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Greenhouse Gas Levels Reach Record Highs: UN Report

Levels of heat-trapping greenhouse gases in the atmosphere have reached another new record high, according to **the United Nations weather agency, World Meteorological Organization (WMO)**.

Key Findings

- In its annual greenhouse gas bulletin, WMO reveals that there is **no sign of a reversal of the upward trend**, responsible for climate change, sea level rise, ocean acidification and extreme weather.
- It can be noted that report **talks about concentrations and not emissions**. The concentrations differ from emissions in that they represent what **remains in the atmosphere after some of the gases are absorbed by the seas, land and trees**. Since 1990 the warming impact of these long lived gases on the climate has increased by 41%.
- Atmospheric CO₂ reached 146% of the pre-industrial level in 2017, primarily because of emissions from combustion of fossil fuels and cement production, deforestation and other land-use change. Levels of other key greenhouse gases methane and nitrous oxide in the atmosphere also rose.
- The increase in **CO₂ concentration** from 2016 to 2017 was **smaller than the rise** from 2015 to 2016 **because of the impact of El Niño**, which peaked in 2015 and 2016. This triggered droughts in some parts of the world, which in turn **reduced the ability of forests and vegetation in these areas to soak up CO₂**, hence more of it stayed in the atmosphere.

El Nino

- El Niño means **The Little Boy**, or **Christ Child in Spanish**. It is a **periodic climate event** that causes waters to **warm up in east-central Pacific Ocean**, which in turn causes huge changes in wind directions bringing less rain to Southeast Asia and the

Indian subcontinent, while increasing rain in other parts of the world.

- There is also an **opposite of an El Niño**, called **La Niña means The Little Girl in Spanish**. This refers to times when waters of the tropical eastern Pacific are **colder than normal** and trade winds blow more strongly than usual.
- Collectively, El Niño and La Niña are parts of an oscillation in the ocean-atmosphere system called **the El Niño-Southern Oscillation, or ENSO cycle**.

World Meteorological Organization (WMO)

- It is a **specialized agency of the United Nations**, which is dedicated to international cooperation and coordination on:
 - The state and behaviour of the **Earth's atmosphere**,
 - The atmosphere's **interaction with the land and oceans**,
 - The **weather and climate it produces**, and
 - The resulting **distribution of water resources**.
- The Secretariat, **headquartered in Geneva**, is headed by the **Secretary-General** (appointed by the **World Meteorological Congress for a four-year term**). Its supreme body is the World Meteorological Congress.
- WMO originated from the International Meteorological Organization (IMO), which was founded in 1873 to facilitate the exchange of weather information across national borders. **WMO became a specialized agency of the United Nations in 1951**.
- **Methane is the second most** important greenhouse gas, and about 60% of it in the atmosphere comes from human activities like cattle farming, rice cultivation and fossil fuel extraction. Levels in the atmosphere are now about 257% of what they were before the industrial revolution, and the rate of increase is very much constant over the last decade.
- **Nitrous oxide comes** from natural and human sources including fertiliser use and industry. It's now about 122% of pre-industrial levels. N_2O is emitted into the atmosphere from **both natural (about 60%) and anthropogenic sources (approximately 40%)**, including oceans, soils, biomass burning, fertilizer use and various industrial processes.

The likely causes of N_2O increase in the atmosphere are an **increased use of fertilizers in agriculture and increased release of N_2O from soils due to an excess of atmospheric nitrogen deposition related to air pollution**.
- **Sulphur hexafluoride (SF_6)** is a potent **long lived Green House Gas (GHG)**. It is produced by the **chemical industry**, mainly as an electrical insulator in power distribution equipment.
- While Chlorofluorocarbons (CFCs) and most halons are decreasing, some hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), which are also potent GHGs, are increasing at relatively rapid rates, although they are still low in abundance.

- The WMO also highlighted the **discovery of illicit production of CFC-11**, a banned chemical that both warms the planet and destroys ozone. Investigations indicate that at least some of the production is in China.

