESS mission for the Earth Science Division in the Science Mission Directorate at NASA Headquarters in Washington.

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## FOCUSING ON PUBLIC HEALTH ENGINEERING

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

An open canal in Mogappair, Chennai. | Photo Credit: VEDHAN M.

Globally, around 80% of wastewater flows back into the ecosystem without being treated or reused, according to the United Nations. This can pose a significant environmental and health threat. In the absence of cost-effective, sustainable, disruptive water management solutions, about 70% of sewage is discharged untreated into India's water bodies. A staggering 21% of diseases are caused by contaminated water in India, according to the World Bank, and one in five children die before their fifth birthday because of poor sanitation and hygiene conditions, according to Startup India. As we confront these public health challenges emerging out of environmental concerns, expanding the scope of public health/environmental engineering science becomes pivotal.

For India to achieve its sustainable development goals of clean water and sanitation and to address the growing demands for water consumption and preservation of both surface water bodies and groundwater resources, it is essential to find and implement innovative ways of treating wastewater. It is in this context why the specialised cadre of public health engineers, also known as sanitation engineers or environmental engineers, is best suited to provide the growing urban and rural water supply and to manage solid waste and wastewater.

The availability of systemic information and programmes focusing on teaching, training, and capacity building for this specialty cadre is currently limited. Both as professions and as practice, engineering and public health have been traditionally understood as different fields. However, together, these fields can offer a wide range of opportunities for the development of advanced wastewater treatment systems, for understanding complex quality and monitoring processes, designing and managing septic tank systems, supplying good quality water in adequate quantities, maintaining hygiene and access to water, and ensuring that water supply is sustainable, including the study of relevant industry standards and codes of practices.

Currently in India, civil engineering incorporates a course or two on environmental engineering for students to learn about wastewater management as a part of their pre-service and in-service training. However, the nexus between wastewater and solid waste management and public health issues is not brought out clearly. Most often, civil engineers do not have adequate skills to address public health problems. And public health professionals do not have adequate engineering skills. India aims to supply 55 litres of water per person per day by 2024 under its Jal Jeevan Mission to install functional household tap connections. In this regard, expansion of the pipeline network, identification of sustainable sources of water which have water available year-round, installation of online systems for monitoring the quantity and quality of supply, and collection and treatment of wastewater become increasingly important. The goal of reaching every rural household with functional tap water can be achieved in a sustainable and resilient manner only if the cadre of public health engineers is expanded and strengthened.

In India, public health engineering is executed by the Public Works Department or by health officials. This differs from international trends. To manage a wastewater treatment plant in Europe, for example, a candidate must specialise in wastewater engineering. With the Government of India starting to think along these lines, introducing public health engineering as a two-year structured master's degree programme or through diploma programmes for professionals working in this field must be considered to meet the need of increased human resource in this field. For this, the role of medical colleges and public health institutes deserves a

discussion. In the current scenario, optimisation and efficiency forms key words in all services. Refresher courses for health and engineering institutes with an updated knowledge in areas of environment science should be made available. Public health professionals can be groomed through in-service training.

Furthermore, public health engineering should be developed as an interdisciplinary field. Engineers can significantly contribute to public health in defining what is possible, identifying limitations, and shaping workable solutions with a problem-solving approach. Similarly, public health professionals can contribute to engineering through well-researched understanding of health issues, measured risks and how course correction can be initiated. Once both meet, a public health engineer can identify a health risk, work on developing concrete solutions such as new health and safety practices or specialised equipment, in order to correct the safety concern.

Public health engineering's combination of engineering and public health skills can also enable contextualised decision-making regarding water management in India. For example, wastewater management systems, especially decentralised and onsite systems, have to be designed based on hydro-geological data and observations of climate patterns. From promoting a robust understanding of processes, trends, and the latest technology in water and wastewater quality monitoring, treatment, and management, public health engineering can help decision/policy makers explore the available options. Given the population growth, diminishing resources and risky exploitation of natural resources, various State governments and not-for-profit organisations are looking to hire environmental engineers through whom public health problems can be addressed.

There is no doubt that the majority of diseases are water-related, transmitted through consumption of contaminated water, vectors breeding in stagnated water, or lack of adequate quantity of good quality water for proper personal hygiene. Diseases cannot be contained unless we provide good quality and adequate quantity of water. Most of the world's diseases can be prevented by considering this. Training our young minds towards creating sustainable water management systems would be the first step. Currently, institutions like the Indian Institute of Technology, Madras (IIT-M) are considering initiating public health engineering as a separate discipline. To leverage this opportunity even further, India needs to scale up in the same direction.

Ligy Philip is Institute Chair Professor in Department of Civil Engineering, IIT-Madras

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## BIRDWATCHERS FROM INDIA, NEPAL AND BHUTAN RECORD HIMALAYAN SPECIES

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

Birdwatchers in the Himalayan regions of India, Nepal and Bhutan came together for a unique inter-country exercise to document as many birds of the mountain range as possible. Photo: Special Arrangement

Uttarakhand reported the highest [number of bird species](#), at 293, while the maximum number of checklists (lists of birds seen and heard by birdwatchers), at 192, was uploaded from Jammu & Kashmir, according to the primary report from birdwatchers in the Himalayan regions of India, Nepal and Bhutan, who came together for a unique inter-country exercise to document as many birds of the mountain range as possible.

The Himalayas, the tallest mountain range in the world, with its snow-capped mountains, cold deserts, lush green forests and grasslands, and white waters of rivers, are home to numerous unique birds. The exercise was undertaken on May 14 and a total of 607 species have been documented so far, in just one day. The 'Himalayan Bird Count' programme aimed to celebrate the incredible bird diversity of the Himalayas.

"Birdwatchers from Ladakh, including members of the Wildlife Conservation and Birds Club of Ladakh, spread out in various regions of Ladakh and uploaded 182 checklists.

