Prelim Bits 12-01-2022 | UPSC Daily Current Affairs

Man Portable Anti-Tank Guided Missile

Defence Research and Development Organisation (DRDO) successfully flight tested the final deliverable configuration of Man Portable Anti-Tank Guided Missile (MPATGM).

- MPATGM is an indigenously developed anti-tank missile.
- This low weight, fire & forget missile is for infantry and Parachute (Special Forces) of the Indian Army.
- It can be 'Soft' launched from a man portable launcher using an Ejection Motor.
- The missile has miniaturised infrared imaging seeker for homing on to the designated target and destroying it.
- The missile is designed for a maximum range of 2.5 km.
- It also has advanced avionics for on-board control and guidance.

Reference

1. https://pib.gov.in/PressReleasePage.aspx?PRID=1789153
2. https://www.drdo.gov.in/man-portable-anti-tank-guided-missile
3. https://www.ndtv.com/india-news/defence-research-and-development-organisation-flight-tests-man-portable-anti-tank-guided-missile-2702794

Grime-eating Bacteria

Scientists have started using grime-eating bacteria extensively to restore classical art.

- Usually, art restorers have usually employed chemical agents and, more recently laser techniques, to remove dirt, oil, glue, or pollutants from monuments, stoneworks, and paintings.
- But in the 1980s, the bacteria Desulfovibrio vulgaris was first used to clean a marble monument at the Cave Hill Cemetery in US.
- Since then, the role of micro-organisms has been recognised in protecting the artistic heritage of humanity.
- The process of using bacteria to restore classical art is called **Bio-cleaning**.

- The living bacterial cells were suspended in a gel and applied to the vertical walls and left for 24 and 48 hours.
- When the gel was removed, the inorganic dark brown layer and the other deposits were removed by the bacteria.
- The treatment was soft & delicate and didn't show any structural damage.
- **Other microbes used** - Pseudomonas stutzeri CONC11 bacterium isolated from the waste of a tannery, Rhodococcus sp. ZCONT that came from soil contaminated with diesel.
- The Archaeological Survey of India is exploring the option of employing bio-restoration at the Taj.

Reference

https://indianexpress.com/article/explained/how-scientists-are-using-grime-eating-bacteria-to-restore-classical-art-7718388/

Red Sanders

Red Sanders has fallen back into the 'endangered' category in the International Union for Conservation of Nature's (IUCN) Red List.

- Red Sanders or Sandalwood (Pterocarpus santalinus) is an Indian endemic tree species, with a restricted geographical range in the Eastern Ghats.
- It is endemic to a distinct tract of forests in Andhra Pradesh.
- This light-demanding species grows in the rocky, degraded and fallow lands with Red Soil and hot and dry climate.
- **Specialty** - Red Sanders is known for their rich hue and therapeutic properties.
- They are high in demand across Asia, particularly in China and Japan, for use in cosmetics and medicinal products as well as for making furniture, woodcraft and musical instruments.
- **Status** - Red Sanders was classified as 'near threatened' in 2018 and has now joined the 'endangered' list once again in 2021.
- The IUCN's Red List summary states that while the species retained its geographical area despite harvesting since the 16th century, its population saw a sharp decline of 50-80%.
- **Threats** - Over-exploitation

Protection Status	
IUCN Red List	Endangered
CITES	Appendix II (banned from international trade)

Wildlife Protection Act, 1972	Schedule II (Harvest of the tree is also restricted at the state level)

IUCN Red List

- The IUCN Red List of Threatened Species is the world's most comprehensive inventory of the global conservation status of plant and animal species.
- It uses a set of quantitative criteria to evaluate the extinction risk of thousands of species.
- These criteria are relevant to most species and all regions of the world.
- The status ranges from 'least concern' for the species that are abundant in numbers to 'extinct' for those that have completely disappeared from the planet.
- Species that come under 'critically endangered', 'endangered' and 'vulnerable' categories are considered threatened.

