TATHASTU
Institute of Civil Services

DAILY CURRENT AFFAIRS

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53/1, Upper Ground Floor, Bada Bazar Road, Old Rajinder Nagar, New Delhi -110060
www.tathastuics.com 9560300770, 9560300554 enquiry@tathastuics.com

NORTHERN LIGHTS OR AURORA BOREALIS

SOURCE: ***THE INDIAN EXPRESS***

TAG: GS-I, GS-III – **Important Geophysical Phenomena, Environment, Science and Technology.**

Why in News:

- The night sky was lit up by northern lights, or aurora borealis, at Hanle village in Ladakh early.
- Northern lights were also witnessed in other parts of the world, including in the United States and the United Kingdom.
- Meanwhile, southern lights, or aurora australis, were spotted in countries such as New Zealand and Australia.

About Auroras:

- Auroras are natural light displays in the sky, predominantly seen in high-latitude regions near the Arctic and Antarctic circles.
- They are caused by charged particles from the Sun (the solar wind) interacting with Earth's magnetic field and upper atmosphere.
- The colours of auroras are produced by different atmospheric gases - oxygen gives green and red, while nitrogen produces blue and purple hues.
- Auroras are directly linked to increased solar activity and geomagnetic storms on Earth.
- The intensity, colours, and patterns of auroras can vary greatly, leading to dynamic and mesmerizing displays in the night sky.
- They are most visible in places with minimal light pollution and clear, dark skies during the local autumn, winter, and early spring.

Geomagnetic Storms:

- A geomagnetic storm is a temporary disturbance in the Earth's magnetosphere caused by a burst of solar wind from the Sun.
- It occurs when a high-speed stream of charged particles from the Sun interacts with the Earth's magnetic field.
- These charged particles transfer energy into the magnetosphere, causing it to become highly unstable.
- This instability can lead to fluctuations in the Earth's magnetic field, potentially affecting power grids, satellites, and radio communications.
- Geomagnetic storms are classified on a scale from G1 (minor) to G5 (extreme) based on their intensity.
- They are often associated with auroras (northern and southern lights) due to the charged particles interacting with the Earth's upper atmosphere.

The Scientific Significance of the Aurora:

- Auroras provide insights into the Earth's magnetosphere and its interactions with the solar wind and charged particles from the Sun.
- They serve as a visual indicator of space weather conditions, helping scientists study geomagnetic storms and their potential impacts on Earth's atmosphere and technological systems.
- Auroras are used to investigate the complex dynamics of the Earth's magnetic field and its response to solar activity.
- They offer opportunities to study the behavior of charged particles and their interactions with atmospheric gases, contributing to our understanding of plasma physics.
- Observing auroras at different wavelengths, from visible light to radio waves, provides insights into the underlying physical processes and energy transfer mechanisms.

Conclusion:

- Auroras lies in their ability to serve as a natural laboratory for studying the Earth's magnetosphere, solar-terrestrial interactions, atmospheric physics, and space weather phenomena, ultimately advancing our knowledge of the dynamic space environment around our planet.

AFTER COAL AND GAS, GOVT BOLSTERS HYDRO CAPACITY TO MEET RISING PEAK DEMAND

SOURCE: ***THE INDIAN EXPRESS***

TAG: GS-II, III – **Government Policies and Intergventions, Infrastructure-Energy, Environment.**

Why in News:

- The Ministry of Power said it has "optimised" hydropower generation to make available an additional 4GW capacity, weeks after it instructed fifteen imported coal-based and all gas-based thermal plants to be operational during the summer months.
- With peak power demand set to touch 240 GW in June, the ministry's latest effort to avoid supply shortfall reflects growing concern over risk of outages.

