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Source : www.hindustantimes.com Date : 2020-09-04

REVIEW THE CHAR DHAM PROJECT - EDITORIALS - HINDUSTAN TIMES

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

Sep 04, 2020-Friday
-°C

Humidity
-

Wind
-

Delhi, Mumbai, Chennai, Kolkata

Noida, Gurgaon, Bengaluru, Hyderabad, Bhopal , Chandigarh , Dehradun, Indore, Jaipur, Lucknow, Patna, Ranchi

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The ministry of environment, forest and climate change (MoEFCC) has sought responses from the ministry of road transport and highways (MoRTH) and the Uttarakhand government about the alleged violations of the forest conservation act during the construction of the Char Dham Pariyojana in Uttarakhand. The 12,000-crore Pariyojana, which was inaugurated by Prime Minister Narendra Modi in December 2016, aims to build an 889-km all-weather road, connecting the Hindu pilgrimage sites of Kedarnath, Badrinath, Yamunotri and Gangotri in the Himalayas. The issue of environmental violations in the project is being heard by the Supreme Court (SC), and the case is due to come up on September 8.

While there has been criticism of the project on environmental grounds (recent landslides in the state prove once again that it is risky to build in the ecologically-fragile zone), its plan of action illustrates how the Indian State has flouted procedures to push the project through. One, the government used a legal loophole to avoid conducting the mandatory Environmental Impact Assessment (EIA), including public hearings, to fast-track the project. Two, official agencies refused to abide by SC orders on stoppage of work. And, three, it suppressed a MoRTH's revised circular on the contentious issue of road standards in hilly and mountainous terrains to go ahead with its road-widening plans.

This is not all: A senior Uttarakhand government official tried to mislead MoEFCC by sending an "altered" report to the ministry, bypassing Ravi Chopra, the chairman of the High Powered Committee (HPC) set up by SC to look into the project. This "subterfuge", as Mr Chopra wrote it in his letter to the ministry, was conducted because five members of the panel felt that the project will cause "irreversible damage" to the Himalayan ecology, while 21 others (mostly government representatives) said that the ecological damage can be "minimised". The Chopra report has said that the project is an "act of irresponsibility and disregard towards the Himalayas", when it is becoming clearer that any development devoid of "honest and uncompromising ecological concerns" will bring "devastation and disaster on our heads". The Centre must take the Chopra report seriously, review its stand on the need for broader roads, and conduct a carrying-capacity study of the area. The government's stand will also define how serious it is about complying with green norms in general, and the larger issue of the climate

crisis.

END

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Source : www.thehindu.com Date : 2020-09-05

KAZIRANGA NATIONAL PARK SET TO BE EXPANDED BY 3,053 HECTARES

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

A tourist road inside the Kaziranga National Park in Assam. File | Photo Credit: Ritu Raj Konwar

The Assam government has approved the addition of 30.53 sq km to the 884 sq km Kaziranga National Park.

The additional areas straddling two districts — Nagaon and Sonitpur — would make the larger Kaziranga National Park and Tiger Reserve (KNPTR) grow to 1085.53 sq km. However, the wildlife habitat still awaits the possession 14.62 sq km “added” earlier in two other districts.

The core area of the KNPTR is 430 sq km.

A Forest Department spokesperson said preliminary notifications were for seventh, eighth and ninth additions on Thursday.

“The additions include encroachment-evicted areas and suitable wildlife habitat on river islands (sandbars) that are vulnerable to encroachment. It is a move to consolidate the wildlife areas anticipating better wildlife conservation and reduction in human-wildlife negative interactions in the future,” KNPTR director P. Sivakumar said.

He added that the three additions are habitat corridors and would help provide connectivity to Orang and Nameri National Parks across river Brahmaputra from KNPTR besides the hills of Karbi Anglong to the south of the park, where the rhino, tiger, deer and other animals take refuge during the floods.

“Of course, we will need more manpower to guard the additional areas,” Mr Sivakumar said.

The seventh and eight additions totalling 4.83 sq km are in Nagaon district while the ninth, covering 25.70 sq km, is in Sonitpur district.

Wildlife activists have appreciated the official stamp on the expansion of KNPTR but have pointed out that the rhino habitat is yet to be handed over possession of 1,461.59 hectares (14.62 sq km) of land comprising the second, third, fifth and sixth additions in Golaghat and Biswanath districts.

On August 17, the Gauhati High Court had directed the Principal Chief Conservator of Forests (Wildlife) and the Chief Wildlife Warden, Assam, to submit an action-taken report on eviction of encroachers in areas added to the park earlier.

The court had on October 9, 2015, ordered the eviction of encroachers in the second, third, fifth and sixth additions to the KNPTR while observing that the State government delivered a total of 39,836.74 hectares covering the first and fourth additions.

Designated a UNESCO World Heritage Site in 1985, the KNPTR has an estimated 2,413 rhinos and 121 tigers.

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Source : www.thehindu.com Date : 2020-09-05

THE ENVIRONMENT IS A NATIONAL ISSUE

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

Environment issues are currently at the centre of a heated debate. Even the Congress President, Sonia Gandhi, felt impelled to write on the issue (*The Hindu*, Editorial page, *Stop the dismantling of environmental rules*, August 13, 2020). As a former Environment Minister in the United Progressive Alliance (UPA) dispensation, I feel that environment issues should be above political dissonance, and to this end attempt to highlight critical facts which need to be flagged for public knowledge. To politically weaponise environmental issues is unproductive and unacceptable.

It may be politically convenient — but not presenting the complete picture — to express shock at India being ranked at "177 out of 180 countries" in the Environmental Performance Index Report. Besides, in the June 2020 EPI, India's rank stands improved at 168, not 177 which is the 2018 rank.

The Environmental Performance Index has been developed by two U.S. universities (Yale and Columbia) in collaboration with the World Economic Forum and European Commission and available ranking shows India at 118 in 2006, 123 in 2010, 155 in 2014 and 177 in 2018, thereby giving a message opposite to that sought to be conveyed, regarding our standing at 177 in 2018.

Also, the experts in the two universities conclude: "... the 2008 ranking suggests that wealth is a major determinant of environmental success." Any balance between the environment and development needs to be struck within India and based on our priorities, and not some international index.

Further, the environment index cited by Ms. Gandhi, as explained above, shows a drop of 37 points (namely six points a year) in six years of UPA rule — and 22 points in 4 years (4.5 points a year) — under the present rule. The statistics are self-explanatory.

Pointed reference is made to the Narendra Modi government's alleged preoccupation with "crony capitalism" and implementing "ease of doing business" to the detriment of the environment. This charge ignores the record of UPA governments, when important Group of Minister Committees were set up to implement ease of doing business, as also a special Monitoring Cell in the Cabinet Secretariat. Regardless of affiliation, every government faces this balancing challenge.

Further, the link between the great winter smog and pollution in North India, and the present draft EIA draft is not reasonable, since winter pollution in North India did not begin in 2014, after Narendra Modi was elected. In point of fact, the winter smog and pollution in North India exemplify the anomalies of federalism, where the imperatives of the Centre and States differ. There are also problems of environmental laws which are effective in principle, against point sources like industries — but not against agriculture-related pollution such as stubble burning or public usage pollution relating to vehicular and household sources. Undoubtedly, big industry has erred grievously in polluting our environment, and the government needs to take stringent steps against violators.

Ms. Gandhi writes about the problems of Adivasis. However, this problem did not arise in just the last few years. The UPA governments were unable to frame subordinate legislation and implement the Forest Rights Act effectively for eight long years, even in Congress-ruled States.

In fact a major dilution of the Forest Rights Act was spearheaded by the Prime Minister's Office in the UPA dispensation, and office memorandums formalising the dilution were issued despite objections from some quarters. 'Forests' was a State subject until transferred to the Concurrent list by the 42nd Amendment Act. However, *de facto*, the powers of the State governments continue, which is why, regardless of political affiliation, State governments hesitate to fully implement the Forest Rights Act.