Under the **Montreal Protocol, CFC-11 was supposed to be phased out** of production.

Montreal Protocol

- Adopted on **16 September 1987**, the Montreal Protocol on **substances that deplete the ozone layer** regulates the production and consumption of nearly 100 man made chemicals referred to as Ozone Depleting Substances (ODS).
- The protocol provides for **phasing out halogenated hydrocarbons like tetrachloride, CFCs used in aerosols, halons** used in fire extinguishers, **HydroChloroFluoroCarbons (HCFCs)** used in refrigeration and foams, and **methyl** used in fumigation activity of agriculture.
- Since its adoption, it has undergone **eight revisions**, the latest and the **ninth being the Kigali agreement**.
- In **2016, Kigali amendment** was made to the protocol to **phase out HydroFluoroCarbon (HFC)**, a set of 19 gases in the hydrofluorocarbon family used extensively in the air-conditioning and refrigeration industry. Though **HFCs are not ozone-depleting** but are thousand times more dangerous than carbon dioxide in **causing global warming**.
- Under the amendment, developed nations will begin phasing down HFC gases by 2019, while developing countries will follow suit by 2024.

Conclusion

- This report by WMO needs to be seen alongside the recent IPCC 1.5C report which warned that the world needed to be essentially carbon neutral by 2050.
 - The WMO bulletin comes out **before climate negotiators begin at the Conference of Parties (COP24) meeting in Katowice, Poland**, where countries will discuss putting the Paris climate agreement into practice and increasing their ambitions when it comes to cutting warming gases.
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APEC Fails to Reach Consensus

30th Asia Pacific Economic Cooperation (APEC) Summit took place in Papua New Guinea.

- For the first time since its inception APEC has failed to release a joint communique due to lack of consensus among the members over trade and security issues.
- All 20 countries except China agreed to the joint statement.

US-China Targeted Each Other at APEC

- US targeted China's **Belt and Road Initiative (BRI)** and called it as **"constricting belt"** and a **"One-way Road"**.
- While urging the nations to support it, US also warned smaller countries to be cautious of **"debt-trap"** by China and said not to accept debt which compromise sovereignty.
- China defended BRI and said that there is **no geo-political agenda behind it** and it is **not an exclusive club closed to non-members**, nor is it a trap.
- China targeted US policy of **"America First"** and said that erecting barriers and cutting ties is a **short-sighted approach doomed to fail**.

Consequences

- **On Global Economy**
 - The U.S.-China discord at APEC highlights the dangers of their trade war, trade war between the US and China could cripple the Pacific Rim economy.
 - Due to the tariff war International Monetary Fund has downgraded its global growth outlook for 2018 and 2019.
 - If this continues, global supply chains will be impacted, and shrinking trade volumes may cause companies to seek out new trading routes and partners.
- **On Global Institutions**

Multilateral rule-making bodies such as the World Trade Organisation (WTO) and APEC may lose their authority, and an interlocking system of bilateral trade treaties may substitute the consensus-based approach which came into existence after World War 2.

Asia-Pacific Economic Cooperation

- Established: 1989
- **Members: 21**
- **India is not a Member.**
- Member Nations:
 - The founding members were Australia; Brunei Darussalam; Canada; Indonesia; Japan; Korea; Malaysia; New Zealand; the Philippines; Singapore; Thailand; and the United States.
 - China; Hong Kong, China; and Chinese Taipei joined in 1991.
 - Mexico and Papua New Guinea in 1993.
 - Chile joined in 1994. And in 1998, Peru Russia and Vietnam joined.
- APEC is the premier Asia-Pacific economic forum. Primary goal of APEC is to support sustainable economic growth and prosperity in the Asia-Pacific region.
- Its 21 member economies are home to around 2.8 billion people and represent approximately 59% of world GDP and 49% of world trade in 2015.

