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MK Yadav Sir

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TIMES OF INDIA

Page 11

ACTIVE PHARMACEUTICAL INGREDIENTS

(Syllabus: GS Paper Economy & Infrastructure)

29 of 43 'critical' APIs now locally produced

TIMES NEWS NETWORK

Getty Images



HEALTHY PROGRESS

New Delhi: India has started making 29 out of 43 'critical' active pharmaceutical ingredients (APIs) that were earlier imported, senior officials in the health ministry said on Tuesday. An official said that this will reduce the country's dependency on other countries, including China.

In 2021, the department of pharmaceuticals had launched a product-linked incentive (PLI) scheme for pharmaceutical goods and in-vitro diagnostic medical devices. Officials said the financial outlay under this scheme is Rs 15,000 crore over a period of six years. "The department of pharmaceuticals has released the first tranche of incentives amounting to Rs 166 crore to four selected applicants," an official said.

"Working to reduce import dependency through indigenous production, the government is focussing on production of high-value pharmaceuticals and high-end medical devices. Manufacturing of components for high-end devices will be another step towards Aatmanirbharta," said health minister Mansukh Mandaviya.

Context: India has started making 29 out of 43 'critical' active pharmaceutical ingredients (APIs) that were earlier imported.

Active Pharmaceutical Ingredients (API)

- **About**: The active ingredients **contained in a medicine.**
  - It is that part of the medicine that produces the **intended therapeutic effects.**
  - For example, in a painkiller, the active ingredient relieves pain.
    - In the OTC drug Crocin, the API is paracetamol.
  - Fixed-dose combination drugs use multiple APIs, while single-dose drugs like Crocin use just one API.
- **Components of Drugs**: All drugs contain **two parts:**
  - **API**
  - **Excipient**: These are **chemically inactive substances** that help deliver the API to the system. Eg. lactose, mineral oil, etc.
- **Manufacturing process:** API is not made by only one reaction from the raw materials but rather it becomes an API via several chemical compounds.
  - The chemical compound which is in the process of becoming an API from raw material is called an **intermediate**.
  - There are some APIs that pass "**through over ten kinds of intermediates** in a process when it changes from being a raw material into an API".
  - The long manufacturing process is continued until it is purified and reaches a very high degree of purity.

Status of India

- **Self-reliant**: During the early 90s, India **was self-reliant in manufacturing APIs.**
- **Global status**: **China is the world's largest producer and exporter** of APIs and many of the Indian companies depend on imports of the ingredients to produce formulations.
  - Their cost of operation is one-fourth of India's cost. Even the cost of finance in China is 6-7 per cent against India's 13-14 per cent.

INDIAN EXPRESS Page 1

BEAT-THE-HEAT SOLUTION

(Syllabus: GS Paper 3 - Agriculture)

ICAR develops wheat that can beat the heat

Scientists breed new varieties for early sowing, to escape March mercury spike



(From left) ICAR D-G Himanshu Pathak, IARI's principal scientist Rajbir Yadav and its director A K Singh with the new HD-3385 variety at the institute's field in Delhi. *Harish Damodaran*

HARISH DAMODARAN
NEW DELHI, FEBRUARY 21

ON MONDAY, the Union Agriculture Ministry announced that it had set up a committee to monitor the situation arising from the increase in temperatures and its impact, if any, on the wheat crop. Like last March, this year, too, a heat spike threatens to singe the crop in its final, critical grain-filling phase, leading to a significant drop in yields.

Scientists at the Indian Council of Agricultural Research (ICAR) have come up with "beat-the-heat" solutions through new wheat varieties, such as HD-3385, which are amenable to early sowing and harvesting by March-end.

This comes even as cereal inflation soared to a record 16.12 per cent year-on-year in January – driven primarily by wheat and atta (flour), whose consumer prices registered an annual increase of 25.05 per cent. The situation has been rendered worse by wheat stocks in government godowns: At 154.44 lakh tonnes on February 1, this is the lowest in six years for the same date.