Deforestation ought to be a primary concern of any right-thinking government. Forest clearances for mining and industries, while major, are not the only causes of deforestation. Population pressure due to which the slash-and-burn (or *jhoom* cycle) has reduced in forest areas from 17-20 years to two-three years giving no time for forest regeneration, and creeping conversion of forest to cultivated land are both major drivers of deforestation; there is also the increasing use of timber for household and industry purposes. However, while diversion of forests for mining and industry is regulated by law and challenged in courts, the other major drivers are not even discussed.

'Nirmal Ganga' can be achieved by zero discharge of effluents and domestic sewerage, but 'Aviral Ganga' can only be achieved by constant balancing between irrigation needs of agriculture and potable water for cities on the one hand and the environmental flow of the river on the other.

The balance of imperatives between the environment and poverty eradication, and the critical need to harmonise the working of the central, State, and local governments, as also intelligence, monitoring and compliance with law are vital dimensions of environment preservation.

To address environment protection from the standpoint of ideological or political mooring is to sound the death knell of our environment. The environment is a national issue which requires the unwavering participation of all governments, and all citizens, regardless of political affiliation.

Jayanthi Natarajan is a political activist and a former Union Environment Minister

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Source : www.thehindu.com Date : 2020-09-06

HOW AFRICAN SAHARA AMPLIFIED A DROUGHT IN ASIA

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

Paleolithic study: Kathleen Johnson carries her caving gear across a river, exiting a cave in Laos.

About 4,000 to 5,000 years ago, a severe drought crippled countries of Southeast Asia forcing a shift in human settlement patterns of the area. Researchers have now told the story behind this mega-drought. By studying the mineral deposits of caves in Vietnam they point to a connection between the end of the Green Sahara and this mega-drought.

The team collected stalagmite samples from the caves in Laos and examined the oxygen, carbon isotopes and trace metals. They also conducted different modelling and paleoclimate experiments. The data suggested that during this period the Sahara started losing its vegetation. The reduced plant growth led to increased airborne dust which cooled the Indian Ocean, shifted the atmospheric circulation patterns and caused a condition similar to today's El Niño events.

This ultimately led to a large reduction in monsoon moisture across Southeast Asia that lasted more than 1,000 years, says Kathleen Johnson in a release. She is an associate professor of Earth system science at the University of California and one of the corresponding authors of the paper published in *Nature Communications.*

Previous studies have shown that this demise of the Green Sahara also caused the collapse of the Akkadian Empire of Mesopotamia and the de-urbanisation of the Indus Valley Civilization.

This mega-drought period also brought about many lifestyle changes in the mainland Southeast Asian countries of Myanmar, Thailand, Laos, Cambodia and Vietnam. The first appearance of cultivated cereals - millet in central Thailand and rice in northeast Thailand were during this period. It also introduced the nucleated village agrarian lifeway. Studies of ancient DNA sequencing of human genomes have also pointed to population changes in mainland Southeast Asia about 4,000 years ago leading to some emigration in the region.

"Archaeologists and anthropologists have been studying this event for decades now, in terms of societal adaptations and upheavals, but its exact cause has eluded the scientific community," said lead author Michael Griffiths in a release. "Results from this work could help us better understand, to varying degrees, the observed societal shifts across many parts of the tropics and extratropics." He is a professor of environmental science at William Paterson University, New Jersey.

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LOW OZONE OVER BRAHMAPUTRA RIVER VALLEY BRINGS GOOD NEWS FOR HEALTH OF PEOPLE

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

There is good news for the Brahmaputra River Valley (BRV). Researchers have found that the concentration of near surface ozone in this region in the North-East corner of India is low compared to the other urban locations in India

Scientists at the **Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital** an autonomous research institute under the Department of Science and Technology (DST) Govt. of India have evaluated the near surface ozone in the Brahmaputra River Valley (BRV) and found relatively low concentration of Ozone over Guwahati compared to the other urban locations in India. Their present work has been published recently in the journal ***'Atmospheric Pollution Research'.***

Tropospheric, or ground-level ozone, is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC). It usually increases when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight, impacting human health.

In the study led by Dr. Umesh Chandra Dumka (Scientist, **ARIES, Nainital**, India) along with contributions by Dr. A. S. Gautam (Professor at ***Hemvati Nandan Bahuguna Garhwal University***), Dr. Suresh Tiwari (Scientist **Indian Institute of Tropical Meteorology, New Delhi** Branch) and Prof. Philip K. Hopke (Adjunct Professor, **University of Rochester School of Medicine and Dentistry, USA**) and Prof. R. K. Chakrabarty (**Washington University, USA**) and other team members analysed the variability of ozone and other air pollutants over Brahmaputra River Valley region. It also assessed seasonal, day of week, and characteristics of ozone to identify the emission source of ozone and its precursors, especially methane (CH_4) and NMHCs, along with study the relationships between the meteorological parameters, ozone and its precursors in a tropical setting.

The examination of nitric oxide, nitrogen dioxide, and ozone concentrations in this study suggested that this site is well influenced by local sources such as adjacent major national highway. During the daylight hours, the site is in or nearly in a photo-stationary state, indicating a low impact of organic species on the ozone concentrations.

[Publication link: https://doi.org/10.1016/j.apr.2019.12.013

Dr. Umesh Chandra Dumka (dumka@aries.res.in; 09897559451) and Dr. Suresh Tiwari (smbtiwari@tropmet.res.in; 88264 66330) can be contacted for further details.]

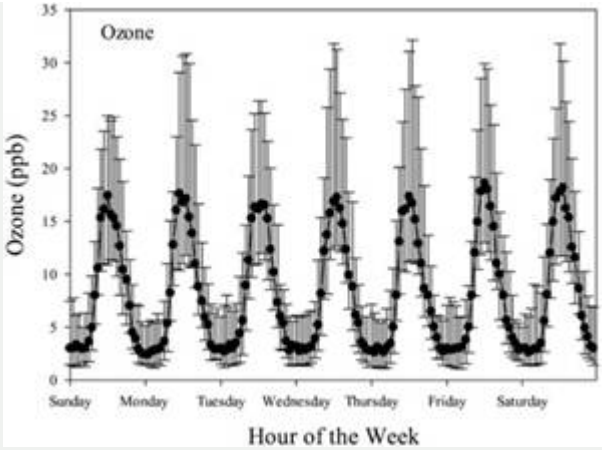

Figure 1: Median ozone concentration as a function of hours of the week. Error bars represent the 25th and 75th percentile values (courtesy Dumka et al., 2020, Atmospheric Pollution Research; https://doi.org/10.1016/j.apr.2019.12.013).

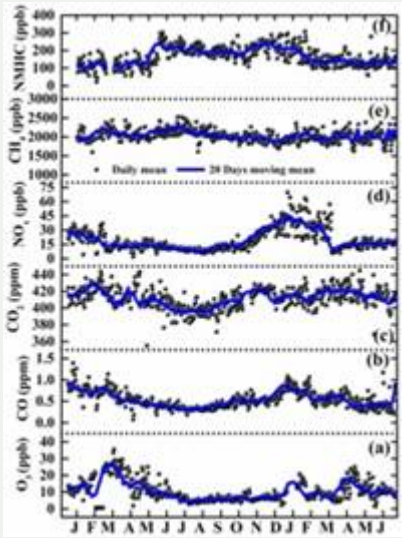

Figure 2: Daily and 20 days moving mean of O3 (ppb), CO (ppm), CO2 (ppm), NOx (ppb), CH4 (ppb) and NMHC (ppb) from January 1st, 2013 to June 30, 2014, in Guwahati, India (courtesy Dumka et al., 2020, Atmospheric Pollution Research; https://doi.org/10.1016/j.apr.2019.12.013).