- In **1994** during Bogor, Indonesia summit, APEC sets the **Bogor Goals** of “**free and open trade and investment in the Asia-Pacific by 2010 for industrialized economies and 2020 for developing economies.**”
 - India has requested membership in APEC, and received initial support from the United States, Japan, Australia and Papua New Guinea. Officials have decided not to allow India to join as India does not border the Pacific Ocean, which all current members do.
 - **India was invited to be an observer for the first time in November 2011.**
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India to Study Marijuana-Derived Drugs

Three major science administrators in India — **The Council of Scientific and Industrial Research (CSIR), the Indian Council for Medical Research (ICMR) and the Department of Biotechnology** — are getting together to promote research in **herbal drugs**, some of which involve deriving new drugs from marijuana.

- Scientists are preparing for India’s first human clinical trials to test cannabis-based compounds on select diseases.
- Researchers will test whether strains of marijuana could be effective in the treatment of breast cancer, sickle-cell anaemia as well as for “bioequivalent” (similar in make-up and effect) to marijuana-derived drugs already approved by the United States Food and Drug Administration (U.S. FDA).
- The studies into the therapeutic potential of marijuana is part of a governmental thrust to produce new drugs derived from herbs and plants that find mention in Ayurvedic and other traditional medicine knowledge systems.
- India’s move towards clinical trials of cannabis derivatives comes amid growing evidence of the safety and efficacy of medicinal cannabis in the treatment of cancer, multiple sclerosis and a rare but severe form of epilepsy.

Marijuana or Hemp

- Marijuana (or hemp), part of the cannabis super-family, is illegal for commercial cultivation though it grows as weed in several parts of the country. Uttarakhand, Jammu and — recently Uttar Pradesh — have allowed restricted cultivation of the plant for medical research.
- The Marijuana has two components **CBD (cannabidiol) and THC (tetrahydrocannabinol)**.
- **CBD does not cause intoxication or euphoria** and has been successfully proven to provide relief to chronic pain without causing psychoactive side effects.
- It is **THC** which **is the primary psychoactive components** of Marijuana.

The 1985 Narcotic Drugs and Psychoactive Substances Act

- The NDPS Act 1985 **bans commercial cultivation of cannabis.**
- The **bar does not apply to an edible preparation called bhang**, which is allowed in some States.

1961 UN Single Convention on Narcotics Drugs

- The Single Convention on Narcotic Drugs of 1961 is an international treaty to prohibit production and supply of specific (nominally narcotic) drugs and of drugs with similar effects except under licence for specific purposes, such as medical treatment and research.
- The Single Convention refers to drug addiction as **“a serious evil for the individual [that] is fraught with social and economic danger to mankind”**.

Marijuana Legalisation Debate

- Cannabis has been recognised for its medical use in 29 out of 51 US States, Canada, Australia and a significant number of another 20-odd countries across the world. In India, however, cannabis-derived drugs are unavailable, illegal and cannot be prescribed by doctors.
- Apart from medical purposes, the cultural and economic significance have been used as an argument in the favour of cannabis legalization.
- **Marijuana Should Be Legalized**
 - **Legalisation will curb crime**
 - Evidence suggests that strict enforcement of the narcotics law based on **prohibition tends to target the most defenceless members** along the drug smuggling chain.
 - Prohibition strengthens the cartels they should be targeting. The big cartels and traffickers remain out of reach of the regular law enforcement machinery.
 - Filling jails with drug users and street-level suppliers only **stresses the criminal justice system.**
 - **Legalization** will also enhances security for all of society, as **it helps undermine criminal markets.**
 - Due to the drug’s illegality, cannabis are sold underground and is a source of revenue for criminal gangs and terrorist organizations.
 - **Cultural and Historical Significance**
 - The **documented use of cannabis in India dates back to the Vedic period.** In the Atharva-veda, the ‘bhang’ plant finds a notable mention as one of nature’s five sacred, distress-relieving plants. During the festival of Holi, the consumption of bhang is an integral part of the celebrations even today.
 - **Indian Hemp Drugs Commission in 1894** found consumption of cannabis

