

Space Junk

Why in news?

In March, a Chinese military satellite, Yunhai 1-02 collided with a piece of junk leftover from a 1996 Russian rocket launch leaving a trail of debris high above the Earth

What causes space junk?

Space junk refers to the dead and unwanted craft left behind in the finite space of Earth orbit for decades

- Unoperational / Expired / Exploded satellites, rocket parts or spacecrafts
- Anti-satellite tests that incapacitates or destroys *satellites* for strategic or tactical purposes (like **Mission Shakti** conducted by DRDO, China's 2007 ASAT test, etc.)
- Rare collision between two spacecrafts
- Mega-constellations of satellites planned by companies such as SpaceX 's **Starlink prpjct**

What are the threats posed by space junk?

- Collision of space debris with other satellites or amongst themselves produces more fragments and exacerbates the problem
- A belt of space junk would make certain low-Earth orbits unusable
- Experts have warned of **Kessler syndrome**
- Astronauts in space would be harmed by space debris
- Old batteries from defunct spacecrafts can explode and leaks may occur in the system
- The International Space Station (ISS) is constantly at risk from space debris

The Kessler syndrome is a scenario in which the density of objects in Low Earth Orbit (LEO) is high enough that collisions between objects could cause a cascade that increases the likelihood of further collisions

What has been done so far to manage the space junk?

- Orbital Debris Program Office was set up by NASA which issued the world's first set of debris-mitigation guidelines in 1995
- it proposed that ~~satellites be designed to re-enter Earth's atmosphere within 25 years of mission completion~~
- Europe plans ClearSpace-1, Earth's first space debris removal mission in 2025
- Researchers from Purdue University are test-launching a first-of-its-kind Spinnaker3 drag sail to low-earth orbit, in an effort to clean up space debris
- Japanese startup Astroscale launched a satellite that retrieves used satellites and other space junk
- In August 2020, **NETRA Project** was initiated by **ISRO** which is an early warning system to protect the satellites from space debris and other hazards of Space
- International Space Law points that if a satellite becomes dysfunctional, then the satellite should deorbit and its re-entry into the earth should be carried

What should be done?

- Updation of the **1967 Outer Space Treaty** which grants countries permanent property rights to their objects in space complicating the efforts to clean up debris
- Funding research into debris-removal technologies and partnerships with companies by NASA
- Expansion of Artemis Accords, a framework for space cooperation that includes (so far) 11 other countries by US

Source: Livemint