

VOLUME 1 | JUNE 2021

# EARTH ROOT

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# About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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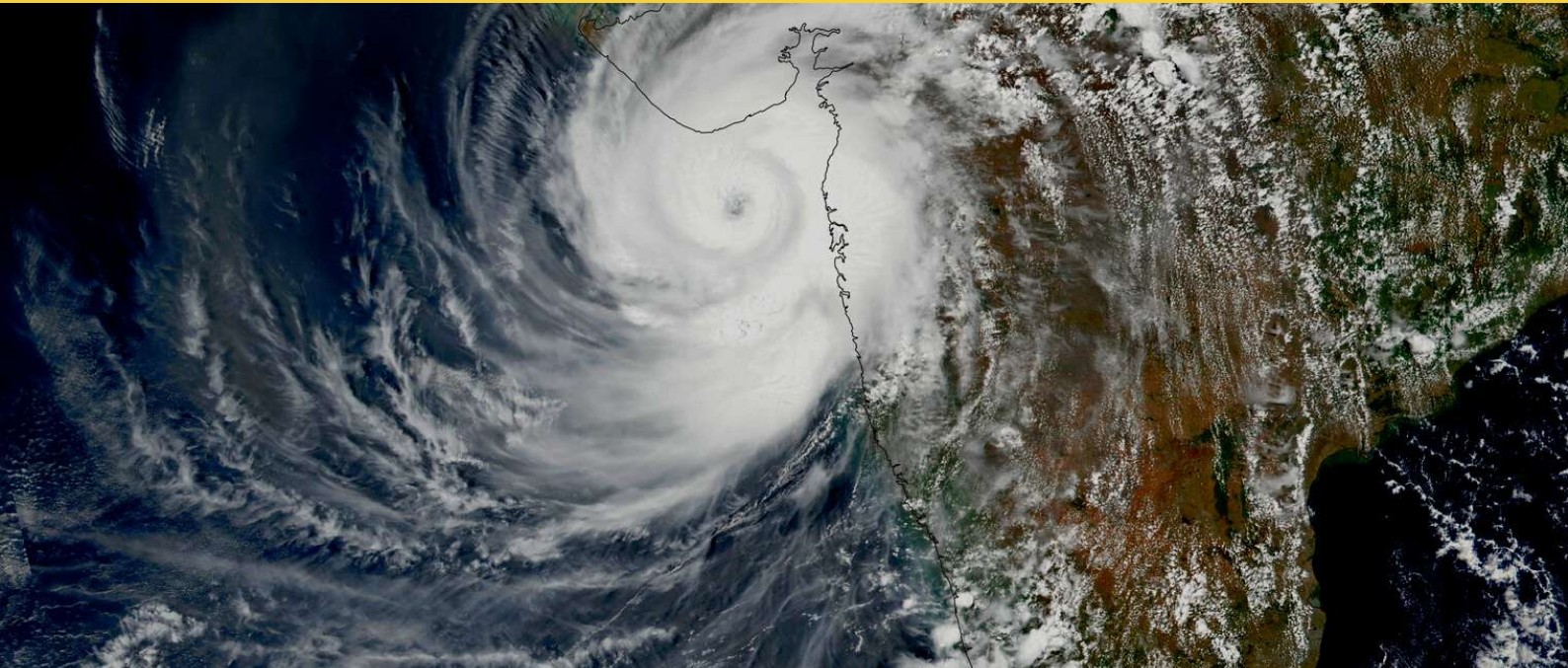
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# CYCLONE TAUKTAE IN THE ARABIAN SEA – AN INDICATIVE OF A LINK WITH CLIMATE CHANGE

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Prof. S K Dhaka, Rajdhani College, University of Delhi



img source: NASA Earth Observatory

## **ECO TIP !**



### **OPEN BLINDS TO LET IN NATURAL LIGHT**

It's eco-friendly as consuming natural light prevents you from switching on light. It also gives you positivity and makes you feel fresh

Extremely Severe Cyclone “Tauktae” was the most devastating tropical cyclone that formed in the Arabian Sea. Its impact remained from May 12 to 17th, 2021 in the Indian western coast side, and finally it made a landfall in Gujarat on 17th May. It was active for another two days until May 19 over northern and central Indian states. It remains the strongest tropical cyclones to have ever affected the west coast of India so immensely. Cyclone Tauktae has killed over 104 people, largest casualties reported so far made by any single cyclone from the Arabian Sea over the last decade. Keeping in view the availability of enhanced warning systems, prior information of formation, and movement of the cyclone using satellite, coastal radar system, and predictions made using super computers was not enough to stop the large scale damage of resources and lives.

About 200,000 people were evacuated across several states as the cyclone approached, bringing with it heavy



rains and gusty winds. With the entire nation passing through the second wave of Covid-19, the destruction caused by Tauktae certainly has hindered the preparation of the hospitals and medical services.