- in colonial India extensive and determined that its use was very ancient, had some religious sanction, and was harmless in moderation.
 - The **commission recommended against complete ban** on its consumption as it can push consumer towards other hard drugs.
 - Until 1985, when NDPS Act was enacted, cannabis derivatives — bhang, charas and ganja — were regulated by the various state excise departments and legally sold by licensed shops.
 - **Less Health Risk when compared to Alcohol**
 - WHO study concluded that the public health risks from cannabis use were likely less severe than those posed by alcohol and tobacco, which are legal.
 - **Business and Economic Possibilities**
 - The legal **marijuana market** is currently worth **more than \$7 billion globally**, and is expected to hit \$31 billion by 2021.
 - The **fabric produced from hemp is of very high quality**. Hemp is also highly suitable as a technical fibre. India also has many startups working in this field like The mumbai-based The Bombay Hemp Co. (BOHECO).
 - **Marijuana Should Remain Illegal**
 - **Marijuana Causes Psychosis**
 - Marijuana can trigger mental health related issues in its users. THC in marijuana has been proved to cause psychosis.
 - Those who use it as adolescents or younger may be more likely to **develop mental health problems later in life**. In some cases, it can also make people feel **nauseous, lethargic, forgetful, anxious, or confused**.
 - **Marijuana is a gateway drug**
 - **Cannabis has been engineered to become much more potent an addictive**. Growers has decreased level of CBD and increased level of THC.
 - A vulnerable person who will abuse it as a gateway drug before moving to more dangerous substances. **In a study it was found that 45% who used marijuana also used other 'Hard' drugs**.
 - **Marijuana damages organs**
 - The World Health Organization has listed a number of diseases associated with the consumption of marijuana, including **impairment in cognitive functioning, airway injury, bronchitis and lung inflammation**.
 - **Regulations difficult to enforce**
 - If marijuana will be available at a pharmacy with a prescription (like in the US) how government will ensure that it's not bought for recreational purpose. Considering, cough syrups and inhalants are freely accessible and brought incessantly by addicts.

Way Forward

- Prohibiting and making it illegal has not prevented the availability of marijuana in the

market nor its use by people.

- The **potential risks that cannabis poses illustrate why it is necessary to legally regulate this drug**. Rather than leaving the trade of cannabis in the hands of an unregulated criminal market, the drug should be safely produced by competent farmers, packaged and tested in suitable facilities, and sold by reputable and licensed vendors.
- **Regulation allows cannabis buyers to know what they are consuming and moderate their intake in accordance with the THC level in the marketed marijuana**.
- Imposing tax on cannabis sales can create revenue for the state. **Tax collected could be spent on educating people about the risks of cannabis use, like public service information on alcohol and tobacco**.

Atmospheric Geoengineering Experiment to Curb Global Warming

The research by scientists at Harvard and Yale universities, published in the journal *Environmental Research Letters*, proposed using a technique known as **stratospheric aerosol injection**, which could cut the rate of global warming in half.

- The technique would involve **spraying large amounts of sulfate particles** into the Earth's lower stratosphere at altitudes as high as 12 mile (around 20 kilometre). The sulfates will be delivered with specially designed high-altitude aircraft, balloons or large naval-style guns.
- The idea is to **help shield the Earth from just enough sunlight** to help keep temperatures low, i.e. **increasing the planet's albedo**, or reflective power. This method would **mimic what large volcanoes do**. E.g.:
 - In 1991, **Mount Pinatubo erupted in the Philippines**. It was the second largest eruption of the 20th century. In total, the eruption injected 20 million tons of sulfur dioxide aerosols into the stratosphere which **lowered atmospheric temperature by approximately 1-degree Fahrenheit**. However, it's effect only lasted a couple of years because the sulfates eventually fell to Earth. Moreover, it **affected precipitation** in many parts of the world.
- The report does, however, acknowledge that the technique is **purely hypothetical** and would involve developing a new, purpose built tanker with substantial payload capabilities that may take around 15 years' of time.

Geoengineering

- Geoengineering is the technique designed to **tackle the effects of climate change directly**, usually by **removing carbon dioxide (CO₂) from the air** or **limiting the**

amount of sunlight reaching the planet's surface.