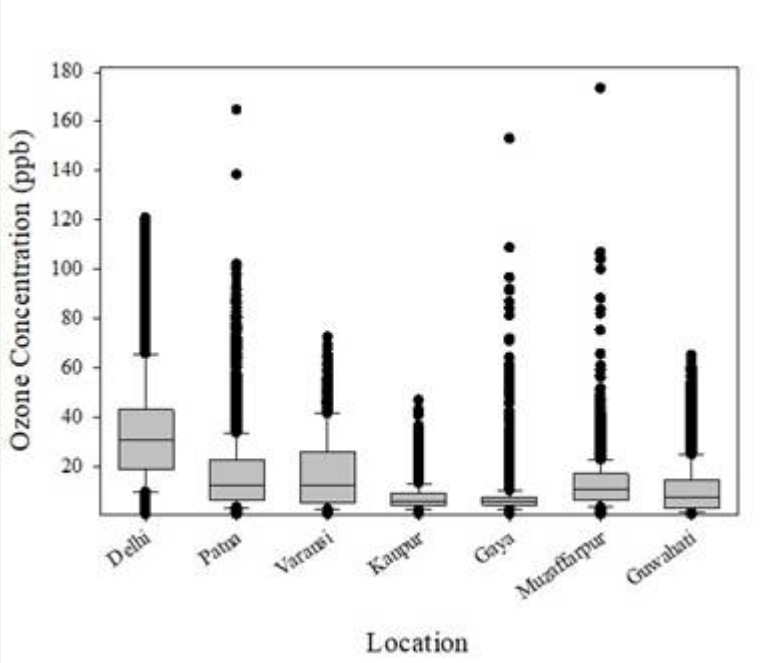

Figure 3: Spatial Variability of Ozone over IGP (Indo-Gangetic Plain) and Guwahati (Brahmaputra Valley Region).

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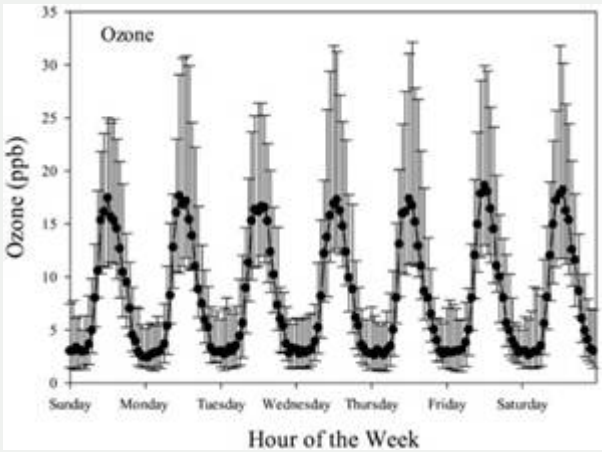

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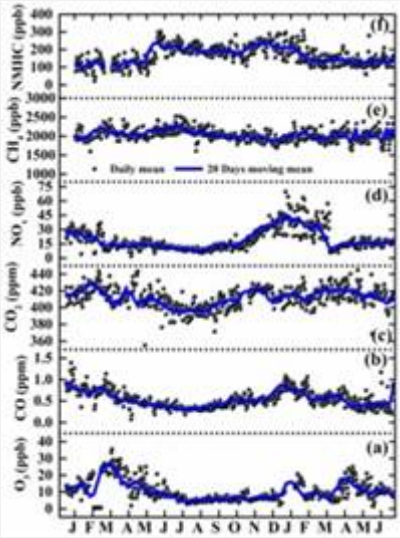

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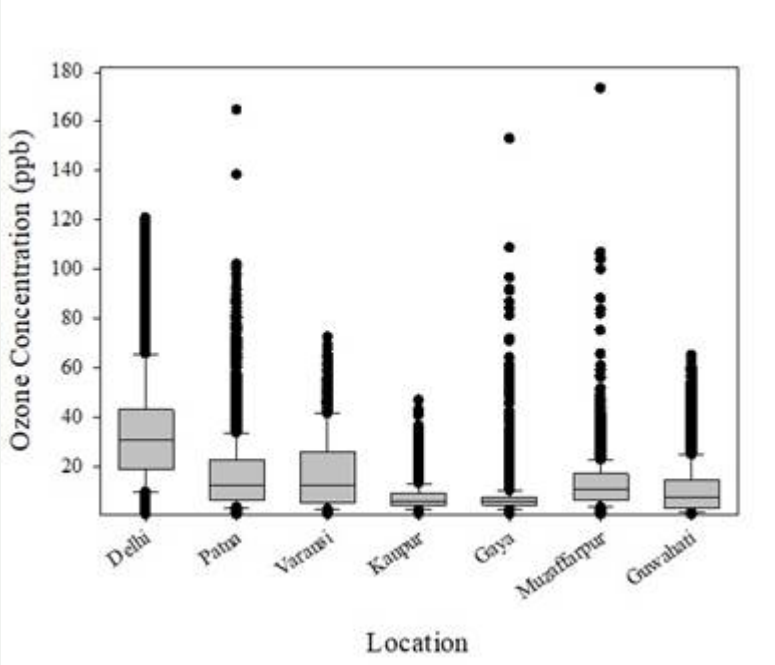

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ON THE CLIMATE CRISIS, A GRAVE WARNING

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

Sep 14, 2020-Monday
-°C

Humidity
-

Wind
-

Delhi, Mumbai, Chennai, Kolkata

Noida, Gurgaon, Bengaluru, Hyderabad, Bhopal , Chandigarh , Dehradun, Indore, Jaipur, Lucknow, Patna, Ranchi

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According to a new climate change assessment that was launched by the United Nations (UN) secretary-general Antonio Guterres on September 9, the Covid-19 lockdowns have made a dent on global greenhouse gas emissions — but this is not nearly enough. Following a sharp fall in early April of 17% from 2019 levels, by June, as economies started opening up, daily emissions rose to within 5% of last year's record levels. The *United In Science* report has been compiled by the World Meteorological Organization based on its findings, along with the findings of five other global science bodies. The report said that the final levels of emissions for 2020 would be 4-7% less than in 2019. However, on a larger scale, the world hasn't moved forward on combating the climate crisis.

To limit global heating to less than a 2 degree Celsius rise above pre-industrial levels by 2100, emissions need to fall by 5% every year. This year, the pandemic took care of this but there is no doubt that governments must do much more. Between 2020 and 2024, global temperatures are likely to breach the 1.5 degrees Celsius threshold in multiple months. The world is now 1.1 degrees warmer than pre-industrial times, and 2016-2020 is set to be the hottest period ever since records began to be kept. This, and the fact that global sea levels are rising, shows that the climate crisis is intensifying. It is clear that countries must reduce carbon emissions over the next 10 years. The shift away from fossil fuels to renewable energy needs to be scaled up if catastrophic levels of temperature rise are to be averted. As countries seek to reboot their Covid-ravaged economies, the assessment comes as a grave warning.

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Source : www.hindustantimes.com Date : 2020-09-17

ON BIODIVERSITY, A GLOBAL FAILURE - EDITORIALS - HINDUSTAN TIMES

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

Sep 17, 2020-Thursday
-°C

Humidity
-

Wind
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Delhi, Mumbai, Chennai, Kolkata

Noida, Gurgaon, Bengaluru, Hyderabad, Bhopal , Chandigarh , Dehradun, Indore, Jaipur, Lucknow, Patna, Ranchi

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The world has failed to achieve even one of the 20 Aichi Biodiversity Targets signed by 170 countries and regions through the United Nations Convention on Biological Diversity (CBD), says the latest *Global Biodiversity Outlook 5* (GBO-5) report released on Tuesday. The conservation targets, which aim to protect the world's imperiled flora and fauna, were formulated in Japan in 2010. The convention is currently ironing out its post-2020 framework, which will be adopted at its next meeting in Kunming, China, in 2021. The new framework will create a new set of targets to remedy the Aichi goals' failures, and turn things around.

National governments failed to meet the CBD goals despite an earlier warning from United Nations that one million species could disappear within decades, widening the Holocene extinction: The planet's sixth mass extinction event, driven by human activity. They failed because of two reasons. One, most countries struggled to balance conservation with the needs of their growing populations and economy (it is the same policy dilemma that is hobbling the fight against the climate crisis). And two, positive conservation steps were upended by perverse incentives which enable destruction — for instance, fossil fuels need mining and overfishing destroys coral reefs, all of which has an impact on preservation.