The India Meteorological Department (IMD) had predicted that the cyclone wind intensity would be in the category of extremely severe cyclone that ranges from 166 to 220 kmph. Usually wind speed reduces when cyclones make a landfall. However, in this case it was unusual and wind speeds of up to 170 kmph - 185 kmph were recorded. Through an overhead examination of the characteristics of Tauktae, it can be indicated that climate change is real and such storms are related to the cyclogenesis. Immediately after the passing of Tauktae small western disturbances grew rapidly during subsequent nights using the remnant moisture over northern India and made a wide spread rainfall. Scientifically, one can raise questions about the monsoon progression and its intensity during June over India due to the moderation in heating the landmass and disturbing the low pressure system in the northern India.

Immediately after the Tauktae cyclone, there is another one named YAAS emerging this time in the Bay of Bengal. YAAS is likely to affect the region on 26-27 mainly it will give impact on Assam, Sikkim, and Meghalaya. It has not yet made landfall at the time of writing this article.

It is a matter of serious concern for the scientific community how to understand the extremely severe cyclone development in the Arabian sea, which is general remains less in comparison to the Bay of Bengal side. The emergence of cyclones with this magnitude needs a thorough examination of dynamical features of wind flow and sea surface activities in terms of long-term changes in temperature. Satellite observations over a long period would give an indication about the systematic changes such as a slight increase in temperature and increase/decrease in wind speed and direction etc. It is the time to focus on the studies in Arabian Seaside, why the region which in general remains calm not as vigorous as eastern coast i.e. Bay of Bengal now under a significant change. From a socio-economic point of view, such natural calamity gives a serious setback to life and

## WORLD ENVIRONMENT DAY

Celebrated on 5th June, World Environment Day aims to create awareness and encourage people to take action to protect the environment. The theme for 2021 is "Ecosystem Restoration," and the country to host the celebrations this year will be Pakistan. The year 1974 marked the beginning of this observance.



# WORLD OCEANS DAY

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World Oceans Day takes place on 8th June every year to remind everyone of the importance of oceans and the impact of human actions on them. Officially celebrated from the year 2008, it raises awareness about the crucial role of oceans as a source of food, medicine, and oxygen. The Oceans: Life and livelihoods is the theme for this year.



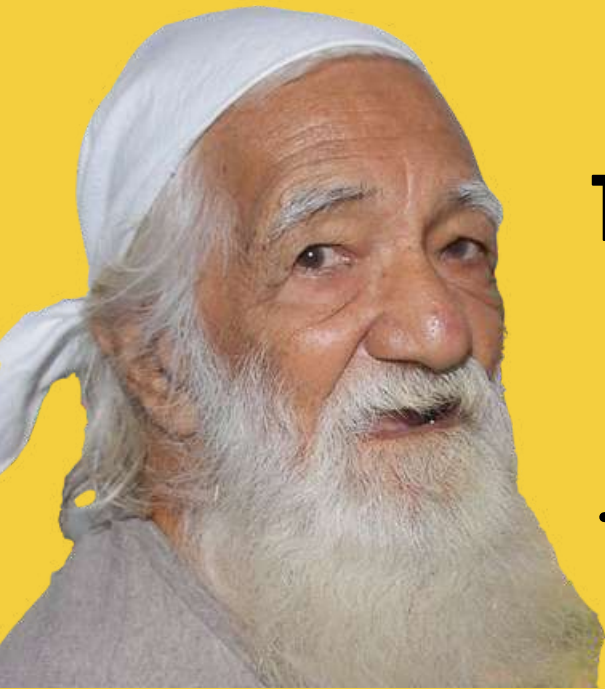
*Strong sea waves near the Gateway of India ahead of Cyclone Tauktae's landfall in Mumbai on May 17. (PTI Photo)*

development especially taking place in the coastal areas. On the other hand it causes thousands of Crore rupees damage of the resources and properties coming on the way of the storm.

In comparison to the countries such as China, Taiwan, Japan, South Korea, and the USA they more often face the fury of typhoons. Alone in Japan, on average, 20-25 typhoons hit the island every year; however, the preparedness is much faster and advance than us, and their quick action and acceptance of the warnings are taken by the public. Unfortunately, despite warnings were issued but ignored near Mumbai in the deep sea by some oil drilling companies and the huge accidents took place by sinking the ship and as a result, several casualties happened.

Seriousness in the scientific community to work separately now in the Arabian Sea should be inculcated and this theme "The Arabian Sea and linkages to Climate Change" be taken as soon as possible. We need to make a national program to work in this direction, while strong coordination amongst drilling deep-sea companies, government organizations, and navy functioning are required to combat the super cyclone like the Tauktae.