In just 36 checklists, birdwatchers from Sikkim recorded 157 species. Similarly, 50 checklists yielded a whopping 234 species in Arunachal Pradesh," Gala Mittal from Bird Count India said.

In India, the event was confined to Ladakh, J&K, Himachal Pradesh, Uttarakhand, Sikkim, northwest Bengal and Arunachal Pradesh. In many places, birders took groups of people out for birdwatching, showing them the wonders of nature.

Bird Count India is an informal partnership of organisations and groups interested in documenting and monitoring India's birds. The initiative encourages birdwatchers to upload their bird lists to eBird ([ebird.org/india](http://ebird.org/india)), a global platform for bird observations.

This first edition of the event was co-organised by Bird Count India, Bird Conservation Nepal, and the Royal Society for Protection of Nature, Bhutan, which plan to bring the Himalayan birding fraternity together for a common good via more birding events such as this.

According to the organisers, around 1,000 lists were uploaded from India, Nepal and Bhutan on May 14.

"There was incredible participation from individual birdwatchers and various groups, ranging from government entities like the Himachal Pradesh Forest Department and bird clubs to various wildlife conservation organisations. Stretching from the westernmost Ladakh to the easternmost Arunachal Pradesh, the Himalayan region's biodiversity is threatened by rapid warming and rampant infrastructure development," Ms. Mittal said.

"Himalayan Bird Count can provide consistent, snapshot information of bird diversity in a region that is increasingly threatened by climate change. This kind of information, across years, can help us understand what's happening to our country's birds," said Ghazala Shahabuddin, senior

fellow with the non-profit Centre for Ecology, Development and Research working in the Kumaon hills, Uttarakhand.

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## EXPLAINED

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

A farmer walks over dried land (file photo) | Photo Credit: AP

**The story so far:** A United Nations report has revealed that many parts of India fall under the list of regions that are [vulnerable to drought](#) globally. The report also stated that India's Gross Domestic Product (GDP) reduced by 2 to 5 per cent between 1998 and 2017 due to severe [droughts in the country](#).

These and other global findings centred on drought were collated in the [Drought in Numbers, 2022 report](#) presented by the United Nations Convention to Combat Desertification (UNCCD).

The Drought in Numbers report is a collection of data on the effects of droughts on our ecosystem and how they can be mitigated through efficient planning for the future. The report also helps inform negotiations surrounding key decisions by the UNCCD's 197 member parties at the 15th Conference of Parties (COP15), currently underway in Abidjan, Côte d'Ivoire. Drought, land restoration, and related aspects such as land rights, gender equality and youth empowerment are among the top considerations at COP15.

UNCCD's COP15 focuses on desertification, land degradation, and drought, with the theme for the conference being "Land. Life. Legacy: From scarcity to prosperity." The conference has brought together government representatives, private sector members, and civil society stakeholders to ensure that land continues to benefit present and future generations.

It proposes to tackle "the interconnected challenges of land degradation, climate change, and biodiversity loss" as we move into the UN Decade on Ecosystem Restoration.

The UNCCD's 197 parties, which includes 196 member States as well as the European Union, are expected to brainstorm sustainable ideas to further land restoration and drought resilience, focusing on "future-proofing land use." The UNCCD envisions restoring one billion hectares of degraded land by 2030, creating a land degradation-neutral world.

According to World Bank estimates, drought conditions can force up to 216 million people to migrate by 2050. Other factors at play along with drought could be water scarcity, declining crop productivity, rise in sea levels, and overpopulation.

Weather, climate and water hazards have accounted for 50 per cent of all disasters and 45 per cent of all reported deaths since 1970, World Meteorological Organisation data has revealed. Nine in ten of these deaths have occurred in developing countries.

Between 2020 and 2022, 23 countries have faced drought emergencies. These are Afghanistan, Angola, Brazil, Burkina Faso, Chile, Ethiopia, Iraq, Iran, Kazakhstan, Kenya, Lesotho, Mali, Mauritania, Madagascar, Malawi, Mozambique, Niger, Somalia, South Sudan, Syria, Pakistan, United States, and Zambia. According to the report, climate change alone will cause 129 countries to experience an increase in drought exposure in the next few decades.

More than a billion people around the world were affected by drought in 2000-19, making it the second-worst disaster after flooding. Africa was the worst hit, with 134 droughts, of which 70 occurred in East Africa. The World Health Organisation has noted that approximately 55 million people globally are directly affected by droughts annually, making it the most serious hazards to

livestock and crops in almost every part of the world.

The impact of drought is, however, not uniform across genders. Research shows that women and girls in emerging and developing countries suffer more in terms of education levels, nutrition, health, sanitation, and safety as a result of droughts. The burden of water collection also disproportionately falls on women (72 per cent) and girls (9 per cent). The report notes that they may spend up to 40 per cent of their caloric intake fetching water.

According to the report, if predictions are correct and global warming reaches 3° C by 2100, drought losses could be five times higher than today's levels. The largest increase in drought losses is projected in the Mediterranean and the Atlantic regions of Europe.

Australia's megadrought in 2019-2020 contributed to "megafires" resulting in one of the most extensive losses of habitat for threatened species. About three billion animals were killed or displaced in the Australian wildfires. On a related note, 84 per cent of all terrestrial ecosystems are threatened by changing and intensifying wildfires.

According to a 2017 report by the Food and Agriculture Organisation, the percentage of plants affected by drought has more than doubled in the last 40 years. Around 12 million hectares of land are lost each year due to drought and desertification.

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# PAST SEVEN YEARS WARMEST ON RECORD: WORLD METEOROLOGICAL ORGANISATION

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

The past seven years were the warmest on record, and 2021 did not see record-breaking temperatures because of a La Niña event at the start and end of the year, according to a report by the World Meteorological Organisation (WMO) on Wednesday.