The *GBO-5* comes out at a crucial time when, amid the Covid-19 pandemic, the world is being forced to rethink its development objectives and its relationship with nature. Business-as-usual will only plunge the globe into deeper crises, given the complex interdependence of all elements in nature. A stronger CBD framework must push national governments to act and avoid a natural catastrophe that can endanger human lives.

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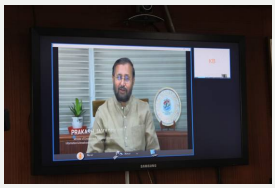
Source : www.pib.gov.in Date : 2020-09-19

IN A FIRST, EIGHT BEACHES OF INDIA RECOMMENDED FOR THE COVETED “BLUE FLAG” INTERNATIONAL ECO-LABEL.

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

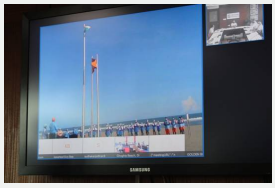
On the eve of International Coastal Clean-Up Day which is celebrated across 100 countries since 1986, Union Ministry of Environment, Forest and Climate Change (MoEFCC) announced at a virtual event that for the first time eight beaches of India are recommended for the coveted International eco-label, the Blue flag certification. The recommendations are done by an independent National Jury composed of eminent environmentalists & scientists. Blue Flag beaches are considered the cleanest beaches of the world. The eight beaches are Shivrajpur in Gujarat, Ghoghla in Daman&Diu, Kasarkod and Padubidri beach in Karnataka, Kappad in Kerala, Rushikonda in Andhra Pradesh, Golden beach of Odisha and Radhanagar beach in Andaman and Nicobar.

Union Environment Minister, Shri Prakash Javadekar who couldn’t attend the event due to the ongoing parliament session, said through a video message that the government is committed to clean the beaches across the country. He said, clean beaches are the testimony to environment in the coastal area. He said, the issue of marine litter and oil spilling has caused disturbances to the aquatic life and the Government of India is undertaking various efforts for the sustainable development of coastal regions.



The event also saw the launch India’s own eco-label ***BEAMS*** by e-hoisting the flag - #***IAMSAVINGMYBEACH*** simultaneously at these eight beaches. SICOM, MoEFCC in pursuit of promoting its policies for sustainable development in coastal regions have embarked upon a highly acclaimed program ***“BEAMS”*** (Beach Environment & Aesthetics Management Services) under its ICZM (Integrated Coastal Zone Management) project. This is one of the several other projects of ICZM that Govt of India is undertaking for the sustainable development of coastal regions, striving for globally recognized and the coveted eco-label ‘***Blue flag***”.

The flag hoisting program was conducted simultaneously at these 08 beaches virtually from MOEFCC and physically at the beaches by respective States/UTs through its MLAs and/or Chairman of Beach Management Committees (***BMCs***).



Speaking on the occasion, Union Environment Secretary, Shri R.P. Gupta said that high standards are being maintained to clean the beaches to keep environment safe and in the next four to five years 100 more beaches will be cleaned.

In a video message, World Bank's country director Mr. Zunaid Khan applauded India's efforts towards cleaning up the its beaches and said that India with its strategies for sustainable coastal zone management shall act as a lighthouse for other countries in the region.

With a view to protect and conserve the coastal and marine ecosystems and environment through a holistic coastal management, the Ministry of Environment, Forests & Climate Change launched the Integrated Coastal Zone Management (ICZM) activities in India for a holistic approach with an interactive, dynamic, multidisciplinary, and iterative planning process *to promote sustainable development & managemen*t of coastal zones through its own wing SICOM.

The concept of ICZM was introduced in 1992 during the Earth Summit at Rio de Janeiro and most of the coastal countries in the World have been adopting ICZM principles for managing their coastal zones. Thus, adoption of ICZM principles for managing and sustainably developing our coastal regions is helping India in keeping with its commitments to international agreements on ICZM.

The objective of ***BEAMS*** program is to abate pollution in coastal waters, promote sustainable development of beach facilities, protect & conserve coastal ecosystems & natural resources, and seriously challenge local authorities & stakeholders to strive and maintain high standards of cleanliness, hygiene & safety for beachgoers in accordance with coastal environment & regulations. This program promotes beach recreation in absolute harmony with nature.

International Coastal Cleanup Day got its start in 1986 when Linda Maraniss met Kathy O'Hara while working for Ocean Conservancy. O'Hara had just completed a report called Plastics in the Ocean: More Than a Litter Problem. The two of them reached out to other ocean-lovers and organized a Cleanup for Ocean Conservancy. The first Cleanup consisted of 2,800 volunteers. Since that time, the Cleanup has grown into an international event in more than 100 countries.

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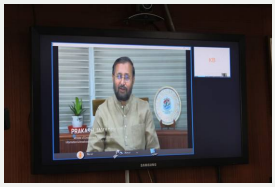

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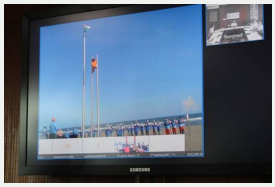

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SCIENTISTS USE INDIAN OCEAN EARTHQUAKE DATA TO TELL HOW FAST IT IS WARMING

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

Representational image via Caltech website.

Scientists have developed a novel method to determine how fast the Indian Ocean is warming by analysing the sound from seabed earthquakes, an advance that may lead to a relatively low-cost technique to monitor water temperatures in all of the oceans.

According to the researchers, including those from the California Institute of Technology (Caltech) in the U.S., as much as 95% of the extra heat trapped on the Earth by greenhouse gases like carbondioxide is held in the world's oceans, making it important to monitor the temperature of ocean waters.

In the current study, published in the journal *Science*, the scientists used existing seismic monitoring equipment, as well as historic data on earthquakes, to determine how much the temperature of the ocean has altered, and continues changing, even at depths that are normally out of the reach of conventional tools.

They assessed a 3000-kilometer-long section in the equatorial East Indian Ocean, and found temperature fluctuations between 2005 and 2016, with a decadal warming trend that "substantially exceeds previous estimates."

By one estimate, the scientists said the ocean could be warming by nearly 70% greater than had been believed.

However, they cautioned against drawing any immediate conclusions, as more data need to be collected and analysed.

Jorn Callies, a co-author of the study from Caltech, noted that the method works by monitoring underwater quake sounds, which are powerful and travel long distances through the ocean without significantly weakening.

The researchers explained that when an earthquake happens under the ocean, most of its energy travels through the earth, but a portion of that energy is transmitted into the water as sound.

They said these sound waves propagate outward from the quake's epicenter just like seismic waves that travel through the ground, but added that the sound moves at a much slower speed.

The study noted that the ground waves arrive at a seismic monitoring station first, followed by the sound waves, which will appear as a secondary signal of the same event.

This effect, according to the researchers, is similar to how one often sees the flash from lightning seconds before hearing its thunder.

Since the speed of sound in water increases as the water's temperature rises, they found that the length of time it takes a sound wave to travel a given distance in the ocean can be used to deduce the water's temperature.

The scientists said analysing earthquakes which happen again and again in the same place can shed more information on the rate of warming.

“In this example we’re looking at earthquakes that occur off Sumatra in Indonesia, and we measure when they arrive in the central Indian ocean,” said Wenbo Wu, lead author of the study from Caltech.

“It takes about a half hour for them to travel that distance, with water temperature causing about one-tenth-of-a second difference. It’s a very small fractional change, but we can measure it,” he added.

In the study, the scientists used a seismometer that has been in the same location in the central Indian Ocean since 2004.

They said this helps them look back at the data it collected each time an earthquake occurred in Sumatra, for example, and determine the temperature of the ocean at that same time.

“We are using small earthquakes that are too small to cause any damage or even be felt by humans at all,” Mr. Wu said.