However, the bigger uncertainty has to do with the wheat now in farmers' fields, due for harvesting only in April. Last year, a surge in March temperatures damaged the crop just when the grains were accumulating starch and proteins. This significantly reduced production as well as government procurement.

There are fears of a repeat this time, with both maximum and minimum temperatures already 3-5 degrees Celsius above

CONTINUED ON PAGE 4

Context: The Union Agriculture Ministry announced that it had set up a committee to **monitor the situation arising from the increase in temperatures** and its impact, if any, on the current wheat crop.

- Last year, a spike in March temperatures singed the crop just when the grains were accumulating starch and proteins, leading to a **significant drop in output as well as government procurement.**

Beat-the-heat solution

- **About**: Beat-the-heat solution put forth by scientists at the **Indian Council of Agricultural Research (ICAR)** is to advance the time of sowing.
- **Mechanism**: Wheat is a typically **a 140-145 days crop planted mostly in November** - before the middle of the month in Punjab, Haryana, Rajasthan and Madhya Pradesh (post the harvesting of paddy, cotton and soybean) and the second half and beyond in Uttar Pradesh and Bihar (after sugarcane and paddy).
  - If **sowing can be preponed** and taken up from around October 20, the crop isn't exposed to terminal heat, with much of the grain-filling being completed by around the third week of March. It can, then, be comfortably harvested by the month-end.
- **Limitation**: But the solution is easier said than done - for the simple reason that the wheat sown before early-November is also prone to **premature flowering.**
  - To get around the problem, Indian Agricultural Research Institute (IARI) scientists have bred wheat varieties with what is termed **"mild vernalisation requirement"** or the need for a certain minimum period of low winter temperatures for initiation of flowering.
  - In this case, the crop, when sown in October 20-25, will come to heading only in 100-110 days. Adding another 4-5 days for pollination, it leaves a long window from mid-February for **grain formation and filling.**
  - The IARI scientists have developed three varieties (**HDCSW-18, HD-3410 and HD-3385)**, all of them incorporating genes that are responsible for the mild vernalisation requirement preventing premature flowering and early heading.
  - IARI has registered HD-3385 with the **Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA).**
    - **PPVFR Act 2001** was enacted to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants.

THE HINDU Page 12

CENTRAL DEPUTATION OF AIS

(Syllabus: GS Paper 2 - Polity & Governance)

Home Ministry asks States to relieve IPS officers for Central deputation

Vijaita Singh
NEW DELHI

Officers who fail to join within a month will be debarred from Central deputation for five years

The Union Home Ministry has written to the States to nominate an adequate number of Indian Police Service (IPS) officers for Central deputation.

The Ministry expressed concern that the State governments were either withdrawing the names of selected officers or not relieving them for taking up an assignment with the Central government that resulted in considerable delay in the placement of the officers at the Centre and adversely impacted the entire process of "selection, deputation and cadre management".

The Ministry cautioned that the officers selected who fail to join within a month would be debarred from Central deputation for five years. "If any officer, on being selected, does not join within one month of issue of his/her appointment order, either on account of personal disinclination or on refusal by the State Government concerned to relieve the officer", he or she would be debarred for five years, the Ministry said. The debar policy is in existence for decades.

220 vacancies

As on February 6, there were 220 vacancies for IPS officers from the rank of Superintendent of Police (SP) to Director-General of Police in 17 Central organisations such as the Central Bureau of Investigation (CBI), the Central Armed Police Forces (CAPF) and the Intelligence Bureau (IB).

IPS officers are recruited by the Union Public Service Commission (UPSC) on behalf of the Centre and their services are placed under various State cadres. As per norms, at least 40% of senior duty posts in each State cadre are earmarked as Central Deputation Reserve (CDR) posts. The concurrence of officers is also required for Central deputation.

"The CDR of each IPS cadre determines the extent to which the number of officers could be sent on deputation to the Government of India. However, it has been the experience that the offer list of some States do not contain sufficient number of names vis-a-vis CDR utilisation," the Ministry said.