La Nina is a cooling of surface temperatures in the Central Pacific. While this had a temporary cooling effect, it did not reverse the overall trend of rising temperatures. The average global temperature in 2021 was about 1.11 ( $\pm 0.13$ ) °C above the pre-industrial level.

The report comes even as north, central and western India reel under an onslaught of pre-monsoon heat waves, with temperatures in March breaching century-old records.

Four key climate change indicators — greenhouse gas concentrations, sea level rise, ocean heat and ocean acidification — set new records in 2021, according to the report. Extreme weather led to economic damage worth hundreds of billions of dollars and triggered shocks for food, water security and displacement that worsened in 2022.

“Renewables are the only path to real energy security, stable power prices and sustainable employment opportunities. If we act together, the renewable energy transformation can be the peace project of the 21st century,” said Antonio Guterres, Secretary-General of the United Nations. The world must act in this decade to prevent ever worsening climate impacts and to keep temperature increase to below 1.5°C above pre-industrial levels, he said.

“It is just a matter of time before we see another warmest year on record,” said WMO Secretary-General Prof. Petteri Taalas. “Our climate is changing before our eyes. The heat trapped by human-induced greenhouse gases will warm the planet for many generations to come. Sea level rise, ocean heat and acidification will continue for hundreds of years, unless means to remove carbon from the atmosphere are invented. Some glaciers have reached the point of no return and this will have long-term repercussions in a world in which more than 2 billion people already experience water stress.”

The WMO report added that ocean surface temperatures were at a record high. The upper 2000m depth of the ocean continued to warm in 2021 and would continue to do so in the future — a change which is irreversible on centennial to millennial time scales. The scientific consensus was that ocean warming rates have shown a particularly strong increase in the past two decades and this warmth was penetrating to ever deeper levels.

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## POCKETS OF HOPE, LINKING NATURE AND HUMANITY

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

In the Nilgiri Biosphere Reserve | Photo Credit: M. SATHYAMOORTHY

Biodiversity is the living fabric of our planet. It underpins human well-being in the present and in the future, and its rapid decline threatens nature and people alike.

According to the [Global Assessment Report on Biodiversity and Ecosystem Services](#) released in 2019 by the [Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services \(IPBES\)](#) at the UNESCO headquarters in Paris, the main global drivers of biodiversity loss are climate change, invasive species, over-exploitation of natural resources, pollution and urbanisation.

Because of our collective excesses, the ecological carrying capacity of planet earth has largely been exceeded. This trend needs to be redressed, with cleaner air, high quality drinking water, and enough food and healthy habitats to ensure that ecosystem services continue to benefit humanity without critically affecting nature's balance. Whether we look at nature from an environmental, from a cultural or even from a religious point of view, it is our responsibility and clearly in our interest to respect the environment.

In fact, the possibilities exist, and all is not lost. In the last 50 years or so, much has been accomplished for the protection of nature, including the establishment of conservation areas, and a number of international conventions have been signed and ratified.

One of the best mechanisms that has been created is the World Network of Biosphere Reserves, created in 1971 by UNESCO. Biosphere reserves are places where humans live in harmony with nature, and where there is an effective combination of sustainable development and nature conservation. They represent pockets of hope and proof that we are not inexorably headed towards a doomsday ecological scenario, provided we take appropriate action.

In South Asia, over 30 biosphere reserves have been established. The first one was the Hurulu Biosphere Reserve in Sri Lanka, which was designated in 1977 and comprises 25,500 hectares within the tropical dry evergreen forest.

In India, the first biosphere reserve was designated by UNESCO in 2000 within the blue mountains of the Nilgiris. It stretches across the States of Tamil Nadu, Karnataka and Kerala. The network has gone from strength to strength, and it now counts 12 sites, with Panna, in the State of Madhya Pradesh, as the latest inscription in 2020.

We need many more biosphere reserves and pockets of hope, and the region offers countless options.

South Asia has a very diverse set of ecosystems. To begin with, Bhutan, India and Nepal combined have thousands of glaciers, surrounded by lakes and alpine ecosystems.

The Khangchendzonga Biosphere Reserve, established in 2018, is a good model. It includes some of the highest ecosystems in the world, with elevations up to 8,586 metres. The reserve is home to orchids and rare plant species. At the same time, more than 35,000 people live there. Their main economic activities are crop production, animal husbandry, fishing, dairy products and poultry farming.

Bangladesh, India, the Maldives, and Sri Lanka all have extensive coastlines, with coral reefs and mangrove forests. These areas are exposed to extreme weather events (storms, floods, droughts), and sea-level rise.

The Maldives are recognised as the lowest-lying country in the world, with a mere elevation of 1.5 metres above the high tide mark. Together with UNESCO, the archipelago has embarked on a plan to establish pilot sites for the conservation and restoration of coastal ecosystems, and to enhance the population's knowledge on climate change adaptation. Separately, three biosphere reserves have already been created in the Maldives.

UNESCO Biosphere Reserves have all developed science-based management plans, where local solutions for sustainable human living and nature conservation are being tested and best practices applied. Issues of concern include biodiversity, clean energy, climate, environmental education, and water and waste management, supported by scientific research and monitoring. The aim is to detect changes and find solutions to increase climate resilience.

All biosphere reserves are internationally recognised sites on land, at the coast, or in the oceans. Governments alone decide which areas to nominate. Before approval by UNESCO, the sites are externally examined. If approved, they will be managed based on an agreed plan, reinforced by routine checks to ensure credibility, but all remain under the sovereignty of their national government.

Some of the countries in South Asia do not yet have any or enough biosphere reserves. In most if not all cases, the political will is certainly there but there is a lack of know-how and financial resources. Of course, more financial support from richer nations and from the private sector would be desirable for establishing biosphere reserves in these countries.

Bangladesh, Bhutan, and Nepal are on the priority list of UNESCO, because they do not yet have any biosphere reserves. Their governments are already working on their first nomination files. Our organisation also believes that it would be important to increase the number of biosphere reserves in India, the Maldives and Sri Lanka.