“But the seismometer can detect them from great distances, thus allowing us to monitor large-scale ocean temperature changes on a particular path in one measurement,” he added.

Based on the data analysed so far, the researchers confirmed that the Indian Ocean has been warming, as other data collected through other methods have indicated.

But they added that the ocean might be warming even faster than previously estimated.

“The ocean plays a key role in the rate that the climate is changing,” Mr. Wu said.

“The ocean is the main reservoir of energy in the climate system, and the deep ocean in particular is important to monitor,” he added.

Since undersea earthquakes happen all over the world, the researchers said the system can be developed to monitor water temperatures in all of the oceans using existing infrastructure and equipment at a relatively low-cost.

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OCEAN SERVICES, MODELLING, APPLICATIONS, RESOURCES AND TECHNOLOGY (O-SMART) SCHEME OF THE MINISTRY OF EARTH SCIENCES

Relevant for: Environment | Topic: Disaster and disaster management

The objectives of O-SMART (Ocean Services, Modelling, Applications, Resources and Technology) scheme of Ministry of Earth Sciences (MoES), Govt. of India are

(1) To generate and regularly update information on Marine Living Resources and their relationship with the physical environment in the Indian Exclusive Economic Zone (EEZ),

(2) To periodically monitor levels of sea water pollutants for health assessment of coastal waters of India, to develop shoreline change maps for assessment of coastal erosion due to natural and anthropogenic activities,

(3) To develop a wide range of state-of-the art ocean observation systems for acquisition of real-time data from the seas around India,

(4) To generate and disseminate a suite of user-oriented ocean information, advisories, warnings, data and data products for the benefit of society,

(5) To develop high resolution models for ocean forecast and reanalysis system,

(6) To develop algorithms for validation of satellite data for coastal research and to monitor changes in the coastal research,

(7) Acquisition of 2 Coastal Research Vessels (CRVs) as replacement of 2 old CRVs for coastal pollution monitoring, testing of various underwater components and technology demonstration,

(8) To develop technologies to tap the marine bio resources,

(9) To develop technologies generating freshwater and energy from ocean,

(10) To develop underwater vehicles and technologies,

(11) Establishment of Ballast water treatment facility,

(12) To support operation and maintenance of 5 Research vessels for ocean survey/monitoring/technology demonstration programmes,

(13) Establishment of state of the art sea front facility to cater to the testing and sea trial activities of ocean technology,

(14) To carryout exploration of Polymetallic Nodules (MPN) from water depth of 5500 m in site of 75000 sq.km allotted to India by United Nations in Central Indian Ocean Basin, to carryout investigations of gas hydrates,

(15) Exploration of polymetallic sulphides near Rodrigues Triple junction in 10000 sq. km

of area allotted to India in International waters by International Seabed Authority/UN and,

(16) Submission of India's claim over continental shelf extending beyond the Exclusive Economic Zone supported by scientific data, and Topographic survey of EEZ of India.

The Indian Tsunami Early Warning Centre (ITEWC) was established at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, an autonomous body under Ministry of Earth Sciences which continues to provide timely tsunami advisories to stake holders and has functioned flawlessly since its establishment in October 2007. The ITEWC is also providing tsunami services to 25 Indian Ocean Countries as part of the Intergovernmental Oceanographic Commission (IOC) of UNESCO framework. INCOIS has introduced several innovative concepts in tsunami modeling, mapping of coastal inundation, Decision Support System, SOPs to meet the emerging challenges and provide accurate and timely tsunami early warnings. INCOIS has established a Global Navigation Satellite System (GNSS) & Strong Motion Accelerometers in Andaman and Nicobar Islands for quick and reliable estimation of source parameters for near source earthquakes. In addition, INCOIS has carried out Multi-hazard Vulnerability Mapping (MHVM) along the mainland of Indian coastland MHVM atlas has been prepared. The ITEWC, INCOIS regularly conducts workshops, training sessions and tsunami mock exercises to create awareness and preparedness about the tsunamis. In addition to workshops and trainings for disaster managers, ITEWC is also coordinating with coastal States/UTs to implement Tsunami Ready Programme, a concept introduced by UNESCO, at community level. Odisha has implemented the programme in two villages (Venkatraipur and Noliasahi) and based on the national board recommendation, IOC (UNESCO) recognized these villages as Tsunami ready communities.

We have better Tsunami prediction models at ITEWC and INCOIS is continuously working towards improving its accuracy.

This information was given by the Union Minister of Science and Technology, Earth Sciences and Health and Family Welfare, Dr Harsh Vardhan in a written reply in Rajya Sabha on September 20, 2020.

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NB/KGS/(RSQ-983)

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NB/KGS/(RSQ-983)

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Source : www.thehindu.com Date : 2020-09-24

CHINA VOWS TO GO CARBON NEUTRAL BY 2060

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

Climate action:Xi Jinping’s pre-recorded message playing at the UN General Assembly session on Tuesday.AP

The U.S. is guilty of “obstructing” the global fight against emissions, China said on Wednesday, as Beijing seized the climate agenda by vowing to go carbon neutral by 2060, a target welcomed by environmentalists despite its patchy detail.

The goals, which include a pledge to reach peak emissions in 2030, are the most concrete ones yet announced by China, which is the world's biggest polluter and accounts for a quarter of the planet's greenhouse gas emissions. They also open a new divergence in relations with the U.S., which are already pinched by squabbles over trade, tech, defence and human rights.

Speaking to the United Nations (UN) General Assembly, Chinese President Xi Jinping on Tuesday renewed his support for the Paris climate accord and called for a ‘green focus’ as the world recovers from the COVID-19 crisis.

Under President Donald Trump, the United States, the world's second-largest polluter, pulled out of the agreement, blaming China for the stalled momentum on tackling global emissions.

“This clearly ... seriously obstructs the progress of reducing global emissions,” China's Foreign Ministry spokesman Wang Wenbin said in a statement on Wednesday. “What qualifications does such a country have to criticise China,” he asked, citing U.S.’s hunger for plastics and its export of waste.

In his speech to the UN, Mr. Xi said China aims to have “C02 emissions peak before 2030 and achieve carbon neutrality before 2060”.

‘Nuanced picture’

In addition to its embrace of global emissions-busting deals, China already feeds nearly 15% of its energy demands with non-fossil fuels, Mr. Wang added. China's “installation of renewable energy stands at 30% of the world total,” he said.

But experts say the picture is more nuanced, with massive investments continuing at home and overseas in coal and other fossil fuels.

China currently has 135 gigawatts of coal-power capacity either permitted or under construction, according to Global Energy Monitor, a San Francisco-based environmental group. This equates to about half the total coal-power capacity in the United States.

Welcoming China's pledge, EU commission president Ursula von der Leyen tweeted “a lot of work remains to be done”.

The 2060 objective is still a decade later than the date set by dozens of small states as well as European powers. But it was applauded by experts as a significant step to inject momentum into the Paris accords. Joeri Rogelj, a climate expert at Imperial College London's Grantham Institute, called Mr. Xi's pledge “unexpected and eye-opening”.

Trump’s criticism

Mr. Xi's tone at the UN contrasted sharply with that of Mr. Trump, who called the Paris accord unfair to the United States.

Mr. Trump said he is standing up for U.S. constituencies such as coal miners, and has loosened environmental rules, although individual States such as California have insisted on fighting climate change on their own.

“Those who attack America's exceptional environmental record while ignoring China's rampant pollution are not interested in the environment,” the U.S. President said in his UN speech shortly before Mr. Xi spoke.

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Source : www.thehindu.com Date : 2020-09-28

THE BENEFITS OF A CARBON TAX

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

With China, the largest carbon dioxide emitter, announcing that it would balance out its carbon emissions with measures to offset them before 2060, the spotlight is now on the U.S. and India, countries that rank second and third in emissions. One way to cut effluents while earning revenues is to price the carbon content of domestic production and imports, be it energy or transport. With the International Monetary Fund endorsing the European Union's plan to impose carbon levies on imports, India can be among the first movers in the developing world in taxing and switching from carbon-intensive fuels (like coal), the main sources of climate change.

