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Current affairs summary for prelims

10 October 2024

Amazon Basin's Worst Drought in 122 Years

Context: The Amazon Basin, the world's largest tropical rainforest and hydrobasin, is facing its most severe drought in 122 years. This ongoing crisis is driven by a combination of climatic factors and has extensive environmental, social, and economic repercussions.

Geographical Significance:

- **Size:** The Amazon Basin spans 6.87 million sq. km, discharging 16-18% of the world's freshwater into the oceans.
- **Biodiversity:** It holds around 10% of global biodiversity, playing a critical role in regulating climate and biogeochemical cycles.
- **Carbon Storage:** Approximately 150-200 billion tonnes of carbon are stored in its biomass and soils.
- **Floodplains:** Around 750,000 sq. km of the basin consists of nutrient-rich várzea and nutrient-poor igapó floodplains, which are essential for supporting indigenous livelihoods and diverse ecosystems.

Key Drivers of the Drought:

El Niño-Southern Oscillation (ENSO):

- The El Niño phenomenon, specifically the eastern Pacific El Niño, suppresses rainfall across the Amazon Basin by causing descending dry air masses over northern South America.
- This results in reduced rainfall from June onwards, leading to drought, which peaks between December and February.

Tropical North Atlantic (TNA) Warming:

- Simultaneous heating of the TNA shifts the Intertropical Convergence Zone (ITCZ) northwards, further reducing moisture inflow into the Amazon Basin.
- This intensifies the drought, especially in southern and southwestern regions.

Atlantic Multidecadal Oscillation (AMO):

- The AMO, characterized by cyclical variations in sea surface temperatures, exacerbates drought conditions during its warm phase, which has persisted since the mid-1990s.

Deforestation and Fires:

- Deforestation decreases evapotranspiration and leads to higher atmospheric temperatures, while fires contribute to air pollution and create feedback loops that worsen the drought.

Impact on Biodiversity and Communities:

- **Indigenous and Traditional Populations:** Many communities rely on rivers and floodplains for water, food, and transport. The extreme low water levels have isolated these populations, making it difficult to access essential services.
- **Agriculture and Livestock:** Crop failures and livestock deaths are widespread due to extreme heat and lack of water.
- **Aquatic Life:** Warm water temperatures in floodplain lakes have caused mass die-offs of fish and aquatic mammals like manatees and river dolphins.
- **Economic Losses:** Fluvial navigation, crucial for commerce, has been severely disrupted by low water levels, affecting the transport of goods and materials.

Deforestation and Climate Initiatives in India:

- India's total forest cover is approximately 713,789 sq km, constituting about 21.71% of the nation's geographical

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area, according to the India State of Forest Report (ISFR) 2021. Despite these significant figures, certain regions, particularly the Northeast and the Western Ghats, face critical deforestation threats driven by infrastructure projects and agricultural expansion.

- The challenges of water management are particularly pronounced in states like Rajasthan and Maharashtra
- India launched the National Action Plan on Climate Change (NAPCC) in 2008, which outlines eight missions aimed at addressing climate change while promoting sustainable development.
- India also reaffirmed its commitment to achieving Net Zero emissions by 2070 at COP28,

Nobel Prize in Physics 2024

Context: The 2024 Nobel Prize in Physics has been awarded to John J. Hopfield and Geoffrey E. Hinton for their groundbreaking contributions to artificial intelligence (AI) and artificial neural networks (ANNs). Their innovative research has fundamentally transformed machine learning technology, which underpins many AI applications we rely on today.

Hopfield's Contributions:

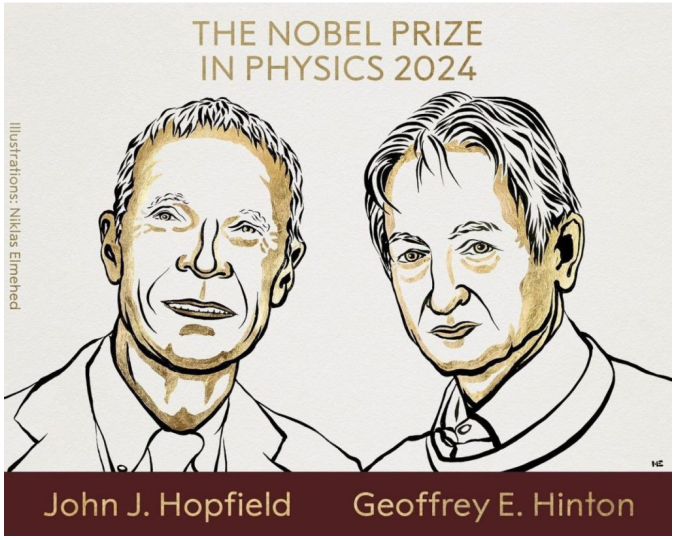
- John J. Hopfield, an American theoretical physicist, is renowned for developing the Hopfield network, a form of artificial neural network capable of storing and recalling information. This seminal work demonstrated how a network of interconnected nodes could remember and retrieve data efficiently. Hopfield's innovation laid the groundwork for subsequent advancements in AI, highlighting the potential of neural networks in computing.