The point is that if these pockets of hope can expand, with at least one biosphere reserve per country, and with more and larger sites covering the terrestrial surface, including coastal areas with their offshore islands, it will give the realisation to millions of people that a better future is truly possible, one where we can truly live in harmony with nature.

On May 22 and on the occasion of the International Day for Biological Diversity, let us do what is right. Now is the time to act for biodiversity.

Eric Falt is the Director of the UNESCO New Delhi Office, which covers Bangladesh, Bhutan, India, Nepal, the Maldives, and Sri Lanka. UNESCO is a member of Team UN in India, together helping deliver on the Sustainable Development Goals

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## INDIA'S MISSING WOLVES

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

Indian grey wolves are unlike their European and American counterparts | Photo Credit: THE GRASSLANDS TRUST

'Wolf! Wolf!' The driver in the vehicle facing us silently mouthed, and pointed to his right. Within seconds, a pack of three magnificent Indian grey wolves appeared in the savanna grasslands, less than 100 metres from us. A large male, followed by what appeared to be a heavily pregnant female, and finally a younger male, probably from their previous litter. Eyeing us cautiously, they walked into the adjoining plantation and disappeared.

There were many things special about this sighting. We were observing the top predator of India's grasslands, in their natural habitat, but this was far from any national park or wildlife sanctuary. This was virtually in Pune city's backyard, a landscape full of people, agriculture and domestic livestock. The Grasslands Trust, an NGO based in Pune, has been observing packs in these landscapes for over a decade. They have documented over 10 different breeding packs that use this landscape of around 700 sq. km. The wolves share this incredible landscape with a suite of other endangered species, the Indian gazelle (chinkara), the Indian fox, the striped hyena, and scores of migratory and resident birds. This area is also home to tens of thousands of agro-pastoralists, and is used as the monsoon grazing grounds by the Dhangar community, a tribe of nomadic pastoralists, who wind their way with their herds of sheep and goat across the Western Ghats every year from the coastal regions of Konkan.

Unfortunately, for the wolves we saw, the ending was not happy. A few weeks later, the entire pack, including their new pups, was found dead or dying from the deadly canine distemper virus. The female was the only survivor.

Diseases such as canine distemper virus is one of the many problems that this enigmatic predator of the Indian savannas faces. A new study estimates that there may be as few as 3,100 wolves in India. This puts them in the same category of endangerment as tigers. Habitat loss is a primary threat to this species. No wildlife sanctuary is dedicated to the preservation of the Indian wolf, and a recent study shows that less than 5% of open natural ecosystems in the country are protected. The wolf, unlike the tiger, is not a creature of forests. It requires vast areas, and manages to live in the interstices of agricultural spaces that are left fallow by farmers dependent on rainfall as their only source of irrigation.

The semi-arid savanna grasslands and rocky areas of the Deccan plateau, in Karnataka, Maharashtra, Telangana and Andhra Pradesh, along with some areas of Gujarat, Madhya Pradesh and Rajasthan are among the last strongholds of the Indian wolf. Pre-Independence, they would have likely shared their habitat with the Asiatic cheetah, coursing down blackbuck and chinkara. The cheetah is now gone, and so are the vast herds of antelope that roamed the Indian plains. Wolves are unfortunately following the same path and have declined across their entire range.

Indian grey wolves are unlike their European and American counterparts. They are smaller, leaner, highly adapted to the hot, arid plains of the Indian subcontinent. They are, along with the Tibetan wolf found in the Himalayas, among the oldest wolf lineages in the world. Scientists have given the Indian wolf its own sub-species status, *Canis lupus pallipes*, and some have argued that it should be its own unique species. If the Indian wolf were to disappear, this ancient evolutionary lineage would be forever lost, and India's savannas would be bereft of both their top

predators.

The Indian wolf's unique genetic signature is under attack from another unlikely source: its own domesticated brethren. The population of free-ranging domestic dogs has exploded in rural India. As the wolf's habitat becomes fragmented, there are more opportunities for dogs to come into contact with wolves. Wolves and dogs have an uneasy love-hate relationship. A solitary dog is likely to be chased away by a pack of wolves, and vice versa. However, if wolf populations are low, and a wolf is unable to find a partner, then it may also mate with a dog, resulting in wolf-dog hybrids. This genetic dilution of wild genes may eventually result in an evolutionary disadvantage for the wolf, robbing it of its ability to hunt prey and remain wild. Dogs can also pass on something more deadly to wolves. Diseases such as canine distemper, canine parvovirus and rabies could easily spread to wolf packs. This is likely to have happened to the pack that we saw near Pune.

While all these dangers continue to imperil the wolf's future, perhaps nothing is as bad as the ignominy heaped on the habitat that the wolf calls home. According to the government of India's *Wasteland Atlas of India*, much of the wolf's native habitat is barren wastelands that are actively prioritised for development activities. It is ironic that one of the greatest dangers to grasslands comes from 'green' projects such as solar energy and tree planting drives.

The survival of the Indian wolf depends on an unlikely ally: nomadic pastoralist communities who graze native sheep and goats in these grasslands. These are the main prey for the wolves, and in many pastoralist communities, such as the Dhangar of Maharashtra, the wolf is worshipped and not begrudged the occasional lamb. But this relationship is not always so rosy. In many other parts of the country, wolves are regularly persecuted by agro-pastoralists, their dens blocked with rocks and pups killed. However, the future of wolves, blackbuck, and that of the pastoralists and their stock is deeply intertwined with the fate of their habitats.

Only by granting the savanna grasslands of India their legitimacy as a natural habitat, and recognising the deep and intricate dependencies between the human and non-human denizens of these vast open landscapes, do we have a chance of saving the wolves.