The Home Ministry said it was observed that even though a few IPS officers had submitted their applications/nominations on the online portal for approval of the competent authority, the same were not being processed or forwarded by the cadre controlling authority or the State governments. It said a conscious attempt should be made by the State governments to forward the names of officers for deputation under the Government of India so that "every eligible officer gets an opportunity to serve at the Centre at least once".

Context: The Union Home Ministry has written to the States to nominate adequate number of Indian Police Service (IPS) officers for Central deputation.

Cadre Control of AIS

- **About**: All India Service officers are recruited by the Union Government (by UPSC) and their services are allotted under various State Cadres.
  - They have the accountability to serve both under the State and the Centre.
  - The Cadre Controlling Authority of AIS is the Union Government.
    - The DoPT is the cadre controlling authority of IAS officers.
    - Cadre controlling authority for deputation of Indian Police Service and Indian Forest Service Officers (IFoS) is the Ministry of Home Affairs (MHA) and the Environment Ministry respectively.
- **Central Deputation Reserve**: The State government has to prescribe a number of officers available for deputation as prescribed under Central Deputation Reserve.
  - Every State cadre of the service provides for a Central deputation quota which in turn requires additional recruitment to be made to the service to provide for trained and experienced members to serve on posts in the Central Government.
- **Present Rules**: In normal practice, the Centre asks every year for an "offer list" of officers of the All India Services willing to go on central deputation, after which it selects officers from that list.
  - Officers have to get a no-objection clearance from the State government for Central deputation.
  - States have to depute the All India Services (AIS) officers, to the Central government offices, and at any point, it cannot be more than 40% of the total cadre strength.
- **Amendments**: In February 2022, the Home Ministry amended the IPS tenure policy doing away with the mandatory requirement of empanelment of IPS officers at the Deputy Inspector-General (DIG) level.
  - Officers with a minimum of 14 years of experience will be eligible for appointment at the level of DIG by the Centre.
  - Officers are assessed on whether they are suitable for Central deputation by the Central Police Establishment Board (CPEB) headed by the Union Home Secretary.
  - The names of officers up to the rank of Inspector-General of Police are then sent to the Appointments Committee of the Cabinet (ACC), headed by the Prime Minister, for approval.

PIB FEB 22

SUPOSHIT MAA ABHIYAN

(Syllabus: GS Paper 2 - Health)

PM lauds the initiative of 'Suposhit Maa' by Lok Sabha speaker, Om Birla

Context: The Prime Minister has praised the initiative of **'Suposhit Maa'** by Lok Sabha speaker who inaugurated Suposhit Maa Abhiyan in Ramganjmandi area of Kota.

Suposhit Maa Abhiyan

- **About**: On March 1, 2020, the Lok Sabha speaker launched **Suposhit Maa Abhiyan**, a scheme to ensure nutritional support to pregnant women in Kota (the Speaker's constituency), in Kota, Rajasthan.
- **Objectives**: The scheme is in line with achieving **'Malnutrition-free India' by 2022.**
  - The Suposhit Maa Abhiyan is to **provide nutritional support to pregnant women and adolescent girls** in Kota of Rajasthan.
  - This would **contribute to the health of the child** also.
- **Beneficiaries**: 1,000 pregnant women will be covered by the scheme.
  - **Only one pregnant women from a family** will be covered by the scheme.
  - It will also ensure the child's health.
- **Workings of the Scheme:** The pregnant women are to be **registered on a website**, following which they will be 'adopted'.
  - These identified women would be given n**utritional support in the form of food items for a month.**
  - Each of the 1,000 women will be **given a kit of 17kg balanced diet.**
  - Simultaneously, the scheme would **ensure the child's health** through medical exams, blood tests, medicine provisions, delivery, etc.