Hinton's Contributions:

- Geoffrey E. Hinton, a British-Canadian computer scientist, built upon Hopfield's foundational work to create the Boltzmann machine. This development introduced key concepts of machine learning, illustrating how artificial neural networks could learn from data inputs. Hinton's research has been instrumental in driving the evolution of modern AI systems, enabling them to adapt and improve based on experience.

About Artificial Neural Networks:

- Artificial intelligence, as commonly understood today, largely involves the implementation of artificial neural networks. ANNs consist of interconnected nodes designed to function like networks of neurons in animal brains.
- Each node processes input data according to fixed rules, generating an output. By stacking multiple layers of nodes, each performing specialized tasks, ANNs can achieve deep learning capabilities, allowing machines to surpass human capabilities in certain tasks.
- The evolution of AI reflects a paradigm shift from traditional computing to advanced systems capable of complex pattern recognition.
- The foundational work by Hopfield and Hinton not only established the principles of ANNs but also illustrated how concepts from fields like statistical physics, neurobiology, and cognitive psychology could be integrated into computational frameworks.



Applications of Artificial Neural Networks:

- **Image Recognition:** Crucial for self-driving cars and medical imaging.
- **Natural Language Processing (NLP):** Enhancing tasks like language translation and sentiment analysis.
- **Speech Recognition:** Used in virtual assistants and voice-controlled devices.
- **Recommender Systems:** Employed by platforms like Netflix and Amazon for personalized suggestions.
- **Financial Forecasting:** Assisting in predicting market

trends and stock prices.
- **Medical Diagnosis:** Supporting disease diagnosis through image analysis.
- **Robotics:** Facilitating object recognition and motion planning.
- **Fraud Detection**: Identifying fraudulent transactions across sectors.

Impact of Their Work:

- The contributions of Hopfield and Hinton have revolutionized AI, leading to advancements in image recognition, natural language processing, and autonomous decision-making.
- However, their work has also raised concerns about the implications of advanced AI systems.
- Hinton has expressed worries about the rapid pace of AI development and its potential risks, prompting discussions on ethical considerations and safety measures in AI deployment.

"Free to Think 2024" Report

Context: The "Free to Think 2024" annual report, published by the Scholars at Risk (SAR) Academic Freedom Monitoring Project, reveals a significant decline in academic freedom in India over the past decade.

- SAR is a global network comprising 665 universities, including notable institutions like Columbia University and Duke University, documented 391 attacks on higher education communities across 51 countries between July 1, 2023, and June 30, 2024.

Key Findings:

- The report highlights that India's academic freedom score has plummeted from 0.6 points in 2013 to a mere 0.2 points in 2023. This decline places India in the "completely restricted" category of the Academic Freedom Index, marking its lowest score since the mid-1940s.
- The report attributes this deterioration to the ruling Bharatiya Janata Party's (BJP) efforts to impose political control over universities and advance a Hindu nationalist agenda, leading to increased restrictions on student protests and academic expression.

Tensions Between State and Central Governments:

- The reporting period highlighted ongoing conflicts between the Union government and various state governments regarding control over higher education.
- A notable example occurred in Kerala, where Governor Arif Mohammed Khan, appointed by the Union government, clashed with the state government over a legislative amendment aimed at replacing him as Chancellor of state universities.
- Similar power struggles for control of higher education were observed in states like Tamil Nadu, West Bengal, and Punjab, reflecting the broader political tensions in the country.

Academic Resignations and Restrictions:

- The report documents the impact of central government pressure on academia, evidenced by the resignation of Sabyasachi Das, an assistant professor of economics at Ashoka University. After presenting a paper alleging political manipulation during the 2019 Lok Sabha elections at a conference, Das faced public backlash from BJP leaders, prompting concerns about academic freedom and integrity.

Power Packed News

70th National Film Awards

- Recently on October 8, 2024, President Draupadi Murmu presented the 70th National Film Awards at Vigyan Bhavan, New Delhi for outstanding contribution to Indian cinema.
- Veteran actor Mithun Chakraborty was honored with the prestigious Dadasaheb Phalke Award for his remarkable career.
- Rishab Shetty received the Best Actor award for his performance in Kantara, while Nithya Menen and Manasi Parekh shared the Best Actress title for Thiruchitrambalam and Kutch Express.