*Vanak is senior fellow at ATREE, Bengaluru, and Godbole is founder trustee and president of The Grasslands Trust, Pune.*

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## EXPLAINED

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

The Biological Diversity Act, 2002 was framed to give effect to the United Nations Convention on Biological Diversity (CBD), 1992. | Photo Credit: File Photo

**The story so far:** [Rajya Sabha MP and senior Congress leader Jairam Ramesh](#) has criticised the provisions of the Biological Diversity (Amendment) Bill, 2021 that is currently being reviewed by a Joint Parliamentary Committee (JPC). The law was introduced in Parliament on December 16 last year by the Union Environment Minister Bhupender Yadav, and was referred to the JPC. Mr. Ramesh is a member of the committee, whose chairperson is BJP MP Sanjay Jaiswal.

The [Biological Diversity Act, 2002](#) was framed to give effect to the United Nations Convention on Biological Diversity (CBD), 1992, that strives for sustainable, fair and equitable sharing of benefits arising out of the utilisation of biological resources and associated traditional knowledge. To do this, it formulates a three-tier structure consisting of a National Biodiversity Authority (NBA) at the national level, State Biodiversity Boards (SBBs) at the State level and Biodiversity Management Committees (BMCs) at local body levels. The primary responsibility of the BMCs is to document local biodiversity and associated knowledge in the form of a People's Biodiversity Register.

The amended Bill was drafted in response to complaints by traditional Indian medicine practitioners, the seed sector, and industry and researchers that the Act imposed a heavy "compliance burden" and made it hard to conduct collaborative research and investments and simplify patent application processes. The text of the Bill also says that it proposes to "widen the scope of levying access and benefit sharing with local communities and for further conservation of biological resources." The Bill seeks to exempt registered AYUSH medical practitioners and people accessing codified traditional knowledge, among others, from giving prior intimation to State biodiversity boards for accessing biological resources for certain purposes.

Environmental organisations such as Legal Initiative for Forests and Environment (LIFE) have said that the amendments were made to "solely benefit" the AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy) Ministry and would pave the way for "bio piracy." The modifications will exempt AYUSH manufacturing companies from needing approvals from the NBA and thus will go against one of the core provisions of the Act.

Mr. Ramesh contended that the Environment Ministry was drawing a distinction between a registered AYUSH practitioner and a company, and exempting the former from the Act. He said this was an "artificial distinction" as nothing prevented a registered AYUSH practitioner from having informal links with a company structure. These paved the way for potential "abuse of the law," he said in a letter to Mr. Jaiswal and other committee members.

Multiple provisions of the Bill, he said, were aimed at diluting the authority of the National Biodiversity Authority (NBA), especially the clause appointing 16 ex-officio officers of the Centre. Another provision, that requires companies to seek the approval of the NBA only at the time of commercialisation, and not when applying for a patent, was of concern. The Bill also decriminalised violations, such as bio-piracy and made them civil offences, and this defeated the Act's "deterrent powers," he said.

An analysis by the Centre for Science and Environment (CSE) and the *Down To Earth* magazine on how the Biodiversity Act was being practically implemented, pointed out serious shortcomings. There was no data available — barring a few States — on the money received

from companies and traders for access and benefit-sharing from use of traditional knowledge and resources. It was unclear if companies had even paid communities despite commitments. In the case of the Irula Cooperative in Tamil Nadu — traditional knowledge holders of the method of collecting snake venom used for pharmaceutical products — only one company had agreed to pay, but even that promise remained unfulfilled. State boards told *Down to Earth* that the money collected has not been disbursed to communities because there was no information available about the knowledge holders. The law says that if the information was unavailable, then funds ought to be spent on conservation in the region from where the knowledge-bioresources come. As of now, the funds were lying unutilised, according to State boards. As per law, Indian pharmaceutical companies are required to pay between 3-5% on the extracted bioresources or between 0.01-0.05% on the annual gross ex-factory sales. But companies have resisted paying. In most cases, the courts have held that these companies have to seek prior approval and make payments to the NBA or the State boards. Often, it was not clear who was required to pay, how much or what has already been paid. The proposed amendments didn't address these issues and so aren't helpful in solving the current challenges of implementation.

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## PANEL TO INVESTIGATE RAMBAN TUNNEL COLLAPSE

Relevant for: Environment | Topic: Disaster and disaster management

The Centre has constituted a committee of three independent experts to investigate the reasons for the recent collapse of a part of an under-construction tunnel in Ramban on Jammu-Srinagar highway and suggest remedial measures.

The state-owned National Highways Authority of India has already initiated a process to handle such emergency situations and is taking all possible measures to avoid such incidents in future, an official statement said on Sunday.

According to the Ministry of Road Transport and Highways office order, Professor J.T. Sahu of the IIT, Delhi will be the chairman of the committee, and it will submit the report within 10 days.

According to the official statement, the stretch between Digdole and Khooni Nallah of the Ramban Banihal section is prone to frequent landslip and shooting stones due to fragile geology.

Those whose life could not be saved are being given workman compensation and an additional *ex gratia* of Rs. 2 lakh by EPC contractor which amounts to at least Rs. 15 lakh.

It is yet to be determined whether the incident occurred due to work being executed or natural reasons.

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## 60% E-WASTE RECYCLING LIKELY BY 2023

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

All aboard: Electronic goods such as laptops and phones will come within the ambit of the new rules. File photo

Consumer goods companies and makers of electronics goods have to ensure at least 60% of their electronic waste is collected and recycled by 2023 with targets to increase them to 70% and 80% in 2024 and 2025, respectively, according to a draft notification by the Environment Ministry made public this week.

The rules also bring into effect a system of trading in certificates, akin to carbon credits, that will allow companies to temporarily bridge shortfalls.

A wide range of electronic goods, including laptops, landline and mobile phones, cameras, recorders, music systems, microwaves, refrigerators and medical equipment, have been specified in the notification.