PIB FEB 22

JAADUI PITARA

(Syllabus: GS Paper 2 - Education)

Jaadui Pitara is going to fill the minds of children with new enthusiasm and colour: PM

Context: The Prime Minister has hailed the **launch of Jaadui Pitara,** a learning-teaching material for foundational years.

- The National Education Policy 2020 envisaged play-based learning teaching material. In accordance with the policy, **Union Minister of Education** recently launched the **"JAADUI PITARA".**

Jaadui Pitara

- **About**: It is a set of p**laybooks, puzzles, flashcards, posters, worksheets, and storybooks.**
  - The material intrigues the curiosity of the children.
  - It is for children between the **age of 3 to 8 years.**
  - It is available in **13 different Indian languages.**
- **Developed by**: It was developed under the **National Curriculum Framework.**
  - The material is easy to use and can be downloaded and printed on paper.
- **Nodal Ministry:** Ministry of Education.
- **Primary objective**: Learn Through Play.
- **Focuses on five major developmental activities:**
  - Literacy development
  - Positive learning habits
  - Cultural development
  - Cognitive development
  - Socio-emotional development
  - Ethical development
- **Significance**: The Government of India is in the footsteps of creating **Amrit Generation.**
  - The teaching material will help India achieve this.
  - Amrit Generation is the **future generation of India.**
    - They are **patriotic, responsible, and dutiful**. They take part in government activities and contribute largely to the welfare of the country.

BUSINESS STANDARD

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TIGER DEATHS INVESTIGATION

(Syllabus: GS Paper 3 - Env & Eco)

Tiger deaths: How they are investigated

30 tigers have died in India so far in 2023

NITIN KUMAR
New Delhi, 21 February



The high number of tiger deaths — 30 — so far this year has been a cause for concern at the National Tiger Conservation Authority (NTCA), the agency responsible for maintaining the details of each tiger mortality in India.

What has happened with the tigers?

In the first 50 days of this year, 30 tigers have died. This is the highest number of tiger deaths in three years and it has prompted the Ministry of Environment, Forest and Climate Change to expedite its investigation into the cause of the deaths. Every tiger death is, in any case, investigated.

Who investigates?

According to the NTCA guidelines, the field director is responsible for the investigation if the big cat has died in a tiger reserve. For a protected area (national park/wildlife sanctuary), the manager concerned is in charge of the investigation.

In other areas (revenue land/conservation reserve/community reserve/village/township), the wildlife warden, according to the Wild Life (Protection) Act, 1972, or the divisional forest officer/deputy conservator of forests, under whose jurisdiction the area falls, is the authority responsible for the probe.

The overall responsibility at the state level rests with the chief wildlife warden of the state concerned.

According to NTCA data from 2012 to July, 2022, around 53 per cent of all deaths have occurred inside the tiger reserves; 35 per cent of tiger mortalities were recorded outside the boundary of tiger reserves; and the remaining 12 per cent were due to seizures.

The process

A tiger death is entered in the database only after the state government verifies the death. NTCA procedures are stringent when it comes to tiger deaths. All tiger deaths are considered as an incident of 'poaching' unless the investigation proves otherwise.

Supplementary details like post mortem reports, forensic and lab reports and circumstantial evidence are gathered for closing a particular tiger death case and classifying it as either "natural", "poaching" or "unnatural but not poaching".

The onus of proving a death as natural or a result of poaching — with adequate evidence like necropsy report, pathology report, coloured photographs, forensic reports and other reports under the standard operating procedure — is on the state.

In the absence of clear evidence, supporting reports are used to arrive at a conclusion. The final analysis in such cases is done at the NTCA headquarters at Delhi. However, if doubt persists even after the investigation is over, the cause of death is classified as poaching.

According to forest officials, the complete process to ascertain the cause of the death can take more than a year.

Asked about the reason for the delayed investigation, SP Yadav, additional director general, Project Tiger, said the forensic examination to determine the cause takes time. "There are very few laboratories that conduct forensic examination of tiger deaths in the country," he said. "Some of these laboratories also conduct forensic tests on human bodies, which get preference over tigers."