# SUNDERLAL BAHUGUNA: THE MAN WHO BELIEVED “ECOLOGY IS PERMANENT ECONOMY”

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DR. POOJA TOMAR

The 94 years old soft-spoken activist and environmentalist, Sunderlal Bahuguna, took his last breath on 21st May 2021. He lived an extremely inspiring life and his death is an irreparable loss for the nation. He was a man with high values and feat. Bahuguna was the beacon behind the famous Chipko Movement in 1970s. The Hindi word “Chipko” means to hug, during this movement people hugged and held trees to prevent them from getting cut by loggers. He saved the trees of Himalayas and forest-based communities with this revolutionary movement. The man was also the spirit of Anti Tehri Dam Project. He was a Gandhian hence he fought non-violent and rather fasted, for 45 and 74 long days, to make a point to the government about the ecological impact of the dam.

In the process, he was also put in the jail. Sunderlal Bahuguna, who grew up in Himalayas, worked selflessly for the people on hills by protecting their forests, rivers, culture and community. He coved miles and miles on foot to spread environmental awareness and consciousness. He motivated and inspired hundreds by his actions. Bahuguna strongly believed in women power, and thought nature and women are connected which is why females played a major role in all his life work. For the green revolution he brought, Bahuguna

was awarded with Padma Shri and Padma Vibhushan by the government of India.

Sunderlal Bahuguna will always be remembered for his extraordinary ventures towards ecological prevention. His life will be celebrated and shall always remain as a source of inspiration for generations, and his work will be a milestone in India’s green revolution.



img source: India Today



# THE ANCIENT WISDOM OF SUSTAINABILITY IN INDIA

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Aishwarya Rajesh Chavan



## **ECO TIP !**



### **COLLECT RAINWATER WATER HOUSE PLANTS**

Rainwater harvesting is something which everyone should practice. But if not that one can always collect rainwater and use it for purposes like washing the dishes or clothes, watering the plants. In this technique we can save water.

After damaging and exploiting mother earth enough, people all over the world are speaking and obsessing over the concept of 'sustainability'. Climate change, global warming, plastic pollution, species extinction, rising sea levels, melting of glaciers, deforestation, and many other environmental threats have been an eye-opener for a few sensible people.

However, a few environmentalists, NGOs, professors, architects, and engineers are coming forward to embrace and implement the concept of sustainability in our daily day-to-day routine.

Nations all over the globe are taking potential steps to save our planet. India, too is one such country that is doing its best in fighting against the environmental crisis. Well, little do the people know that 'sustainability' is not a modern or new concept for the Indians. We have been practicing it and celebrating this ancient wisdom for decades!

India is a country that is well-known and famous in the world for its Culture, Spirituality, and Ayurveda. We might as well like to add 'Sustainability' to the list. Indian culture is deeply rooted in the belief system of 'Nature and Humans co-exist'. In the olden days, people prayed and worshipped the five elements of nature namely, Fire, Ether, Water, Earth, and Wind. Apart from worshipping them on auspicious days and occasions such as marriages, people acknowledged and made sure to pray to them daily.

Indians made sure to give back to mother nature after taking resources from her and caused minimum damage to their mother. Simple daily habits such as using earthen pots for cooking and eating in plates made out of leaves (practiced even now in South India), kept them healthy and nourished their backyards by disposing them into the soil. They wore clothes made out of natural fibers of cotton and jute. Women wore homemade makeup made from natural seeds and oils. Household food and other items were stored in containers made of metal and clay.

They grew their food and ate what was harvested, consuming local foods. What is now called a 'kitchen garden', was a way of life for the Indians. Every house had at least one cow, whom they would lovingly take care of and obtain milk from. 'Cruel-free milk' was what they believed in, for not milking the cow without her consent was practiced consciously.

They woke up at sunrise and slept an hour and a half after sunset; keeping their bodies and mind sustainable, too. They were closely connected with nature consumed only how much they would really need and meditated daily. They practiced gratitude and always saw themselves as inferior to nature.

The houses were built with natural and degradable materials such as mud, stones, bamboo, and wood. They used all locally available materials. On demolition, the materials easily degraded into the soil, causing no harm. 'Vernacular Architecture' which is now widely studied today by architects, is what Indians knew and practiced since the beginning. They always valued resources, people, and things. Nothing was 'single used'.

They made sure to utilize the commodities till they were completely worn off; may it be clothes, utensils, food, etc. So now you see! What the modern world is looking for solutions, we Indians have manifested it long back. The world might call us 'old-fashioned', but in fact, we were the ones who were 'ahead of time'.

People look at the Indian wisdom today and want to implement it for a better future tomorrow.

To put it in a nutshell, I would just like to say, that-

***Be proud of your Sustainable Culture; for we have so much to offer to the world.***

**" PRACTISE, PREACH AND PRESERVE OUR  
MOTHER NATURE! "**

## INTERNATIONAL DAY OF TROPICS

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International Day of Tropics, marked on 29th June every year celebrates the importance of Tropics, home to 95% of the mangrove forests globally and has over 54% of the world's renewable water resources. As we celebrate its diversity and its role in balancing the ecosystem, the day also brings awareness of the challenges faced by tropical nations.







img source: Neuseeland

# IMPACT OF INDIVIDUAL COMMITMENT

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**DR. POOJA TOMAR**

We all know exactly what we need to do to protect our environment, but how many of us are actually doing it? When it's about doing something, people give fancy speeches about what should be done. We all speak about things and ideas. But, for the most part, it's all words and no show. Imagine, even if half the Indian population plants ONE SINGLE tree, there will be more than 68 crore new trees, but are we doing that? Or are we just sitting around gossiping and complaining?