### Public feedback

India, which is unique among South Asian countries in that it has a formal set of rules for electronic waste management, first announced these rules in 2016 and amended it in 2018. The latest rules, which have been put up for public feedback, are expected to come into effect by August.

Along with specifying targets, the rules also lay out a system of companies securing extended producer responsibility (EPR) certificates.

These certificates certify the quantity of e-waste collected and recycled in a particular year by a company and an organisation may sell surplus quantities to another company to help it meet its obligations. "The earlier rules stressed collection targets. Now we are emphasising on the EPR, recycling and trading. This follows from the government's objective to promote a circular economy," Naresh Gangwar, Additional Secretary, Environment Ministry, told *The Hindu*.

Companies will have to register on an online portal and specify their annual production and e-waste collection targets.

The chief entity that will coordinate the trade of EPR certificates and monitor if companies are meeting their targets is the Central Pollution Control Board (CPCB).

### Dealing with delays

Specifically, a steering committee to be headed by the Chairman of the CPCB will oversee the overall implementation of these regulations. Companies that don't meet their annual targets will have to pay a fine or an "environmental compensation", but the draft doesn't specify the quantum of these fines. In fact, companies that fall short can meet a year's target, even after three years. Those that meet their targets with a year's delay will be refunded 85% of their fine, and 60% and 30% after the second and third year, respectively.

In March 2020, the government said it more than doubled the electronic waste (e-waste) it recycled in 2018-19 over 2017-18. This translated to a 10% recycling rate in 2017-18 rising to a

little over 20% in 2018-19.

The EPR also requires producers to set up e-waste exchange facilities to facilitate collection and recycling, and assign specific responsibility to bulk consumers of electronic products for safe disposal.

The State governments have been entrusted with the responsibility of earmarking industrial space for e-waste dismantling and recycling facilities, undertaking industrial skill development and establishing measures for protecting the health and safety of workers engaged in the dismantling and recycling facilities for e-waste.

The e-waste produced in India as per the data provided by the government is lower than estimates by international agencies.

According to the Global E-Waste Monitor 2017, India generates about 2 million tonnes (MT) of e-waste annually and ranks fifth among e-waste producing countries, after the U.S., China, Japan and Germany.

Most of India's e-waste is recycled by the informal sector and under hazardous conditions and a thrust of the e-waste rules is to have more this waste be handled by the formal sector.

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# NEW SPECIES OF AFRICAN VIOLETS FOUND IN MIZORAM

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

The newly-described species *Didymocarpus vickifunkiae* (Gesneriaceae)

(*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](#) .*)

An 'African' flowering plant has been recorded scientifically for the first time in India.

Scientists from the Indian Institute of Science Education and Research (IISER) Bhopal found the variant of the African violets in Mizoram.

The newly-described species, *Didymocarpus vickifunkiae* is currently known from only three locations near the north-eastern State's border with Myanmar and is considered an endangered species. It is an epiphyte — a plant that grows on trees — and produces light pink flowers during the monsoons.

The species has been named after Vicki Ann Funk, a noted botanist who worked at the Smithsonian Institute in the U.S.

**Also read:** [New Assam plant species may aid anti-cancer battle](#)

The finding [has been published](#) in *Systematic Botany*, a peer reviewed journal published by American Society for Plant Taxonomists, in a paper co-authored by research scholar Prasanna N.S. and Vinita Gowda, Associate Professor of Biological Sciences at IISER Bhopal.

"Commonly known as African violets, *Didymocarpus* is a genus belonging to the plant family Gesneriaceae whose members are distributed in Asia from Western Himalayas to Sumatra," Dr. Gowda said.

"Most of these species are narrow endemics and require specialised habitats to survive, thus acting as an indicator of pristine habitats. There are 106 currently known species of this genus, of which 26 are in the northeast," she told *The Hindu*.

African violets, native to Tanzania and Kenya have been popular in the horticultural world, often used indoors in European countries.

"The Mizoram plant is new to science which could be restricted to those areas because of reasons to be studied or it could be more widespread in areas where they remain to be spotted. But its discovery has underscored the floral diversity of the northeast that has a unique biogeographic placement as a part of two biodiversity hotspots — the Indo-Burma and the Eastern Himalayas," Dr. Gowda said.

The new species is an outcome of Mr. Prasanna's evolutionary study on the *Didymocarpus* group of plants found across India and the neighbouring countries, including China. The concentration of this genus is in the northeast.

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# MONEY SPIDER, ANT-MIMICKING SPIDER DISCOVERED AT WAYANAD WILDLIFE SANCTUARY

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

Male of the money spider ( *Prosoponoides biflectogynus*). | Photo Credit: Special Arrangement

Money spiders, commonly found in European meadows, have been reported for the first time in the country from the Muthanga range of the Wayanad Wildlife Sanctuary. The species is called so as it is “believed to bring luck” to the person who comes in contact with it.

Researchers of Christ College, Irinjalakuda, Thrissur, have discovered the spider that belongs to the family of dwarf spiders ( *Linyphiidae*) under the genus *Prosoponoides*. It has been given the name *Prosoponoides biflectogynus*.

“Only six species of spiders belonging to this genus have been identified from across the world so far. It is the first report of this genus from India and hence no extensive studies have been conducted on this species of spiders in the country,” said Dr. Sudhikumar A.V., Head, Department of Zoology, Christ College.

The research team includes Athira Jose and Vishnu Haridas, research scholars of the Centre for Animal Taxonomy and Ecology (CATE), Christ College.

They have also discovered ant-mimicking spiders, belonging to the group of jumping spiders, from the Mananthavady range. They belong to the family of *Salticidae*.

The male and the female money spiders are typically 3 mm and 4 mm long respectively. Both sexes are dark brown and have irregular silver patches and black spots on elliptical abdomen. There are numerous fine black spines on their olive green legs. Eight dark eyes are arranged in two rows.

Females build triangular webs in between dry tree twigs and feed on small insects, while males prefer to hide beneath dry leaves. Two or more male spiders can be found in the web of a single female.