According to the NTCA data from 2012 to July, 2022, around 72 per cent of recorded tiger mortality cases have been closed after scrutinising the post mortem and forensic reports and over 28 per cent of the cases are pending (under scrutiny).

Major causes of deaths

According to forest officials, territorial disputes, age and health issues, poaching, and electrocution are the main reasons for the death of tigers.

The NTCA's mortality data from 2012 to 2022 reveals that of the 762 tiger deaths investigated during the period, around 55 per cent were natural deaths followed by poaching (25 per cent). Seizure (14 per cent) was the third highest cause of death in tigers. The remaining were attributed as unnatural non-poaching deaths.

DECODED

Context: The high number of tiger deaths - 30 - so far this year has been a cause for concern at the **National Tiger Conservation Authority (NTCA)**, the agency responsible for maintaining the details of each tiger mortality in India.

Procedure of Investigation of Tiger Deaths in India

- According to the NTCA guidelines, the **field director** is responsible for the investigation if the big cat has died in a tiger reserve.
- For a **protected area (national park/wildlife sanctuary),** the manager concerned is in charge of the investigation.
- In **other areas (revenue land/conservation reserve/ community reserve/village/township)**, the **wildlife warden**, according to the Wild Life (Protection) Act, 1972, or the divisional forest officer/deputy conservator of forests, under whose jurisdiction the area falls, is the authority responsible for the probe.
- The **overall responsibility at the state level** rests with the chief wildlife warden of the state concerned.
- A tiger death is entered in the database only after the **state government verifies the death.**
- All tiger deaths are considered as an incident of ´**poaching´ unless the investigation proves otherwise.**
- The **onus of proving a death as natural or a result of poaching** - with adequate evidence like necropsy report, pathology report, coloured photographs, forensic reports and other reports under the standard operating procedure - **is on the state.**
- If **doubt persists** even after the investigation is over, the cause of death is c**lassified as poaching.**

DTE FEB 22

GREEN SCHOOLS PROGRAMME

(Syllabus: GS Paper 3 - Env & Eco)



CSE honours over 100 greenest schools in India

Over 700 schools participated in Green Schools Programme; Himachal Pradesh bags the Best Green State Award

By DTE Staff

Published: Tuesday 21 February 2023

Context: Over 700 schools participated in **Green Schools Programme**; Himachal Pradesh bags the Best Green State Award followed by Andhra Pradesh and Punjab.

Key Points

- Over 100 schools across India were certified 'green' by New Delhi-based non-profit **Centre for Science and Environment (CSE).**
- Of these, 19 schools received the topmost **Annual Green School Awards** for their exemplary initiatives in making their campuses environment-friendly and their students environment-conscious.
- The **awards, given annually by CSE,** are based on an exhaustive and rigorous annual audit of resource management and environment-friendly practices within the school campuses. Schools conduct the audit themselves with CSE's help.
- Awards were also conferred on the most proactive teachers, the "best state" and "best district", etc, in an award ceremony by CSE.

Centre for Science and Environment (CSE)

- **About**: It is a **not-for-profit** public interest research and advocacy organisation based in New Delhi, India.
- **Origin**: Established in 1980, CSE works as a think tank on **environment-development issues in India,** poor planning, climate shifts devastating India's Sundarbans and advocates for policy changes and better implementation of the already existing policies.
- **Achievements**: As an acknowledgement of its state-of-the-art training and capacity-building capabilities, CSE has now been recognised by the Government of India as a:
  - **Centre of Excellence** in the area of sustainable urban water/ wastewater management by the Union Ministry of Urban Development (MoUD).
  - **National Key Resource Centre (KRC)** in the area of rural water sustainability by the Union Ministry of Drinking Water and Sanitation (MoDWS).
  - **Nodal Institute for conducting short- and long-term training programmes for environment regulators** by the Union Ministry of Environment and Forests (MoEF)
- **Awards**: In 2018 the CSE was awarded Indira **Gandhi Prize for Peace, Disarmament and Development.**