Reference

1. https://www.downtoearth.org.in/news/wildlife-biodiversity/red-sanders-falls-back-in-iucn-s-endangered-category-81053
2. https://agritech.tnau.ac.in/forestry/forestry_Redsander.html
3. http://www.apfdcl.com/pages/Activities/RedSanders.aspx
4. https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species

Equity Stake

The government is set to own 35.8% in Vodafone Idea and 9.5% in Tata Teleservices after these operators decided to offer equity stake against their dues related to spectrum auction instalments and AGR payments.

- An equity stake is the percentage of a business owned by the holder of some number of shares of stock in that company.
- Shareholders of an equity stake in a company may exercise some level of control, influence, or participation in the activities of the company.
- **Ways** - The most usual way to build up an equity stake is through the purchase of equity shares in the open market.
- But, the smaller companies may simply create such a stake for an investor through a contract.
- Businesses that wish to incentivise their employees sometimes give them an equity stake, and troubled companies sometimes offer their creditors

equity stakes in lieu of the debt.

Reference

1. https://www.thehindubusinessline.com/companies/govt-set-to-become-a-shareholder-in-vodafone-idea-tata-teleservices/article38241554.ece?homepage=true
2. https://capital.com/equity-stake-definition

Bio-Mining of Solid Waste

Putting an end to the delay in starting the biomining of legacy waste at the Brahmapuram waste management plant, Zonta Infratech - the agency entrusted with the work, has set up its office at the plant.

- In the Bio-mining/ Landfill mining process, the garbage is treated with bio organisms or natural elements like air, sunlight, etc
- Bio-mining is a technically assisted and economically managed extraction of recyclables and other revenue-generating fractions from waste materials already been disposed of by landfilling.
- Bio-mining of dumpsites is aided by bioremediation process.
- Bioremediation is a microbe-mediated degradation of organic waste carried out by adding biological inoculum to the dumpsite.
- But, bioremediation is only possible for dumpsites having a higher organic content.
- Bioremediation of legacy waste does not necessarily give efficient results in old / aged landfills where the waste has already reached the maximum level of microbial degradation.

Legacy Wastes

- Legacy wastes are those that have been collected and kept for years at some barren land or a place dedicated for Landfill.
- They are the result of uncontrolled and continuous dumping of municipal solid waste.
- In India, the legacy wastes has predominantly 4 fractions of waste,
    - Fine soil / sand-like material,
    - Scrap polymeric and combustible materials,
    - Stones (greater than 20 millimetres in size) and
    - Miscellaneous items.
- The composition of legacy waste majorly depends upon the landfills' age.
- Older the landfill, the higher the fraction of residual organic waste or fine-

fraction (mass remaining after microbial degradation).
- The higher proportion of fine soil-like material in the dumpsite is attributed to the microbial decomposition / degradation of the organic waste inside the dumpsite.

Bio-Mining of Metals

- Biomining is the process of using microorganisms (microbes) to extract metals of economic interest from rock ores or mine waste.
- Biomining techniques may also be used to clean up sites that have been polluted with metals.
- Biomining is used for metals that are commonly bound up in solid minerals.
- These metals can be more easily recovered when dissolved (by using microbes that can oxidize them) than from the solid rocks.
- Most biomining operations target valuable metals like copper, uranium, nickel, and gold that are commonly found in sulfidic (sulfur-bearing) minerals.
- Microbes oxidize sulfidic minerals, converting metals like iron and copper into forms that can dissolve more easily.
- **Processes** - When the metal of interest is directly dissolved, the biomining process is called “bio-leaching”.
- When the metal of interest is made more accessible or “enriched” in the material left behind, it is called “bio-oxidation.”
- Both processes involve microbial reactions that can happen anywhere the microbes, rocks, and necessary nutrients, like oxygen, occur together.
- **Risk** - The greatest environmental risks are related to leakage and treatment of the acidic, metal-rich solution created by the microbes (similar to the acid mine drainage from some abandoned mines.)
- This risk can be managed by ensuring that bio-mining is conducted under controlled conditions with proper sealing and waste management protocols.

Reference

1. https://timesofindia.indiatimes.com/city/kochi/3000-tonnes-of-waste-to-be-handled-per-day/articleshow/88766137.cms
2. https://www.downtoearth.org.in/blog/waste/towards-circular-economy-what-to-do-with-legacy-waste-in-india-75746
3. https://www.americangeosciences.org/critical-issues/faq/what-biomining

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