The ant-mimicking spider has been named *Toxeus alboclavus*. Researchers collected this species of jumping spiders from among leaf litters.

“They perfectly mimic ants by lifting their front pair of legs while walking as a mechanism to escape from potential predators. Only three species of this genus have been reported from India, and this is the first species reported from the Western Ghats,” noted Dr. Sudhikumar.

The male and the female spiders of this species grow up to 4 mm and 6 mm long respectively. A pair of white stripes on the dark brown abdomen of females makes them distinct from other spiders of this group. The male of the species are characterised by a brown cephalic region and black thorax with white hairs. The forward-projecting fangs have a characteristic shape of an antler. Long spines are present on the base of each leg.

The study was funded by the Department of Science and Technology (DST) and the University Grants Commission (UGC). The findings were published in the British scientific journals *Peckhamia* and *Arachnology*.

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## DR. JITENDRA SINGH INAUGURATES INDIA'S 'FIRST LAVENDER FESTIVAL' IN BHADERWAH

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

Union Minister of State (Independent Charge) Ministry of Science and Technology; Minister of State (Independent Charge) Ministry of Earth Science; MoS of Prime Minister's Office and Ministry of Personnel, Public Grievances & Pensions, Atomic Energy and Space, Dr Jitendra Singh today said that Bhaderwah is the potential destination of Agri-tech StartUps of the country.

After Inaugurating the country's first 'Lavender Festival' here, the Union Minister described Bhaderwah as the birthplace of India's Purple Revolution. Dr. Jitendra Singh said that the country's first lavender festival in Bhaderwah has been possible today only by the progressive thinking of Prime Minister Narendra Modi who after taking the oath as PM in 2014 stressed that the regions which have been disconnected from the mainstream India must be connected to the mainstream through development.



Today's Lavender Festival in the valley of Bhaderwah is the best example of development of present progressive government at the centre which should have been celebrated much earlier, Bhaderwah being the best place for lavender cultivation in terms of land and climate, he added.

Dr. Jitendra Singh also said that the development prospects of PM Modi led government for the far-flung areas like Bhaderwah can also be judged from the fact that the country's first National Institute of High Altitude Medicine is being built in Bhaderwah which will attract scholars and researchers not only from India but across the globe generating employment opportunities for the region. The establishment of this institute is a proof of developmental initiatives reaching far flung places at an unprecedented rate compared to the last seventy years, Dr. Singh added.

The Minister said that the medical college at Doda and other distant places in J&K was not the priority of previous governments which shows that this government is leaving no stone unturned to take development to the farthest corners of the country.

About the development of roads in Doda and Bhaderwah, Dr. Jitendra Singh said that the connectivity to Doda and Bhaderwah earlier through roads was unsuitable due to the threat of landslides especially during rains. But, the construction of roads and tunnels have made the distance easier now, Dr. Singh maintained.

The Minister said that the Bhaderwah-Bani-Basoli Highway, Chattergala Tunnel under Bharatmala, Khilani-Marmat-Sudhmahadev Road connecting Hambal and Kalota, Bhaderwah-Chamba Highway & tunnel, the all weather roads being constructed will open new vistas of development for this region.

Dr. Jitendra Singh said that this government believes in the principle of 'Appeasement to none, justice for all' and doesn't discriminate on the basis of region, religion or caste and, maintained that the government wants that the benefits of all the government schemes must reach the last man in the last queue.



Dr. Singh emphasized that this government is trying its best to change the erstwhile political culture based on other things that may take some time but will be witnessed by the upcoming generations in India.

Referring to the lavender cultivation in the region, Dr. Singh said that Lavender is an avenue of employment generation and research opening many paradigms of development for the region.

He further said that the agriculturist Sh. Bharat Bhushan called the Brand Ambassador of Purple Revolution in India is an inspiration for youth in J&K towards Start-up culture.

Dr. Jitendra Singh further said that no government, even the government of the developed nations can't provide employment to every citizen. But, the present government is creating avenues for employment generation under 'Start-up India, Stand-up India'.

Dr. Jitendra Singh maintained that start-ups under purple revolution in J&K are one of the avenues under 'Start-up India, Stand-up India'.

Dr. Jitendra Singh also said that under Lavender Cultivation, potential farmers' income has not only been doubled but quadrupled. The Minister urged Media and opinion leaders to start awareness campaigns so that youth is attracted towards the start-up culture and their mind-set is freed from the thinking of government job.

Dr. Singh also inaugurated six distillation units under CSIR-IIIM for lavender situated at six different places.

Three MoUs were also signed between CSIR-IIIM Jammu with Agro Voltic Power, Mussoorie Uttarakhand, Lyallpur Khalsa College, Jalandhar Punjab and Fine Fragrance Power Limited, Mumbai.

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Sangeeta Bhagat, Vice-Chairperson DDC Doda, Shakti Raj Parihar, former Minister and MLA, Dr. Sumit Garola, Nodal Scientist CSIR besides scientists and potential farmers cultivating lavender were present during the festival. Many industrialists, potential farmers were felicitated during the lavender festival.

The Lavender Festival in Bhaderwah is being attended in large numbers by Scientists, Technologists, Progressive Farmers and Agri- entrepreneurs drawn from different parts of the country including Jammu and Kashmir.

CSIR-AROMA Mission, under the Ministry of Science & Technology aims to develop and disseminate the aroma-related science and technology to reach the end user/clients of CSIR: Farmers, industry and society.

Pertinent to mention that Aroma Mission is attracting Start-ups and agriculturists from across the country, and during Phase-I CSIR helped cultivation on 6000 hectares of land and covered 46 Aspirational districts across the country. More than 44,000 persons have been trained and several crores of farmers' revenue generated. In the second Phase of Aroma Mission, it is proposed to engage over 45,000 skilled human resources with the aim of benefitting more than 75,000 farming families across the country.