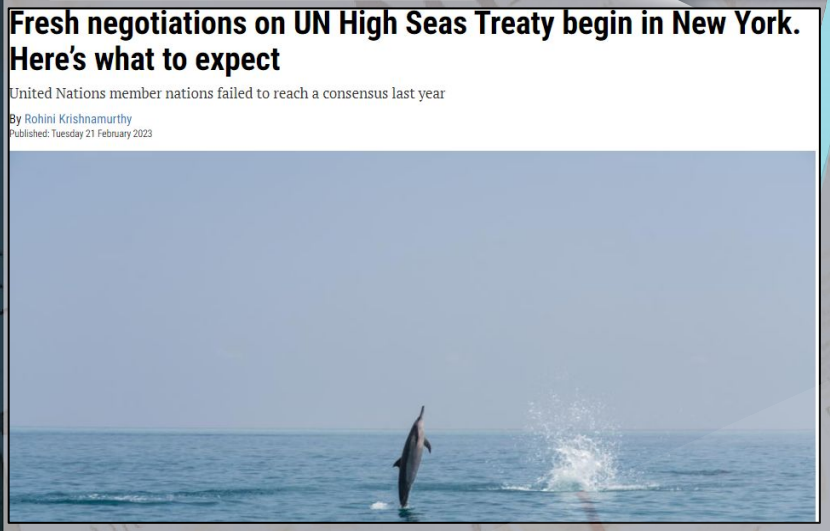
Green Schools Programme (GSP)

- **About**: It is an **environmental education programme** directed to subtly sensitizing students to the environment through hands-on and thought provoking activities.
- **Nodal Agency:** Centre for Science and Environment (**CSE**).
- **Key Features**: It assessed each school that undertook the audit on its resource consumption practices in **six areas** - water management, solid waste management, energy efficiency, air pollution control, land and biodiversity management and food systems followed.
  - It is an **environment management system** that audits, through students, the consumption of natural resources within school campuses and helps schools become good environmental managers by deploying pragmatic solutions to reduce wastage of precious resources.
  - The unique aspect of this programme is the opportunity that it affords schools to **measure their progress year on year** and improve their ranking.

DTE FEB 22

UN HIGH SEAS TREATY

(Syllabus: GS Paper 3 - Env & Eco)

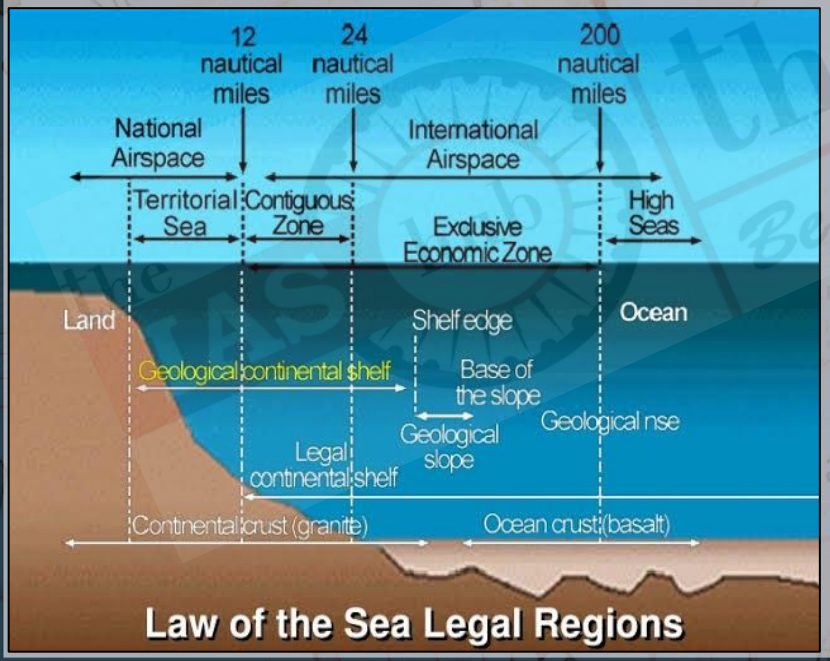


Fresh negotiations on UN High Seas Treaty begin in New York. Here's what to expect