Record heat waves in Delhi, floods in southwest China, and catastrophic forest fires in California this year are indicative of the existential danger from global warming. India ranks fifth in the Global Climate Risk Index 2020. Between 1998 and 2017, disaster-hit countries reported $2.9 trillion in direct economic losses, with 77% resulting from climate change, according to a United Nations report. The U.S. faced the highest losses, followed by China, Japan, and India.

Comment | A case for a differential global carbon tax

Air pollution has fallen worldwide after the COVID-19 outbreak, including in India. But with resumption of polluting activities, emissions in India are set to rise sharply unless strong action is taken. Carbon dioxide, the chief culprit in global warming, was 414 parts per million in August 2020 because of past accumulation. As one half comes from the three top carbon emitters, they need to drive de-carbonisation.

India has committed to 40% of electricity capacity being from non-fossil fuels by 2030, and lowering the ratio of emissions to GDP by one-third from 2005 levels. It is in the country's interest to take stronger action before 2030, leading to no net carbon increase by 2050. A smart approach is pricing carbon, building on the small steps taken thus far, such as plans by some 40 large companies to price carbon, government incentives for electric vehicles, and an environmental tax in the 2020-21 budget.

One way to price carbon is through emission trading, i.e., setting a maximum amount of allowable effluents from industries, and permitting those with low emissions to sell their extra space. Pilot projects on carbon trading in China have shown success. There is valuable experience in the EU, and some American states — for example, the regional greenhouse gas initiative in the U.S. northeast. Another way is to put a carbon tax on economic activities — for example, on the use of fossil fuels like coal, as done in Canada and Sweden. Canada imposed a carbon tax at $20 per tonne of CO2 emissions in 2019, eventually rising to $50 per tonne. This is estimated to reduce greenhouse gas pollution by between 80 and 90 million tonnes by 2022. The fiscal gains from pricing carbon can be sizeable. A carbon tax at $35 per tonne of CO2 emissions in India is estimated to be capable of generating some 2% of GDP through 2030. An internally recommended carbon price of $40 per metric tonne in China could generate 14% additional revenues.

Comment | Putting a global price on carbon

Big economies like India should also use their global monopsony, or the power of a large buyer in international trade, to impose a carbon tariff as envisaged by the EU. Focusing on trade is vital because reducing the domestic carbon content of production alone would not avert the harm if imports remain carbon-intensive. Therefore, leading emitters should use their

monopsony, diplomacy and financial capabilities to forge a climate coalition with partners.

India is among the nations that are hardest hit by climate impacts. There is growing public support for climate action, but we need solutions that are seen to be in India's interest. A market-oriented approach to tax and trade carbon domestically and to induce similar action by others through international trade and diplomacy offers a way forward.

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IS EXTREME HEAT MAKING INDIA UNLIVABLE?

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

2020 is on track to becoming one of the hottest years ever recorded globally. But nowhere is extreme heat and humidity as much a threat as in India

In the summer of 2015, an intense series of heatwaves swept across much of India. Over a period spanning nearly two weeks between end-May and early June, northwest India, the Indo-Gangetic plain and eastern coastal India sweltered as temperature spikes were recorded all through the region. Among others, Hyderabad recorded 46 degrees Celsius on 21 May, Delhi 46.4 degrees Celsius on 25 May, Palamau 47 degrees on 29 May, Allahabad 47.8 degrees on 9 June and Bhubaneswar 44 degrees on 10 June.

But the individual temperature spikes were just the tip of the problem, as heatwave conditions persisted throughout this period. In Telangana, Andhra Pradesh, Odisha and West Bengal, high heat turned lethal in conjunction with high humidity: 1,735 people died in Andhra Pradesh, 585 in Telangana, while the total number of deaths recorded in the country was over 2,400. Daily death tolls were high, like on 26 May, when 74 people died in Telangana. On 25 May, taxi unions in Kolkata refused to work between 11am-4pm after two drivers died of heat stroke. According to the International Disaster Database, it was the fifth deadliest heatwave ever recorded.

But 2015 wasn't an isolated phenomenon. The next year, on 19 May, Phalodi in Rajasthan, on the India-Pakistan border, hit 51 degrees Celsius, a new record for the highest day-time temperature in India. This spike was part of a heatwave where the temperature hovered within 1 degree of that value for three consecutive days. July 2019 was the hottest July ever recorded in India, according to the India Meteorological Department (IMD), while a heatwave swept across much of north and central India in May and June, killing over 180 people in Bihar alone. There were also reports of elderly passengers dying in train compartments owing to the heat. That summer, Delhi set a new maximum record of 48 degrees Celsius, while Churu in Rajasthan hit 50.8 degrees Celsius. On 26 May this year, Delhi hit 47.8 degrees Celsius, while Churu again recorded a high of 50 degrees Celsius as another heatwave swept through north and central India.

Rising Heat And Heatwaves

India knows heat. Although the country is vast enough to host a variety of regional climates, for much of the subcontinent, summer heat is a way of life. But even by India's standards, cases of extreme heat, and overall heat stress, are rising at an alarming rate. In June, the Union ministry of earth sciences (MoES) published India's first national climate change report, *Assessment Of Climate Change Over The Indian Region*. The report said India's average temperature had risen by 0.7 degrees Celsius from 1901-2018.

This rise is primarily due to global warming caused by greenhouse gas (GHG) emissions. In a business-as-usual world of current GHG emissions, the assessment says, India's average temperature will rise by almost 4.4 degrees Celsius by 2100, compared to the recent past (1976-2005). What's more, the frequency of summer heatwaves is projected to increase by two-three times, while the duration of these heatwaves is expected to double (both relative to the baseline period of 1976-2005).

One of the authors of the assessment report is physicist and climatologist Chirag Dhara from the Indian Institute of Tropical Meteorology (IITM), Pune. He says that one of the reasons India is

very susceptible to climate change impacts when it comes to heat is because the country's temperatures are already very high. "You take any system, and when you are already on the edge and you stress the system some more, the impacts are much higher. India's baseline temperatures are already very high. And particularly in the coastal areas and in the Indo-Gangetic plains, the humidity also being high, even a slight jump over there is much worse than the same quantum of jump in an area with a much lower baseline temperature," he says.

Humidity is an important part of this equation. For example, the 2015 deaths in Andhra Pradesh and Telangana were due to high temperature and high humidity. This is reflected in the heat index (HI), a measure of how hot it feels when relative humidity is factored into the air temperature. Another measure is the wet-bulb temperature, which measures heat stress as a combined effect of temperature and humidity on the human body. Human beings, even those who have adapted to high heat, find it difficult to carry out normal activities in a wet-bulb temperature of 32 degrees Celsius. The survivability threshold of the human body is reached at the wet-bulb temperature of 35 degrees. At that level, even if a human being is in the shade, the results are fatal. This comes down to the human body's cooling system: sweating.

"The higher the temperatures, the more the body sweats. But then that sweat needs to evaporate to actually cool the body. So when sweat evaporates readily from our skin, it is grabbing a lot of heat from our skin and transferring it into the atmosphere," says Dhara. "When there's already very high relative humidity, the water cannot evaporate efficiently from the skin. So the heat just stays there, it's unable to dissipate." Dhara says that global warming—which increases not just the temperature but also near-surface humidity—makes hot, humid days more frequent and intense, which in turn makes the body's heat control mechanism less efficient. That's heat stress. And this is the kind of thing that increases the risk of heat strokes.

