Space Junk

Why in news?

Recently, ISRO's rocket debris was found washing the shores of beach of Jurian Bay in Western Australia.

How space junks are produced?

- Space junk refers to the *dead and unwanted craft left behind* in the finite space of Earth orbit for decades.
- **Sources** - Unoperational / Expired / Exploded satellites, rocket parts or spacecraft
- 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 'sStarlink project.

What is the current issue?

- A large object was found on the shores of Western Australia has been confirmed to be the debris of an Indian Space Research Organisation (ISRO) rocket.
- ISRO has agreed with the assessment, saying the debris could be from one of its Polar Satellite Launch Vehicle (PSLV) rockets.
- The object was most likely an unburnt part of the PSLV rocket that launched a navigation satellite for the IRNSS constellation.
- Since that satellite was launched in the southward direction, it is possible that one of the parts of the rocket did not burn completely while dropping back into the atmosphere.
- This could have fell into the ocean which later have been swept towards Australian shore.
- The future course of action will be taken after considering obligations under *United Nations Space Treaties.*

What are the regulations available to deal with space junk?

- **Outer Space treaty, 1967-** *India is a signatory* to this treaty which tells that States shall be liable for the damage caused by their space objects.
- **Liability Convention, 1972-** It is the convention on International Liability for Damage Caused by Space Objects.
- It deals with
    - Damage caused by space objects to other space assets

    - Damage caused by falling objects on earth.

- It makes the *launching country "absolutely liable"* to pay compensation for any damage caused by its space object on the earth or to a flight in air.
- The country where the junk falls can stake a claim for compensation if it has been damaged by the falling object.
- 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.

With the provision of Liability Convention, Canada sought damages from the then Soviet Union, for a satellite with radioactive substance that fell into an uninhabited region in its northern territory in 1978.

Steps taken to deal with Space Junk

- **Orbital Debris Program Office**- It was set up by NASA which issued the world's first set of debris-mitigation guidelines in 1995.
- **ClearSpace-1-** It is European Space Agency mission which aims to demonstrate technologies for rendezvous, capture, and deorbit for end-of-life satellites to builds the path for space junk remediation.
- **Spinnaker3 Drag sail**- Researchers from Purdue University are test-launching a first-of-its-kind sail to low-earth orbit, in an effort to clean up space debris.
- **Astroscale-** It is a Japanese startup which launched a satellite that retrieves used satellites and other space junk
- **NETRA Project-** It was initiated by ISRO in 2020 which is an early warning system to protect the satellites from space debris and other hazards of Space.
- **REMOVE Debris-** It is a space mission that was launched to demonstrate various space debris removal technologies like net capture, harpoon capture, vision based navigation etc.,

What lies ahead?

- **Reliable data-** The collision risk in the space can be tracked effectively with the reliable data.
- **Improve technology-** There is a need to improve technology in tracking models to increase the accuracy.
- **Better coordination-** With increasing number of active satellitesnew approaches including automation and established "rights of way" may be necessary.
- **Minimize debris growth-** It can be achieved through a combination of regulation, voluntary actions, and international agreements.
- **Debris mitigation and removal-** Passive deorbiting debris and active deorbiting debris requires proper mitigation mechanism.
- **Update Outer Space Treaty 1967**- It grants countries permanent property rights to their objects in space complicating the efforts to clean up debris.

References

1. Indian Express| Explained ISRO debris in Australia
2. Indian Express| Mysterious object washed up the shores