Prelim Bits 05-01-2022 | UPSC Daily Current Affairs

Whale Shark

A 15-foot whale shark was rescued by the Andhra Pradesh Forest Department.

- Whale sharks (Rhincodon typus) are the world's largest fish species (its maximum size could be as large as 20 metres).
- **Habitat** - Found in all the tropical oceans of the world, whale sharks have white spotted colouration.
- In India, Gujarat has the maximum density of whale shark population in the Indo-pacific region.
- The presence of whale sharks indicates the availability of plankton and the overall health of the oceans.
- **Food** - The whale shark, like the world's second largest fish, the basking shark, is a filter feeder i.e., they feed on planktons.
- In order to eat, it juts out its formidably sized jaws and passively filters everything in its path. The mechanism is called "cross-flow filtration".
- The whale shark travels massive distances to find food to sustain their huge size, and for reproduction.

Protection Status	
IUCN Red List	Endangered
CITES	Appendix II
Wild Life Protection Act, 1972	Schedule I

- **Threats** - Unregulated over-fishing for their meat, fins and oil; bycatch (accidental capture of non-target species in fishing gear); habitat loss; slow reproduction; climate change and tourism.

Reference

1. https://www.thehindu.com/sci-tech/energy-and-environment/meet-the-team-of-fishermen-in-visakhapatnam-who-saved-the-endangered-whale-shark/article38080827.ece
2. https://www.nationalgeographic.com/animals/fish/facts/whale-shark

Perovskite-based Solar Cells

IIT-Guwahati scientists have created a polyelectrolyte (polymer with positive or negative charge) to increase the stability of the perovskite films used in the hybrid perovskite-based solar or photovoltaic devices.

> Perovskite Solar Cell (PSC) includes a perovskite-structured compound, most commonly a hybrid organic-inorganic lead or tin halide-based material, as the light-harvesting active layer.

- Perovskite-based devices are considered heavily used **semiconductor** materials as they are affordable and easy to manufacture.
- Developing large-scale perovskite solar cells requires high-quality defect-free perovskite films with improved surface coverage.
- But, perovskite materials are **extremely unstable** towards ambient (humidity and oxygen) conditions that restrict their commercialisation.
- **Stabilisation** - The most convenient way to harness the maximum potential of the perovskite active layer is to use a coating of an appropriate passivation material.
- This will make the perovskite active layer 'stable' or less readily affected by the environment, in this case humidity and oxygen.
- Perovskite-based solar cells can be **manufactured at room temperature**, making them cost-effective and more eco-friendly.
- As the all components used in the hybrid perovskite-based solar cells are **recyclable**, they will help reduce the growing problem of Waste Electrical and Electronic Equipment (WEEE).

  An International Renewable Energy Agency (IRENA) report estimated the global PV waste will touch 78 million tonnes by 2050, with India being one of the top five PV waste creators.

Reference

1. https://www.downtoearth.org.in/news/renewable-energy/making-solar-cells-efficient-cheaper-recyclable-iit-guwahati-finds-a-way-80925
2. https://economictimes.indiatimes.com/industry/renewables/iit-guwahati-team-develops-efficient-perovskite-solar-cells-to-produce-electricity-from-sunlight/articleshow/88429557.cms

Solid-state Batteries

- A solid-state lithium-metal battery replaces the polymer separator used in conventional lithium-ion batteries with a solid-state separator (electrolyte) separating the two electrodes.
- The replacement of the separator enables the use of a lithium-metal anode in place of the traditional carbon/graphite anode.

- A Solid-state Battery could offer a safer, cheaper alternative to lithium-ion batteries.
- [Lithium-ion batteries use aqueous electrolyte solutions, where ions transfer to and fro between the anode (made of graphite) and cathode (made of lithium), triggering the recharge and discharge of electrons.]
- Development of solid state batteries which would help in overcoming the main problems of batteries containing liquid electrolytes, i.e. leakage and/or corrosion at the electrodes.
- A solid-state battery has higher energy density than a Li-ion battery that uses liquid electrolyte solution.
- **Advantages** of the solid-state battery technology include
  1. Higher cell energy density (by eliminating the carbon anode),
  2. Lower charge time (by eliminating the need to have lithium diffuse into the carbon particles in conventional lithium-ion cells),
  3. Ability to undertake more charging cycles and thereby a longer life, and improved safety,
  4. Lower cost.

Reference

1. https://indianexpress.com/article/explained/explained-breakthrough-in-battery-tech-7700744/
2. https://www.samsungsdi.com/column/technology/detail/5646html?listType=gallery
3. https://www.sciencedirect.com/topics/materials-science/solid-state-battery

Index of Eight Core Industries

Index of Eight Core Industries for November, 2021 was released by the Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade.

- Index of Eight Core Industries has the base year: 2011-12=100
- **Eight Core Industries** - Coal, Crude Oil, Natural Gas, Petroleum Refinery Products, Fertilizers, Steel, Cement, Electricity.
- These Core Industries comprise 40.27% of the weight of items included in the Index of Industrial Production (IIP).
- Since 2014, Electricity generation data from Renewable sources are also included.
- Since 2019, a new steel product called Hot Rolled Pickled and Oiled (HRPO) under the item 'Cold Rolled (CR) coils' within the production of finished steel has also been included.
- **Related Links** - Index of Industrial Production

Reference

https://pib.gov.in/PressReleasePage.aspx?PRID=1786593

Indian Cyber Crime Coordination Centre

Ministry of Home Affairs (MHA) releases manuals of Indian Cyber Crime Coordination Centre (I4C) of Cyber and Information Security Division.

- Indian Cyber Crime Coordination Centre is an initiative of the Ministry of Home Affairs (MHA) to combat cyber crime in the country.
- Located in New Delhi, this state-of-the-art Centre deals with all types of cybercrimes in a comprehensive and coordinated manner.
- It identifies the research problems of the Law Enforcement Agencies (LEAs) and take up R&D activities in developing new technologies and forensic tools in collab with institutes within India and abroad.
- It aims to prevent misuse of cyber space for furthering the cause of extremist and terrorist groups.
- It even suggests amendments in cyber laws to keep pace with fast changing technologies and International cooperation.
- It aims to coordinate all activities related to implementation of Mutual Legal Assistance Treaties (MLAT) with other countries related to cybercrimes in consultation with the concerned nodal authority in MHA.
- **Components of I4C**
    1. National Cyber Crime Threat Analytics Unit,
    2. National Cyber Crime Reporting Portal,
    3. National Cyber Crime Training Centre,
    4. Cyber Crime Ecosystem Management Unit,
    5. National Cyber Crime Research and Innovation Centre,
    6. National Cyber Crime Forensic Laboratory Ecosystem.

7. Platform for Joint Cyber Crime Investigation Team.

Reference

1. https://www.aninews.in/news/national/general-news/mha-releases-manuals-newsletter-of-indian-cyber-crime-coordination-centre-of-cyber-and-information-security-division20220103221210/
2. https://vikaspedia.in/education/digital-litercy/information-security/indian-cyber-crime-coordination-centre
3. https://www.mha.gov.in/division_of_mha/cyber-and-information-security-cis-division/Details-about-Indian-Cybercrime-Coordination-Centre-I4C-Scheme