I've heard people say that everyone needs to do something since 1 or 2 people cannot make a difference. Well, that's untrue, individual efforts matter all the way. I'd love to share a beautiful and inspiring work of a couple who managed to raise a whole forest just by themselves. Dr. Anil Malhotra and Pamela Gale Malhotra purchased 55 acres of barren land in 1991. The area they purchased, in South of India, was abandoned rice, coffee and cardamom fields hence was facing deforestation.

The couple decided to replant trees and expand the area. After 26 years of replanting, the couple owns the only private Sai sanctuary and wildlife which covers over 300 archers of land and is home to more than 200 endangered species of flora and fauna. They put in years of hard-work and energy to bring this forest back to life.

Vince Lombardi said "Individual commitment to a group effort- that's what makes a team work, a company work, a society work, a civilization work." So, as citizens we all need to put in our individual efforts and take up responsibility for everything that goes around on this planet. Next time when you have a problem with something, don't complain about it, rather, just think of what you can do to change it and just get it done. After all, a positive attitude can change everything. Also, let's not wait for an opportunity, let's create it.

# MASSIVE FOREST FIRE IN MIZORAM

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Sangeeta Pandey



img source: insidene

Across the two districts of south Mizoram, a forest fire had raged in the month of April 2021, which was reportedly spreading across towns and villages of two neighboring districts- Lunglei and Lawngtlai.

Mizoram has a forest cover of 85.41 percent of their total geographical area which is the highest in India. From 2002 to 2020, the primary forests in Mizoram have decreased by about 4.8 percent. Aizawl and Lunglei are amongst the 29 most fire- prone districts in India. The global forest watch has reported a total of 1604 fire alerts in Mizoram in 2021. This is unusually high compared to previous years.

The Jhum- an agricultural practice whereby the land is cleared by burning the vegetation, collection of non-timber forest produce, burning of the farm residues and clearance of land for various purposes, are the major reasons for forest fires. It has damaged vast tracts of land and vegetation.

Lunglei is the worst affected and the state government will probe the cause of the forest fire as it is suspected to be manmade, the official said. The DC claimed that the dry



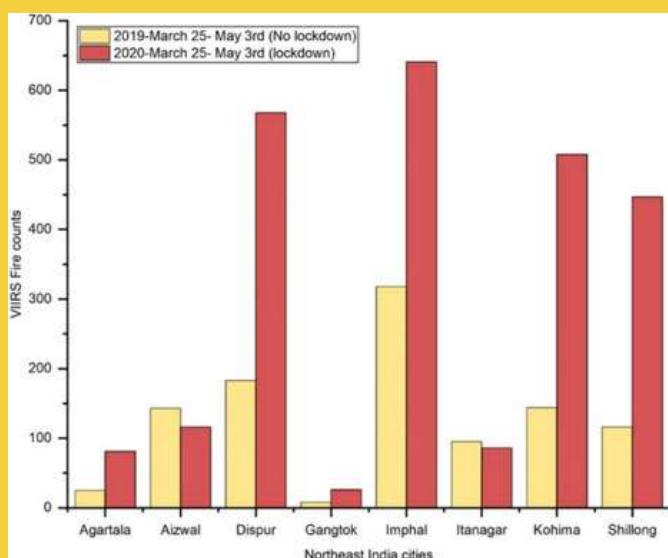
vegetation due to scanty rainfall coupled with strong winds have made the flames very strong. At least 12 houses were gutted at Bungtlang south village in the district by the fire, which was spread from the forest.

The forest fire broke out in at least eight forest areas near Serchhips Chanmari Veng locality, Chhiahtlang, and North Vanlaiphai. Though the blaze is mainly on in the uninhabited forest area surrounding the town, it has spread to more than 10 village council areas within it. Although the fire is under control in the settlement areas, some village councils claim that they are still vulnerable as the fire is still burning in their proximity.

The Chief Minister Zoramthanga requested The Indian Air force for help and the IAF has deployed two helicopters to douse the blaze at Lunglei and surrounding areas, the Defense Ministry said. The fireman is being assisted by Assam Rifles and border security force personnel and local volunteers.

The devastating forest fires have left people in grief. However, the collective people of the Army, Indian Airforce, Forest department, and local volunteers have helped to reduce the damage thereafter up to an extent.