CSIR-IIIM introduced lavender to farmers in Doda, Rama, Kishtwar, Kathua, Udhampur, Rajouri, Pulwama, Anantnag, Kupwara and Bandipora districts. It provided free quality planting material and end-to-end technology package on cultivation, processing, value addition and marketing of the Lavender crop to the farmers.

CSIR-IIIM also installed 50 distillation units — 45 fixed and five mobile — at different locations across J&K under CSIR-Aroma Mission.

Lavender cultivation has employed about 5,000 farmers and young entrepreneurs in geographically remote areas of J&K. More than 1,000 farming families are cultivating it on more than 200 acres.

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## **SNC / RR**

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# HERITAGE TO SUSTAINABILITY, UN-HABITAT LAYS OUT PLAN FOR PINK CITY

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

Urban development: Jawaharlal Nehru Marg with the World Trade Park visible in the background. Special Arrangement

Posing a challenge for urban planners, UN-Habitat has identified multi-hazard vulnerabilities, urban sprawl, weak urban mobility and “green-blue disconnect” as the pressing issues for Jaipur city.

Though Rajasthan’s capital has received a high sustainability rating, government agencies have their task cut out to deal with the city’s expansion.

The global body has based its findings on a sustainable cities integrated approach pilot project, as part of which the “sustainable urban planning and management” component was implemented in collaboration with the Jaipur Development Authority and Jaipur Greater Municipal Corporation.

## Sustainability Rating

Jaipur has received an overall sustainability rating of three on the Urban Sustainability Assessment Framework (USAF) on the basis of data collected for 87 of its 131 parameters. Experts have identified urban sectors where the city needs to pay maximum attention, and made recommendations to increase its green cover, strengthen urban biodiversity, and enhance the quality of life for citizens.

UN-Habitat’s city coordinator Ankit Gupta told *The Hindu* that a few critical issues related to the city’s urban development had been identified to propose strategic interventions and promote sustainable development.

The project has received funding from the Global Environment Facility (GEF-6) to estimate the carbon sequestration potential of Indian cities.

Mitigating urban sprawl remains a major challenge in the State capital, with the UN body emphasising the concept of a compact city with re-development and re-densification of the existing urban areas.

As an indirect measure to curb development on the city’s outskirts, linking the distance from the main city to the development charges imposed on citizens could be considered.

## Better facility

Mr. Gupta said that since the city had weak access to a public transportation system, with less number of buses and poor route delineation, fare integration for different modes of transport would make movement convenient, and reduce traffic and vehicle emissions. Non-motorised transport infrastructure should also be strengthened in the city, he said.

The project found that there are about 800 dry wells in Jaipur’s Walled City that could be used as rainwater harvesting structures.

This would raise the water table, mitigate urban floods and ensure efficient utilisation of water resources, as Jaipur has been facing extreme cases of drought during summer as well as urban floods, according to the project's findings.

### **New proposals**

In order to increase green cover and promote biodiversity, "eco-trails" have been proposed across the city, with plantation along natural drainage channels and railway tracks.

Interestingly, Jaipur's urban greenery is concentrated towards the city centre with the Central Park, Ram Niwas Garden, Deer Park and Golf Club situated there, while newly developed areas lack green cover, generating the urban heat island effect and disrupting biodiversity.

### **Consultation necessary**

Architecture and planning expert Nand Kumar said at a stakeholders' consultation organised by UN-Habitat here that town planners should develop a model to demonstrate to the people and the government how the issues in achieving sustainability could be tackled and urban greenery expanded.

Tourism & Wildlife Society of India (TWSI) secretary Harsh Vardhan said the authorities should start quantifying oxygen produced and carbon dioxide released daily in each urban complex to plan for raising new greens. Urban development should not just embrace cement-steel structures, he added.

Mr. Vardhan said the next crucial aspect would be the selection of floral species for urban areas, as only indigenous, broad-leaved and tap-root trees would produce more shade and oxygen for the city residents.

"Urban bodies grossly undermine such species and instead plant exotic vegetation, which tends to be unhealthy for the citizens," he said.

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# HOW RESILIENT WERE PLANKTONS TO GLOBAL WARMING?

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

Plankton was said to be profoundly affected by water temperature and climate change, according to a series of five studies published on Thursday, May 21, 2015, in *Science* about the voyage of the schooner Tara. | Photo Credit: The Hindu photo library

An international team of scientists has found a remarkable type of fossilisation that has remained almost entirely overlooked until now. The fossils are microscopic imprints, or 'ghosts,' of single-celled plankton, called coccolithophores, that lived in the seas millions of years ago, and their discovery is changing our understanding of how plankton in the oceans are affected by climate change.

Declines in the abundance of coccolith fossils have been documented from multiple past global warming events, suggesting that planktons were severely affected by climate change and ocean acidification. But a study found ( *Science*) new global records of abundant ghost fossils from three Jurassic and Cretaceous warming events (94, 120, and 183 million years ago), suggesting that coccolithophores were more resilient to past climate change than was previously thought.

Despite their microscopic size, coccolithophores can be hugely abundant in the present ocean, being visible from space as cloud-like blooms. After death, their calcareous exoskeletons sink to the seafloor, accumulating in vast numbers, and forming rocks such as chalk.

As more mud was gradually deposited on top, the resulting pressure squashed the coccolith plates and other organic remains together, and the hard coccoliths were pressed into the surfaces of pollen, spores, and other soft organic matter. Later, acidic waters within spaces in the rock dissolved away the coccoliths, leaving behind just their impressions — the ghosts.

"The ghost fossils show that nannoplankton was abundant, diverse, and thriving during past warming events in the Jurassic and Cretaceous, where previous records have assumed that plankton collapsed due to ocean acidification," Prof. Richard Twitchett from Natural History Museum, London says in a release. "These fossils are rewriting our understanding of how the calcareous nannoplankton respond to warming events."

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