

## 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