Particulate matter (PM) is a type of air pollution that consists of small, microscopic particles that limit visibility and make the air appear murky when concentrations are high. There are a variety of sources, such as wildfires and industrial pollutants of it. The fact that it is quite tough to eliminate from your body makes it particularly harmful for living beings. According to the WHO, “roughly 7 million people die every year from exposure to this particles in polluted air that goes deep into the lungs and causing diseases such as heart disease, chronic obstructive pulmonary disease, and respiratory infections etc. Anyone can exhibit immediate symptoms, when excessive levels of PM 2.5 are present. The data goes on to say that air pollution is responsible for more than 116,000 infant deaths in India, and that 1.67 million deaths are due to air pollution, which is now considered India's greatest health concern.



Source: Scientific Reports, 2020



Source: Air Quality Index of Mizoram, May 2021

The above pictures show that how the forest fires of North- East are burning and increasing the pollutant level in the atmosphere from the past few years.

# THE ONLY VOW THAT MATTERS

Jagriti Hinduja

From the window  
He stares  
Leaves Gaze  
Trunk Lays his eyes on me  
With a ray of hope

While I was making an effort to focus on my studies  
I enunciated urbanization, civilization, development  
Surged advancement, fostered economy  
Big flyovers  
High dams  
More timber  
Expanded industries  
And more money

Ah! I heard some whining out there  
He bowed  
You humans are the crowning glory of this earth  
We stay beneath you  
You're the boss and we're the slaves  
Cried with fear  
Anxiety and  
Aversion towards me

He yelled with bitterness  
You cut me  
I'll take away the wildlife and

Your breath along with me and  
Fill your earth with  
Pollution  
Global warming  
Shaken earth's ecology  
You see me crying today  
You'll cry over spilled milk on morrow

If you mend today  
This tree will vanish away all your sorrows  
I tried to understand  
I wanted to help  
And I expect you all to be with me

I vowed to my best friend,  
my caretaker, my lifesaver  
To save his life this time.





# BIRTH OF WORLD'S LARGEST ICEBERG IN ANTARCTICA: A- 76

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SRUTHI P



img source: The iceberg, dubbed A-76, measures around 4,320 square kilometres in size — bigger than the Spanish island of Majorca.(European Space Agency)

Ice shelves that spread along the Antarctic region farther from the pole have undergone disintegrations due to global warming.

Icebergs originate when chunks of ice break off from glaciers, ice sheets, and ice caps, a process known as calving. More icebergs are forming due to global warming, and these icebergs are melting faster than ever.

On May 19, 2021, the European Space Agency declared that a giant iceberg, the size of the Spanish island of Majorca has split off from Antarctica's icy edge and into the Weddell Sea, becoming the world's largest iceberg afloat.

According to a statement released on the space agency's website with an enormous ice sheet photo, scientists designated the newly calved berg as A-76. Recent satellite images taken by the Copernicus Sentinel-1 mission spotted the iceberg.

It has a surface area of 4,320 square kilometres (1,668 square miles) and is 175 kilometres (106 miles) long by 25 kilometres (15 miles) broad. The size of A-76, which broke away from Antarctica's Ronne Ice Shelf, makes it the world's largest extant iceberg, surpassing the now-second-place A-23A - floating in the Weddell Sea and roughly 3,380 square kilometres (1,305 square miles) in size.

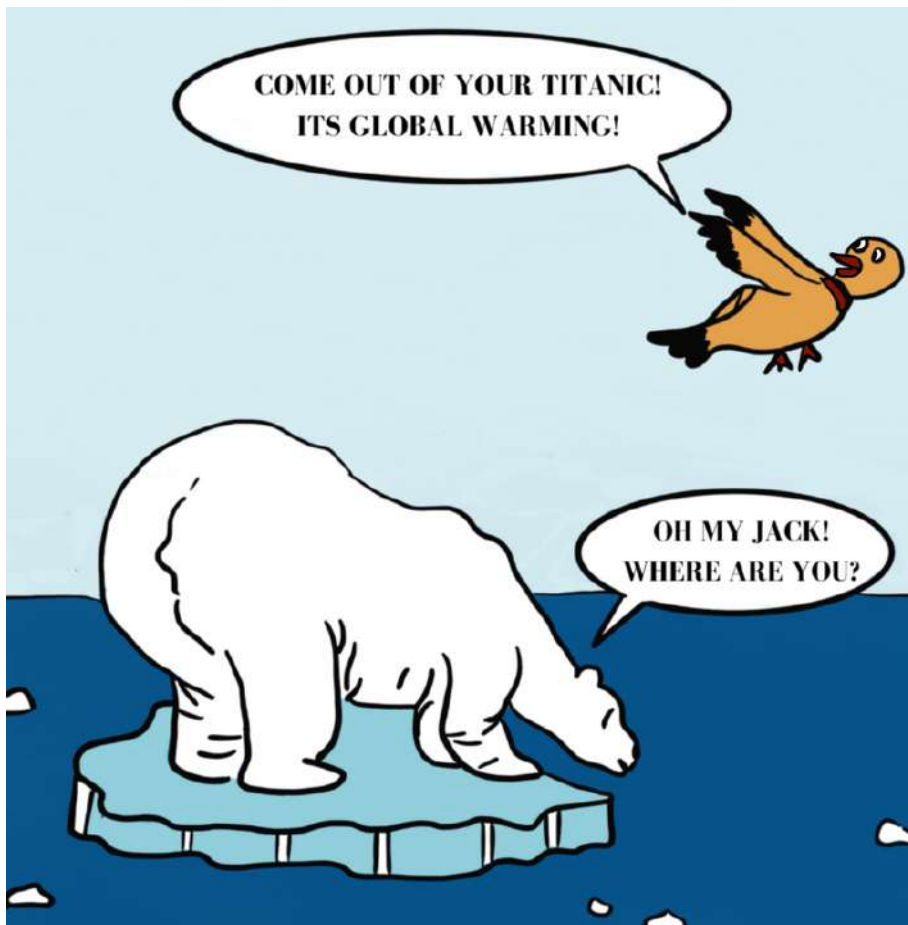
A-76 was detected by the British Antarctic Survey and confirmed by the United States National Ice Center in Maryland, using imagery from Copernicus Sentinel-1, a pair of polar-orbiting satellites.