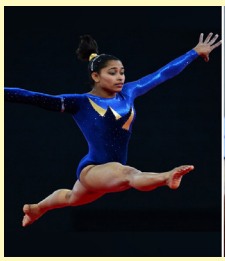
Other Awards conferred:

Category	Winner	Film
Best Film	Aattam	
Best Hindi Film	Gulmohar	
Best Music Director (Songs)	Pritam	Brahmastra
Best Music Director	AR Rahman	Ponniyin Selvan Part-1
Best Male Singer	Arijit Singh	Kesariya (from Brahmastra)
Best Director	Sooraj Barjatya	Oonchai
Best Child Artist	Shripath	Malikappuram (Malayalam)

Delivery of Nirdeshak (Yard 3026) Vessel to the Indian Navy

- Recently, the Indian Navy received the delivery of the Nirdeshak (Yard 3026) vessel, the second of four survey vessels.
- This vessel was designed by the Indian Navy's Warship Design Bureau and built by GRSE, Kolkata. Its primary purpose is to conduct hydrographic surveys in coastal and deep waters, and it is also capable of collecting oceanographic and geophysical data.
- Weighing 3,400 tons and measuring 110 meters in length, it is equipped with advanced tools like data acquisition systems, autonomous underwater vehicles, and digital side scan sonar.
- The vessel can achieve speeds of over 18 knots. More than 80% of Nirdeshak's construction uses indigenous materials, reflecting the Indian Navy and government's commitment to 'Atmanirbhar Bharat.'

Dipa Karmakar Announced Retirement



- Recently, India's famous gymnast, Dipa Karmakar announced her retirement on social media. Dipa Karmakar is a resident of Agartala, Tripura.
- She represented India in the 2016 Rio Olympics and won a bronze medal in the 2015 Commonwealth Games.
- Dipa is one of the few gymnasts in the world who have successfully performed the famous Produnova vault.
- Dipa created history by winning a bronze medal in the women's vault final at the Glasgow Commonwealth Games in 2014. She became the first Indian woman to achieve this feat.
- Dipa is the first Indian female gymnast to represent the country in the Olympic Games.
- She was also awarded the Padma Shri in 2017, the Major Dhyan Chand Khel Ratna Award in 2016 and the Arjuna Award in 2015.

Second Hanle Dark Sky Reserve Star Party

- The Second Hanle Dark Sky Reserve Star Party recently took place in Ladakh, India, organized by the Indian Institute of Astrophysics. This event attracted around 30 amateur astronomers who gathered to observe and photograph the stunning night sky.
- Located at 4,300 meters above sea level, the Hanle Dark Sky Reserve is India's first designated dark sky reserve, centered

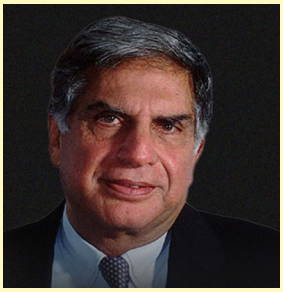
around the Indian Astronomical Observatory. First star party was held at Hanle Dark Sky Reserve from October 12-15, 2023.

- Key features of the Hanle Dark Sky Reserve include minimal light pollution, which allows for clearer views of celestial objects, essential for both casual observation and scientific research. The high altitude and dry climate also create ideal conditions for astrophotography, enabling participants to capture breathtaking images of the night sky.
- Additionally, the reserve promotes astrotourism, attracting visitors interested in stargazing and contributing to the local economy while preserving the region's cultural significance.

Dark-Sky Reserve:

- A dark-sky reserve is an area, often located around a park or observatory, designed to limit or reduce light pollution. These preserves help maintain and protect naturally dark night skies, creating ideal conditions for stargazing and astronomical observations. By restricting artificial lighting, they enhance the visibility of celestial objects and promote awareness of the importance of dark skies for both wildlife and human health.

Former Chairman of Tata Sons and Renowned Indian Industrialist, Ratan Tata Passes Away



- Indian industrialist and former chairman of Tata Sons, Ratan Tata, passed away in Mumbai on October 9, 2024, at the age of 86. He was undergoing treatment at Breach Candy Hospital.
- Ratan Tata, known for his visionary leadership, transformed the Tata Group from an Indian company to a global group from 1991 to 2012. Under his leadership, the Tata Group's revenue grew from $5.7 billion to nearly $100 billion.
- He played a key role in important acquisitions such as Tata Tea's purchase of Tetley and Tata Motors' purchase of Jaguar Land Rover.
- Apart from business, he was dedicated to social work such as education, healthcare and public welfare, which he pursued through the Tata Trusts.

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