United Nations member nations failed to reach a consensus last year

By Rohini Krishnamurthy

Published: Tuesday 21 February 2023



Law of the Sea Legal Regions

Context: A new round of negotiations on the much-awaited United Nations High Seas Treaty for conservation and sustainable use of marine **biological diversity of areas beyond national jurisdiction (BBNJ)** began in New York February 20, 2023.

- The meeting resumed after member nations failed to reach a consensus on the treaty at the fifth session of the **Intergovernmental Conference (IGC)** on the BBNJ in August 2022.
- The **legally binding treaty,** if adopted, will safeguard global ocean health, climate resilience, socio-economic well-being and food security for millions of people.

Proposed UN High Seas treaty

- **About**: Also referred to as the **'Paris Agreement for the Ocean',** the treaty to deal with Biodiversity Beyond National Jurisdiction (BBNJ) has been under discussion for several years.
- **Beyond the exclusive economic zones**: The proposed treaty **concerns the ocean existing beyond the Exclusive Economic Zones** that lie from the coast of a country to about 200 nautical miles or 370 km into the sea, till where it has special rights for exploration.
  - Waters beyond that are known as **open seas or high seas**.
- **Framework under UNCLOS**: The treaty was to be negotiated under the **United Nations Convention on Laws of the Sea (UNCLOS)** of 1982 which governs the rights of countries regarding marine resources.
  - As there is **no treaty for conserving the health of vast swathes of the earth's oceans**, a UN resolution in 2017 had decided to rectify this while setting 2022 as the deadline.
- **Negotiation aspects**: Negotiations included establishing **marine protected areas** to put limits on certain activities, environmental impact assessments or clearances for sustainability of works, financial support to countries and sharing other scientific knowledge.

NATURAL LANGUAGE PROCESSING

(Syllabus: GS Paper 3 - Sci & Tech)

Supreme Court Launches AI for Live Transcript of Court Hearings

Service launched on a trial basis in courtroom of CJI Chandrachud

Our Political Bureau

New Delhi: In a first, the Supreme Court on Tuesday launched the use of Artificial Intelligence and technology powered by Natural Language Processing on a trial basis to provide live transcriptions of court hearings.

The service was launched in the courtroom of Chief Justice of India DY Chandrachud, who is heading a Constitution bench hearing a bunch of pleas on Maharashtra political party Shiv Sena. A screen displaying the live transcription of court proceedings has been placed in the CJI's courtroom facing lawyers.

The CJI said that SC was trying to explore the possibilities of live transcripts. "It is an experiment. Then we will have a permanent record of arguments," he said, adding the facility will help not only judges and lawyers but also law colleges.

The service is being managed by TERES, a company which has been providing the facility to arbitration practitioners. As per the available information, SC will also make available on its website transcripts of oral arguments.



It is an experiment. Then we will have a permanent record of arguments: Chandrachud

"Now, the only issue can be if two or more people talk over. But there are people overseeing it. They will hear and clear it up," the CJI said. Senior advocate Kapil Sibal, who is representing the Uddhav Thackeray faction of Shiv Sena, termed the move "wonderful idea". Justice PS Narasimha said this would mean that SC would be literally a "court of record".

In her plea calling for livestreaming of significant cases, senior advocate Indira Jaising had earlier suggested audio transcripts of hearings for archival. Last month, a bench headed by the CJI had taken these suggestions on record.

Context: In a first, the Supreme Court launched the use of **Artificial Intelligence and technology powered by Natural Language Processing** on a trial basis to provide live transcriptions of court hearings.