According to Ted Scambos, a research glaciologist at the University of Colorado at Boulder, the periodic calving of large pieces of those shelves is part of a natural cycle, and the breaking off of A-76, that is expected to divide into two or three parts shortly, is not connected to climate change.

Scientists reported earlier this year that another enormous Antarctic iceberg that had endangered a penguin-populated island off South America's southern tip had fractured into pieces.

The damage caused by our irresponsible actions is visible through the harmful effects of global warming, like the melting of icebergs.

We should begin damage control now to avoid a dark future. Thus, adopting a sustainable life, following a few guidelines and being eco-friendly can go a long way.



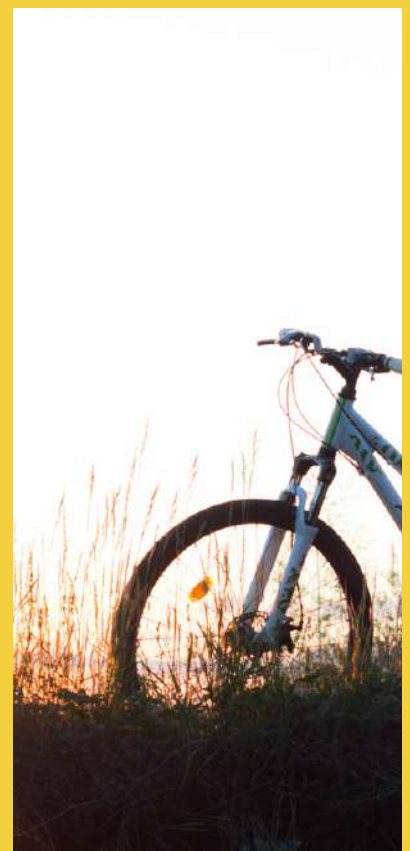
**Cartoon By: Rozina Akhtar**  
**Virtual or real sinking?**

The cartoon shows the melting of glaciers due to global warming, and hundreds of species are extinction. The scenario here shows a similar situation from the movie "Titanic" in a sarcastic manner.

## WORLD BICYCLE DAY

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3rd June marks World Bicycle Day every year that promotes its use as it is environment friendly and affordable. The movement began in 2015 in the USA by Professor Leszek Sibilski and his sociology class to acknowledge the use of bicycles over two centuries and its uniqueness.



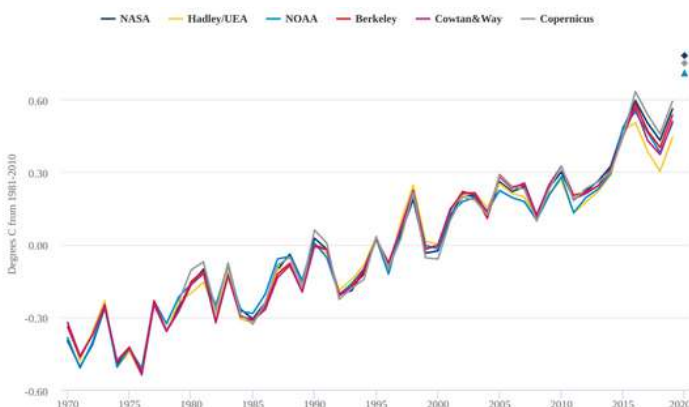


# THE YEAR 2020: A TRANSFORMATION TALE FROM 'ACT OF GOD' TO 'ACT OF HUMANS'.

Khushi Kaushik

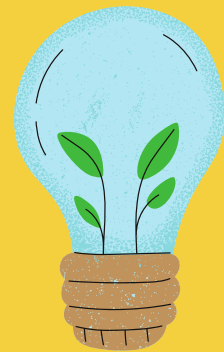
2020 was the hottest year on record. On one hand, where humans were battling a global pandemic and fighting for their lives, nature was battling a slew of natural disasters. Anthropogenic practices having exploited nature, which humans have labeled as an "Act of God." Seems pretty ironic, isn't it? Humanity has been at war with nature, and as is customary, nature has retaliated with much greater intensity, making it suicidal for us to continue. According to numerous surveys, the year 2020 made various records. Although NASA and Copernicus datasets indicate that 2020 was the hottest year, the Met Office and Berkeley Earth indicate that it was the second hottest year.