Reasons behind increasing Hydropower Capacity:

- The country is staring at a 14 GW peak shortfall in June, its largest in 14 years, due to delays in commissioning new coal-based plants, according to a Reuters report.
- In India, which is the world's third largest producer of renewable energy, around 40 percent of installed electricity capacity comes from non-fossil fuel sources.
- This green push has resulted in a sharp 24 percent reduction in the emission intensity of GDP between 2005 and 2016, but it has also thrown up challenges in meeting peak demand with a grid being increasingly powered by renewables.
- The share of installed capacity of renewables like solar and wind has increased to nearly 29 percent of total capacity in FY24, compared to 20 percent in FY20, these sources of power do not have high capacity utilisation as they are variable in nature.
- With lithium-ion battery storage being ruled out as unviable for grid application, at least for now, an emerging policy resolve is that solar and wind-based generation cannot continue to be pushed down to struggling electricity distribution companies or discoms.

Government Schemes related to Renewable Energy:

- The Union Minister for New & Renewable Energy and Power has informed that the Government has set a target of achieving 500 GW of installed capacity from non-fossil fuels by 2030, in line with the Prime Minister's announcement at COP-26.

Solar Parks and Ultra-mega Solar Power Projects:

- The plan for development of solar parks and ultra-mega solar power projects aims to install 40,000 MW capacity.
- Under the scheme, the infrastructure such as land, roads, power evacuation system water facilities are developed with all statutory clearances/approvals.
- The scheme helps expeditious development of utility-scale solar projects in the country.

PM-KUSUM Scheme:

- PM-KUSUM Scheme to promote small Grid Connected Solar Energy Power Plants, stand-alone solar powered agricultural pumps and solarisation of existing grid connected agricultural pumps.
- The scheme is not only beneficial to the farmers but also States and DISCOMs.
- States will save on subsidy being provided for electricity to agriculture consumers and DISCOMs get cheaper solar power at tail end saving transmission and distribution losses.

Green Energy Corridors (GEC):

- GEC create intra-state transmission system for renewable energy projects. Central Financial Assistance (CFA) is provided to set up transmission infrastructure for evacuation of Power from Renewable Energy projects in total ten States (considering both the phases of GEC).
  I. Intra-State Transmission System Green Energy Corridor Phase-I
  II. Intra-State Transmission System Green Energy Corridor Phase-II

Conclusion:

- Governments are increasing hydropower capacity to capitalize on its renewable, reliable, and sustainable energy generation capabilities amidst growing energy demands.

CAN GUT BACTERIA CHEW UP YOUR BAD CHOLESTEROL?

SOURCE: ***THE HINDU***

TAG: GS III- **Science and Technology – Developments and their Applications and Effects in Everyday Life.**

Why in News:

- Bacteria being the pivot of our health and well-being, impacting our key lifestyle markers like cholesterol, blood sugar, triglycerides, body fat and haemoglobin.
- Latest research by the Broad Institute of MIT and Harvard, along with Massachusetts General Hospital, has found that specific bacteria in the gut can chew up cholesterol, lowering its levels in the blood and consequently eliminating the risk of plaque formation in the heart arteries.

How does gut bacteria help in controlling cholesterol levels in your blood?

- Several strains of Lactobacillus bacteria-a common gut bacteria-entrap cholesterol from their surroundings and incorporate it into their membranes. This is another way of eliminating cholesterol from your bloodstream.
- Oscillibacter bacteria influence bile acids, which are essential for fat digestion and absorption. Once they finish their functions, bile acids return to the liver for recycling. But some amount remains in the gut, becoming the food for gut bacteria and growing them. In this process, the gut bacteria break down bile acids into secondary bile acids, which regulate cholesterol metabolism.
- Bacteria break down dietary fibres through fermentation and produce short-chain fatty acids. These inhibit cholesterol formation and keep their levels low.

About Oscillibacter bacteria:

- Oscillibacter bacteria reside in the human gut microbiota.
- They contribute to the fermentation of dietary fibers.
- This fermentation process produces short-chain fatty acids like butyrate.
- Short-chain fatty acids support gut health and may aid in regulating metabolism.
- Oscillibacter may help maintain microbial balance in the gut.
- They could offer protection against certain gastrointestinal disorders.

Conclusion:

- Research suggests that certain gut bacteria, like Oscillibacter, may play a role in metabolizing cholesterol and contributing to overall cardiovascular health, but further studies are needed to fully understand this relationship and its potential implications for cholesterol management.