This lethal combination of heat and humidity has emerged as a major source of worry in South Asia. In August, the McKinsey Global Institute published a paper titled *Climate Risk And Response In Asia: Research Preview*, which looks at a nearer time-frame of 2030-50. Referring to wet-bulb heatwaves, the report says that "…large cities in parts of India, Bangladesh, and Pakistan could be among the first places in the world to experience heat waves that exceed the survivability threshold". Another study, *The Emergence Of Heat And Humidity Too Severe For Human Tolerance*, published in May in *Science Advances*, identifies north-west India, the Indo-Gangetic plain and eastern coastal India as a global heat hot spot, where wet-bulb temperatures of 31 degrees Celsius are already common. The McKinsey paper further says that by 2050, 500-700 billion people in India, Pakistan and Bangladesh could be living in regions which would have a 20% probability of lethal wet-bulb heatwaves every year. Since wet-bulb temperatures severely affect the ability to work, the three South Asian nations could see a hit to their GDP to the tune of 13%.

According to the United Nations Development Programme (UNDP), India lost 3.6% of daytime working hours due to heat in 2015. The International Labour Organization (ILO), in its 2019 report *Working On A Warm Planet*, says India is projected to lose the equivalent of 34 million full-time jobs in 2030 due to heat stress, with agriculture and construction being the worst-hit sectors. In 2019, a study conducted by the University of Chicago's Climate Impact Lab and Tata Centre for Development highlighted the fact that an additional 1.5 million people may die in India each year due to extreme heat by 2100. According to an interactive map on the Climate Impact Lab website, a high emissions scenario would see mortality costs for India rise to 4% of the GDP by 2080.

While heatwaves could have high, concentrated impacts, there's also the impact of chronic heat—high heat conditions that last for extremely long periods of time. To understand this, I spoke to adaptation and water resources specialist Christian Siderius. In 2019, he co-wrote a

policy brief for the London School of Economics and Political Science (LSE) titled *Cities, Climate Change And Chronic Heat Exposure*. In the paper, the authors employed the measurement value of wet-bulb globe temperature (WBGT), which takes into account temperature, humidity, wind speed, sun angle and solar radiation (whether there is any cloud cover). In a WBGT of above 30 degrees Celsius, any physical activity is dangerous.

In the LSE brief, Siderius and his co-authors show that three Indian cities—Delhi, Mumbai and Kolkata—have daytime WBGT approaching 30 degrees Celsius. The heat stress indicators for these cities fall in the "Very Hot (danger)" range. A fourth city, Bengaluru, falls in the "Warm (Caution)" range. The paper states that though this is based on the three hottest months of the year (April, May and June), the danger of heat exposure doesn't really diminish till early October. In a climate change scenario where the world heats up by 3-4 degrees Celsius above pre-industrial levels by 2100, the number of days with dangerous, constant heat could rise to between 100-250.

"The main thing is that of course there is this extreme level above which people really can't physically survive for a very long period. And we are coming closer to that threshold," says Siderius. He says heatwaves are already more regular, but that the period over which the weather is very hot will also be much longer. "Because individual heat events start to merge all together, and you get a very long hot season, and that will grind down people's health. It will also be costly." He says that as average temperatures go up, "you see more extremes, and the extreme is also in the length of heat exposure".

One person who has studied both the 2015 and 2016 heatwaves in great detail is climate scientist Krishna AchutaRao, from the Centre for Atmospheric Sciences at the Indian Institute of Technology, Delhi. In a 2018 paper that he co-authored, *Extreme Heat In India And Anthropogenic Climate Change*, AchutaRao and his co-researchers noted two findings. The first is that the 2016 Phalodi high of 51 degrees Celsius is likely to become more frequent due to climate change. According to climate models, the return period of such an event is once every 7-10 years in our warming world. As a counterfactual, in a world with no climate change, such an incident would take place once every 20-30 years. The other thing they found was that a strong concentration of aerosols in the atmosphere—India's high pollution—reduces surface solar radiation and thus keeps temperatures low by counteracting the warming due to GHGs. High soil moisture due to irrigation also adds to this cooling effect, though it increases the humidity.

"We were trying to understand why there hasn't been a dramatic shift (in India's extreme temperatures). It is a shift, but very subtle. And that's where we hypothesized that both pollution and irrigation might be masking this," he says.

Look at it this way: India's temperature may have risen by just 0.7 degrees Celsius in a century but take away the pollution and we could be looking at a much higher increase in temperature. This is a fact that the MoES assessment report too suggests. Ironic as this may be, AchutaRao's paper makes clear that atmospheric pollution actually exacerbates health risks during a heatwave.

Urban Heat Traps

India is urbanizing at a rapid rate. According to the 2018 UN *World Urbanization Prospects* report, 20% of India's population lived in cities in 1950. By 2018, that figure had increased to 34%, with 461 million urban dwellers. The country is forecast to add a further 416 million urban dwellers by 2050. By 2030, India will add Ahmedabad and Hyderabad to its existing five megacities (cities with populations of over 10 million) of Delhi, Kolkata, Chennai, Bengaluru and Mumbai.

This is a level of urbanization unprecedented in human history. And it is in this same period that climate change impacts will be really felt in the country. Already, the Urban Heat Island (UHI) effect is playing a major role in heating up urban areas. Siderius and other scientists studied the heat stress of three South Asian cities, including Delhi, in 2019. While the city has seen a temperature increase of 1.2 degrees Celsius between 1981-2019, UHI temperatures in parts of the city have gone up by as much as 8 degrees Celsius.

The researchers found that the amount of heat faced by urban dwellers depended on income levels. Higher-income neighbourhoods possess favourable conditions like shading from trees and open green spaces, which reduces the chances of heat getting stored over the day and turning nights warmer. On the other hand, low-income neighbourhoods are densely-built, which means greater heat exposure and greater amounts of stored-up heat. A typical house in an informal neighbourhood in Delhi could be 8 degrees Celsius hotter than the outside temperature at night.

"If it’s very dense, if there’s less green space and less shade, the UHI effect is higher," says Siderius. "During the night, because of all the concrete and the built-up material, it stays very hot and you will have difficulty sleeping. And if that continues for a long period of time, for a couple of weeks, of course then that affects your health." He adds that as Indian cities develop rapidly and densely, they are losing their green cover. "There are few parks, few places with enough shade to accommodate a number of people in a city. In light of the changes in the future, that makes it questionable how liveable cities will be if adjustments aren’t being done," he says.

Minal Pathak is a senior scientist with the Intergovernmental Panel on Climate Change (IPCC) and a member of faculty at the Global Centre for Environment and Energy at Ahmedabad University. Earlier this year, she co-authored a report for the National Institute of Urban Affairs titled *Climate Change, Heat Waves And Thermal Comfort—Reflections On Housing Policy In India*. The study focused on low-income neighbourhoods in Ahmedabad. "The more you build, the more concrete you add in urban areas, even with minor climate change the UHI effect is a significant problem. And now, both of these problems are at their peak. So you have rapid urbanization where we are building over green spaces, open spaces, blue spaces. That’s adding to the heat burden, and the other problem is global warming," says Pathak. She adds that lower-income houses also suffer from poor ventilation, a higher density of people living in cramped spaces, and no ownership of cooling appliances, in some cases even fans.

"This is also going to affect middle-income households because of rising energy costs. Because (with rising heat) air conditioning doesn’t become a luxury, but a necessity. And people are compelled to buy air conditioners and the rising cost of paying for those electricity bills is also an equity issue," she says. Nor is a rise in the use of air conditioning desirable, for it adds to the UHI by shifting greater localized heat outdoors.

According to urban planner and architect Lubaina Rangwala, who works with research organization World Resources Institute (WRI) India’s Sustainable Cities Centre, lack of awareness of the impacts of heat hampers community action. "In India, we worked in Surat where heat stress is one of the bigger climate stresses for the city. We realized that communities don’t consider heat as a life risk or as a health risk. They see it more as a nuisance," says Rangwala.

She says that unlike flooding, which is a visible stress and therefore motivates people to act as communities to demand action, heat isn’t a rallying point for people to ask for increased green areas, or heat shelters. "We have to make those connections and understand the costs that cities and families and people are incurring by not acting. We have coastal cities with wet, humid conditions. But unless the temperature goes above 40 degrees Centigrade, cities are not even

taking it seriously. So you don't even capture the extent of exhaustion because of the wet-bulb temperature," she says.