Depending on which dataset you are looking at, 2020 either ties with 2016 as the hottest year so far or the second hottest year. But it is unanimously agreed that the gap between 2016 and 2020 is negligible and the last decade was the hottest decade so far with constant warming of the planet. Since pre-industrial times, the last six years of this decade have been the world's hottest six years. Today's global temperature is around 1.2 degrees Celsius higher than it was before the Industrial Revolution. According to the Global Temperature Report for 2020 by Berkeley Earth, India warmed by 0.4°C while Russian warmed by 3.6°C, nations baked under intense heat, India was flooded and trashed by extreme rainfall and supercharged cyclones. Forest fires ravaged California, Australia, and Siberia.



Annual global mean surface temperatures from NASA GISTEMP, NOAA GlobalTemp, Hadley/UEA HadCRUT4, Berkeley Earth, Cowtan and Way and Copernicus/ECMWF (lines), along with 2020 temperatures to-date (January-March, coloured dots). Anomalies plotted with respect to a 1981-2010 baseline. Chart by Carbon Brief using Highcharts.

## ECO TIP !



### **OPT FOR A BAMBOO BRUSH**

They are an eco friendly alternative to plastic brush as it is fully biodegradable, made from bamboo which is a natural plant and it is a sustainable resource. Also bamboo is one of the fastest growing plants so we don't need to worry about it and they are good for teeth too.

America was hit by two hurricanes all while the Arctic warmed by a record-breaking 7°C in 2020 – all likely consequences of increasing global temperature.

When the world went into various states of lockdown and Greenhouse Gases were temporarily reduced in 2020, Carbon dioxide was rising in our atmosphere. Our Current greenhouse gas emissions in the atmosphere, even without the extra future emissions, have already locked in heat that will blow our Paris climate goals and causing an imbalance in the earth's system. The law of conservation of energy states that energy is never lost, it only changes shape. Any of the energy that is unable to leave the planet due to the energy-trapping greenhouse gas layer, is consumed by land or ocean.

According to a new study published in the journal *Advances in Atmospheric Science*, the ocean has absorbed just over 90% of the extra heat generated by human-caused climate change so far which means only 10% of all global warming has been absorbed by land, although the land warmed twice as much in 2020, setting a new record of 1.5°C above average, while the ocean warmed only 0.7°C above average. Scientists have been warning about the same concerns for at least 5 decades now but the decliners keep declining all these problems until they can't deny this for any longer or eventually die in denial.

## MAJOR DISASTERS THAT STRUCK THE WORLD IN 2020

- Cyclone Amphan
- Australia's Black Summer
- Russia's Arctic Region Oil Spill
- Beirut Explosion
- Amazon Fire
- Mauritius Oil Spill
- Indonesia Flash floods
- Cyclone Nivar
- Floods In Assam
- Wildfires, Hurricanes In US
- Heat waves in the US
- Taal Volcano Eruption
- Earthquake In Turkey
- Flash Floods In Afghanistan
- Locust Attack In India
- Oil And Gas Leak In Assam
- Cyclone Nisarga, Burevi
- Floods In Kerala, Hyderabad

## GLOBAL WIND DAY

15th June marks Global Wind Day as an event to celebrate wind energy's power and possibilities. WindEurope and GWEC organize it. Events organized in various countries include: Onshore and offshore wind farm visits. Information campaigns. Demonstration turbines in cities. Wind workshops. A wind parade.



# CYCLONE WARNING IN INDIA : YAAS

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Arpita Ganguly

Within one year, just after the cyclone Tauktae, another cyclone irrupted in the Indian ocean; affecting the state of Bengal. Yaas, as it is called, was a severely strong cyclone that made landfall in Balasore, Orissa, and also brought significant impact in West Bengal.

Cyclone Yaas, packing gusts of up to 140kmph, made its landfall at around 9 am on Wednesday, 26th May 2021 destroying tens of thousands of houses, forcing the closure of the busiest regional airport in the city of Kolkata, and bringing storm surges to coastal areas.

Yaas formed in the Bay of Bengal like Cyclone Amphan the previous year. Seventeen teams of the Indian Army had been deployed in ten districts and six teams of Army had been kept on standby in Kolkata. The Kolkata Airport has suspended flights from 8.30 a.m. to 5.45 p.m. on Wednesday. As many as 18 teams of the National Disaster Response Force (NDRF) have been deployed in Odisha. Seven teams have been deployed in Balasore, 4 in Bhadrak, 3 in Kendrapada, 2 in Jajpur, one each in Jagatsinghpur and Mayurbhanj. Four teams have been kept as reserve, as per the NDRF.