- The service is being **managed by TERES**, a company which has been providing the facility to arbitration practitioners. As per the available information, SC will also make available on its website transcripts of oral arguments.
- The experimental live transcription has been **launched only in the courtroom of Chief Justice of India** for now.

Natural language processing (NLP)

- **About**: It is a **branch of artificial intelligence** that helps computers understand, interpret and manipulate human language.
  - NLP draws from many disciplines, including **computer science and computational linguistics,** in its pursuit to fill the gap between human communication and computer understanding.
- **Key Features:**
  - **Content categorization**: A **linguistic-based document summary,** including search and indexing, content alerts and duplication detection.
  - **Topic discovery and modeling:** Accurately capture the meaning and themes in text collections, and apply advanced analytics to text, like **optimization and forecasting.**
  - **Contextual extraction**: Automatically pull structured **information from text-based sources.**
  - **Sentiment analysis:** Identifying the mood or subjective opinions within large amounts of text, including **average sentiment and opinion mining.**
  - **Speech-to-text and text-to-speech conversion**: Transforming **voice commands into written text,** and vice versa.
  - **Document summarization:** Automatically generating **synopses of large bodies of text.**
  - **Machine translation**: Automatic translation of text or speech from **one language to another.**
- **Significance**: NLP **helps computers communicate with humans in their own language** and scales other language-related tasks. For example, NLP makes it possible for computers to read text, hear speech, interpret it, measure sentiment and determine which parts are important.
  - NLP is important because it helps **resolve ambiguity in language and adds useful numeric structure** to the data for many downstream applications, such as speech recognition or text analytics.

DST FEB 22

CORONAL MASS EJECTIONS
(Syllabus: GS Paper 1 - Geography

Solar transient events like ICMEs can make the prediction of space weather uncertain

Context: Scientists tracing **interplanetary coronal mass ejections (ICMEs)** that move out of the solar atmosphere have observationally verified for the first time that ICMEs are initially circular but flatten significantly during their propagation in the solar wind, due to high compression caused by the fast solar wind.

- Such a **deformed morphological feature** not only alters the prediction of the arrival time of these astronomical events, which have a lot of impact on space weather, and also has significant implications in solar-terrestrial physics.
- The study **advances the knowledge of solar eruptions**, which will be very important for upcoming India's first interplanetary mission, "Aditya L1 mission" as well as planning of future space missions of humanity.

Coronal Mass Ejection (CME)

- **About**: It is a large **release of plasma a**nd magnetic field into the solar wind from the Sun's corona.
  - **Solar flares** and other kinds of solar activities are frequently related to the onslaught of CMEs.
  - Coronal Mass Ejections expel plasma, which is mostly composed of **electrons and protons.**
  - The fourth state of matter is also known as **plasma**. At very high temperatures, electrons are stripped from the nuclei of atoms, resulting in a plasma or ionised state of matter.
- **Three different characteristics:**
  - A low electron density cavity.
  - A dense core.
  - A brilliant leading edge.
- **Key Features**: It is **one of the largest eruptions from the surface of the Sun,** capable of containing a billion tonnes of matter propelled into space at speeds of several million miles per hour.
  - The Sun creates roughly **three CMEs each day near Solar Maxima,** and about one CME per five days near Solar Minima.
  - **Solar Maxima and Solar Minima** are the time of intensely high and low activities respectively by the Sun.

Interplanetary Coronal Mass Ejection (ICME)

- **About**: It occurs when a CME **penetrates into the interplanetary space.**
  - ICMEs have the ability to reach **Earth's magnetosphere** and collide with it, causing geomagnetic storms, aurorae, and, in rare situations, damage to electrical power networks.
  - ICMEs usually take between one to five days to reach Earth after leaving the Sun.
- **Key Features**: ICMEs engage with the solar wind and the **interplanetary magnetic field (IMF)** throughout their propagation, and depending on the situation, they accelerate or decelerate to match the solar wind's speed.
  - **Shock waves** are generated by ICMEs that travel faster than 500 km/h (310 mi/h).

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