This is a point echoed by Siderius. "Actually when we started this research only a couple of years ago, the reply we often got was that in India we are used to this. Not such a big issue," he says. "There wasn't really that much interest, and it was only in 2015-16, with heatwaves really becoming more prominent, that interest grew." Indians do know how to deal with heat, he says, but there needs to be a recognition that conditions are a lot more severe than in the past.

Planning For A Hot Future

The 2015 heatwaves prompted the National Disaster Management Authority (NDMA) to publish guidelines on preventing and managing heatwaves a year later. It acknowledged the fact that heatwaves are not listed as a "disaster" under the Disaster Management Act, 2005. However, it urged cities and states to prepare Heat Action Plans (HAPs) that focus on early warning systems, training healthcare professionals, raising public awareness and encouraging collaboration with NGOs and civil society. The NDMA highlighted the Ahmedabad HAP, which was launched in 2013, as a model to follow. Since then, many Indian cities, including Delhi, Hyderabad, Bhubaneswar and Nagpur, have developed HAPs, while some states like Maharashtra and Odisha have formulated state-level HAPs as well. The NDMA identifies heat-prone states every year, and for both 2019 and 2020, this number was 23.

However, despite some progress on this front, analysts say HAPs are still not implemented properly. "The Ahmedabad HAP is among the best in the country, and we really have a foolproof programme, but the implementation has not reached the desired level," says Pathak. She says such plans need to go beyond just early warning systems. "I think the HAP needs to expand way beyond that. You are telling a person that it's going to be really hot. But then where will he or she go? I think shelters or cooler spaces where people could stay in the afternoon, like community shelters, are really needed." She also highlights the fact that there is no respite for the poorest, like pavement dwellers. "People on the pavement just have a plastic sheet protecting them. What kind of sustainability would that be?" she says.

Rangwala says the invisible risk of heat has to be made visible. "Cities like Ahmedabad and Hyderabad, which are cities in the hot and arid areas of the country, now have HAPs and there's a significant amount of capacity building and awareness in these cities," she says. Although still marginal, Rangwala says the heat factor has begun to influence some labour laws and certain aspects of building regulations. However, the amount of concrete being poured into cities as they develop actually hamper any attempts by HAPs to counter heatwaves. "We need to break the notion of this kind of materiality that comes with the vision of growth. We need to be able to employ more passive design and green building methods," says Rangwala.

"There's no single magic bullet that will solve it," says Siderius. According to him, it comes down to accumulating small gains from individual steps. "If you are able to organize your city in such a way that there is airflow, that there is shading at street level, that not everything is concrete or built up, that lowers maybe the outer temperatures at night by a couple of degrees," he says. Creating safe and comfortable green spaces where people would like to go in the evenings, would help. Painting house roofs in a light colour that reflects heat, and then maintaining it, or planning for proper home ventilation, helps too. "But the main thing is that once you have a better temperature range outdoors within your neighbourhood, because you have a better organized city, then it's also easier to take effective measures indoors," he says.

One way to help plan the process is to use the heat maps for cities. Raj Bhagat Palanichamy is a data analyst and a Geographic Information System (GIS) and remote sensing analyst at WRI

India’s Ross Center for Sustainable Cities. Some of his work focuses on preparing heat maps for use by city planners. He uses thermal infrared bands from satellite images for surface temperatures and air temperature data from IMD and local agencies to plot heat for a city. "The maps try to figure out the hot spots in a city. Surface temperature is very helpful in figuring out our interactions with hot bodies. For example, a tar road is hotter for the human body than the shade under a tree," he says.

According to Palanichamy, the hottest spots turn up in massive "tar-concrete" complexes like bus depots or industrial areas. This is followed by areas with low-income houses. "Bengaluru is our most studied city. For example, if you are looking at Kalasipalayam, which is more dense, it’s the old town, and in those sections it is very hot. And if you are looking at a somewhat planned layout like Jayanagar or Langford Town, it is cooler because of the amount of vegetation that is there. You have a proper gridded street network with tree-lined avenues," he says, adding that solutions for urban resilience have to be very local.

AchutaRao too says that solutions have to be local. For example, he says, if heat waves begin earlier, then a heat-stressed state might have to shift the entire school year, so that children are not subjected to them. "It’s one thing to deal with a heatwave forecast by IMD. It’s a different thing altogether if you expect heatwaves to become more frequent. If every year you are going to end up with a hotter peak, you will have to change all your activities. If you are planning on pre-monsoon construction, do you want to put your labour out there in a heatwave?" he says.

There are any number of sectoral impacts with heat, says AchutaRao, but they will be specific to different geographies. "There are regions in India which have almost no incidents of heatwaves. Let’s say, in the future, these regions start experiencing heatwaves. It could potentially change a lot of things that are specific to that region, whether it is human or agricultural or natural systems."

India’s situation with regard to climate change is unique, since the impacts of global warming on the country are going to be multifaceted. Whether it’s sea-level rise, extreme weather events, melting glaciers or an unpredictable monsoon, there are multiple threats for the country to adapt to. But the most worrying impact remains extreme heat. When I ask Pathak about her perception of this challenge, her answer is emphatic. "I always hesitate to use the word ‘worried’ because I think if I started using it then my work wouldn’t mean anything. But if I had to point the finger at one top climate or environmental challenge, I would say that would be the impact from heat."

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ENVIRONMENTALISM AT THE CORE

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

The United Nations Millennium Development Goals and the World Bank Group's global practices have recognised sustainability as an essential issue of global importance. Economic, social and other forms of sustainability have evolved over the years, but it is environmental sustainability that has gained significant popularity.

Environmental sustainability is understood as buying greener products, avoiding hazardous materials, energy optimisation, and waste reduction. While some firms are still reluctant to engage in environmentally beneficial activities as they are afraid to compromise on the economic benefits, some others have positioned environmental practices at the forefront due to legislation, and industry and government commitments. In several firms, high importance has been given to environmentalism due to compelling regulatory norms, and a potential to manage costs, risks and optimise eco-friendly practices. However, in this process, organisations, especially in the manufacturing sector, get so serious about the low-hanging fruits of waste reduction and energy efficiency improvements that they fail to recognise the need for restructuring their learning imperatives and see the big picture of environmentalism. While government norms, organisational policies and corporate environmental responsibility projects drive environment-friendly practices, these are merely short-term actions towards environmental sustainability.

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Only through organisational learning can people be urged to work towards long-lasting benefits. In this context, green supply chain practices are useful. These include green procurement, green manufacturing, green distribution, and reverse logistics. With practices starting from acquisition of eco-friendly raw material to disposal/ reuse/ recycle of used products,employees, suppliers, distributors, retailers and customers will be able to integrate environmental concerns in the daily operations of a firm. Thus, green supply chain practices enable organisational learning in environmental sustainability.

Our research, based on a survey of 220 respondents across 21 manufacturing units in India, points to the inter-linkages between green supply chain practices, organisational performance and learning. We found that these inter-linkages not only lead to a long-lasting natural drive towards environmental performance, but also to higher economic performance . Research shows that the positive impacts of environmentalism can only be felt in the long term when they get embedded into organisational learning systems through green supply chain practices. The resultant learning system smoothens the knowledge flow in the organisation and help firms to strategise for better performance, bearing in mind the environmental aspects. This further promotes environmentalism across all players in manufacturing supply chains. Thus, environmental sustainability is ensured from the source (willingness) and not through force (regulations).

Opinion | No, the lockdown is not a green moment

Drawing linkages between green supply chain practices, corporate environmental performance, corporate economic performance and the dimensions of learning organisations in firms is necessary for an organisation's progress and environmental protection in society. Understanding these inevitable links will enable managers and experts to shape their organisational values, work practices, and performances for the greater good of society.

We infer that when the different players of a manufacturing supply chain realise the inherent benefits associated with organisational learning dimensions, their drive towards environmentalism increases. Policymakers should support this thinking by not merely imposing environmental practices as regulatory norms but by emphasising on the creation of green supply chain-based learning systems in manufacturing.

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