Trees, branches, and thatched roofs were seen flying as the windswept at 150 mph. Relief and restoration works are still going on but the damage is huge. The town of Digha and the forest of Sunderban are underwater, farming fields have been flushed. Till now, 20 fatalities have been reported.

In this grim and unfortunate time of Corona, people's suffering reached its peak level yet again.

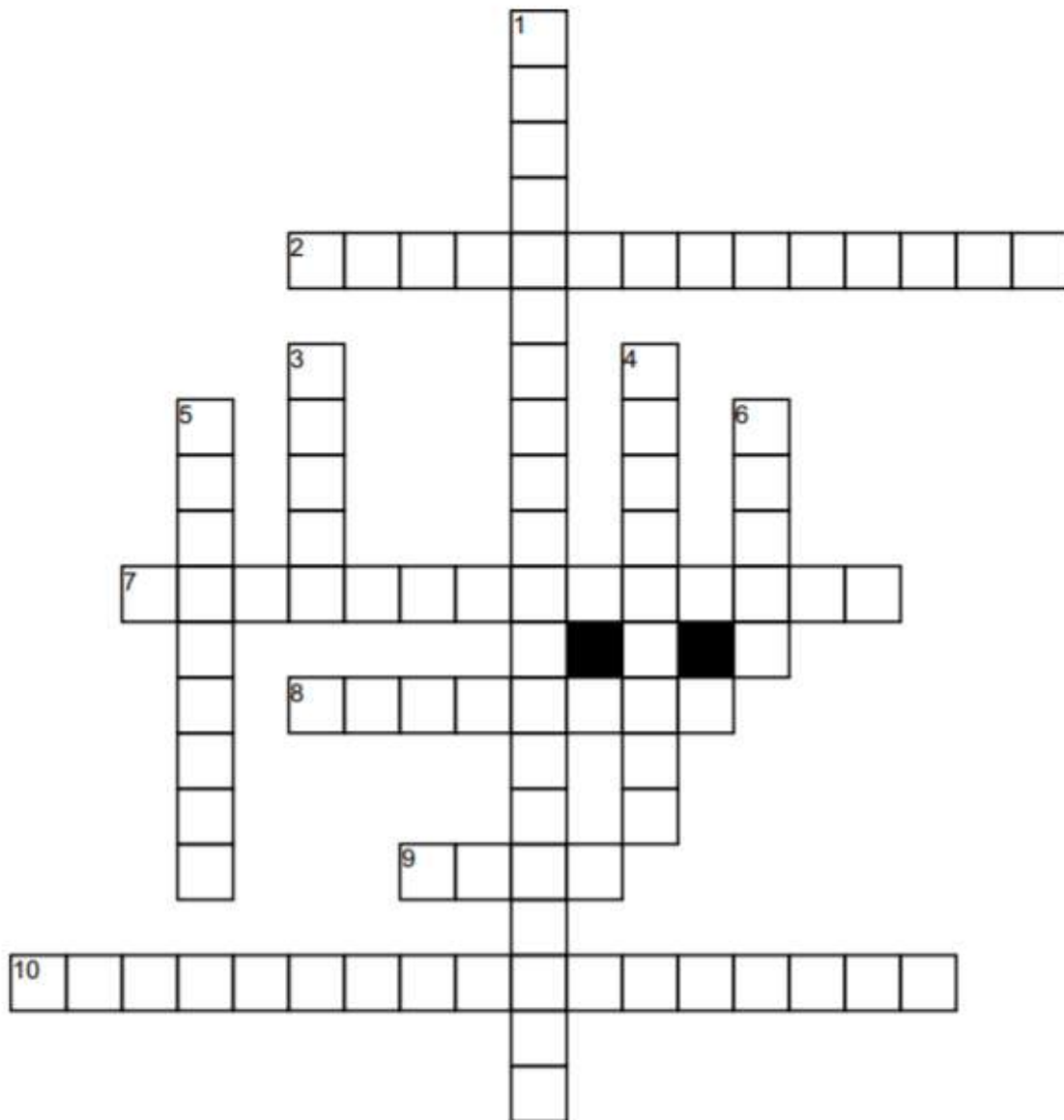


*img source: The New India Express*

**"The North Bay of Bengal is exceptionally warm with temperatures up to 32°C. Distance to landfall is short, preventing it from drawing that energy and intensifying into an extremely severe cyclone,"** Roxy Koll, a climate scientist at the Indian Institute of Tropical Meteorology, Pune, said on Twitter.



# CROSS WORD



## Down

1. Resource that can only be used once
3. Destroyed by CFC
4. Contamination of the Earth
5. Harmful to human and environment
6. Another word for poisonous

## Across

2. Excessive amount of noise that causes
7. Caused by oil spill and factory waste
8. Rain that contains a high concentration of pollutants
9. Smoke and other pollutant combined with fog
10. What is the resource that can be used again and again

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