- It involves deliberate planet-scale interventions to counteract global warming.
- **Methods to remove CO₂ from the air:** Increasing the **capacity of trees and plants to absorb CO₂** from the air, burning large quantities of wood in power plants with **carbon-capture technology**, making and burying **large amounts of charcoal to lock carbon** into the soils, grazing cattle in a way designed to **turn grasslands into giant carbon sinks**, fertilising the **oceans with iron** to encourage the growth of **algae that can soak up atmospheric carbon dioxide**, etc.
- **Methods to limit amount of sunlight:** Placing **mirrors in space that reflect sunlight** away from the Earth, firing **sulphate aerosols into the stratosphere**, using unmanned ships to increase above-ocean cloud cover by **spraying sea water into the air**, etc.

Concerns

- The technique could result in **reduced precipitation, soil moisture and river flow in many regions**.
- Injection of sulphur compounds into the stratosphere is likely to **increase acid deposition** on the ground and also contribute to **ozone layer depletion**.
- Once the aerosol has been injected into the atmosphere, it **cannot be removed**.
- Stratospheric aerosol injection techniques could jeopardize **crop yields, lead to droughts or cause extreme weather**.
- The proposals also don't address the issue of rising greenhouse gas emissions, which are a leading cause of global warming. Few argue that it's only a **temporary Band-Aid covering** a problem.
- Solar radiation management is still a much worse solution than greenhouse gas emissions: it is **more costly and much more risky over the long run**.
- There are the **ethical and governance issues** that surround geoengineering as well, questions about who should be allowed to do what and when.

Conclusion

- The buildup of greenhouse gases is **already altering the atmosphere and climate in an unprecedented and uncontrolled manner**. Climate researchers should **explore solar geoengineering** to determine whether it would actually work and how safe it would be.
- Along with this political scientists also need to start thinking about how to implement such an unprecedented planetary project. All that will be left then is **for society and governments to face the impossibly difficult task of deciding whether to do it**.

Important Facts for Prelims (24th November 2018)

IMD Can Forecast Rise in the Water Level

- Against the backdrop Kerala floods, a **new technology** has been developed by **India Meteorological Department (IMD)** to assess the **rise in water level in rivers and reservoirs due to rain** which can help State governments to minutely monitor the impact of rainfall.
- The technology called the '**Impact Based Forecasting Approach**' which shows "pre-event scenario" can help authorities in taking proactive and real-time decisions.
- Impact-based forecasting and warning services aim to improve the synergy between stakeholders and citizens that play a role in a (e.g. flood) crisis, by bridging the gaps between the four components for an effective early warning system:
 - risk knowledge,
 - monitoring and warning service,
 - dissemination and communication and
 - response capability

India Meteorological Department (IMD)

- IMD was established in 1875.
- It is an agency of the **Ministry of Earth Sciences** of the Government of India.
- It is the principal agency responsible for meteorological observations, weather forecasting and seismology.

Constitution in Braille

- The Constitution of India will be made available in Braille for the first time ahead of the **Constitution Day on November 26**.
- In a joint project undertaken by The Buddhist Association for the blind along with Saavi Foundation and Swagat Thorat, the Constitution will be made available in five parts in Braille for the benefit of visually challenged individuals.
- A book in Braille script cannot cross more than 150 pages due to its limitations. So the constitution will be published in five parts.
- Swagat Thorat has been running **India's first Braille newspaper 'Sparshdnyan'** since 2008.

Vaccine for Goat Plague

- Researchers from the UK and India have jointly developed a '**smart**' **vaccine** which has the potential to help eradicate goat plague.
- The major contribution from British scientists was providing a template for developing the smart vaccine, which is also called **DIVA vaccine**.
- Goat plague, or peste des petits ruminants (PPR), is a highly contagious **viral disease**

that afflicts goats and sheep in many parts of the country.

- The disease kills small ruminants in large numbers unless they are vaccinated. Apart from India, goat plague is prevalent in many African countries, West Asia, China and Mongolia.
-