

Space Junk in Moon

Why in news?

There is going to be a lot of space junk on lunar surface and in Earth's orbit as countries around the globe traveling to the Moon.

What is a space junk?

- Space debris is any *piece of machinery or debris* left by humans in space.
- Dead satellites can refer to big objects such as dead satellites that have failed or been left in orbit at the end of their mission.
- It can also refer to smaller things, like bits of debris or paint flecks that have fallen off a rocket.
- Some human-made junk has been left on the Moon.

Data on Space Debris

- While there are about 2,000 active satellites orbiting Earth at the moment, there are also 3,000 dead ones littering space.
- **Disaster**-There are around 34,000 pieces of space junk bigger than 10 centimetres in size and millions of smaller pieces.
- In 2022, over 2,160 objects were launched into space, about 300 more than 2021 and 900 more than 2020.
- **Private players**- The surging number of rocket launches and the increasing number of payloads carried in recent years have made the space junk problem acute.
- It is especially after private companies such as SpaceX launched thousands of satellites to provide Internet access.
- **Country wise** - Around 13,953 debris are orbiting Earth and the countries responsible for them.
- Close to *35% originated from the Soviet Union/Russia, 31% from the U.S., and 29% from China.*
- **China**- Over 2,700 pieces of debris from a Chinese anti-satellite test in 2007, marked as the single worst contamination of space in history, are still in orbit.
- **India**- Its contribution is *0.5%*. India added to the problem in 2019 by testing an ASAT missile which targeted a live satellite in Low Earth Orbit.
- The country has 103 active or defunct spacecraft and 114 objects categorised as 'space debris' in orbit and it has embarked on research to reduce such fragments from outer space

Why is the space crowded?

- **Moon exploration**- As many as 100 lunar missions are planned over the next decade by governments and private companies.
- **Space congestion**- Near-Earth orbit is even more congested than the space between Earth and the Moon.
- It's from 100 to 500 miles straight up, compared with 240,000 miles to the Moon.

Currently there are nearly 7,700 satellites within a few hundred miles of the Earth.

- **Utility**-Many of these satellites will be used to deliver internet to developing countries or to monitor agriculture and climate on Earth.
- **Low cost**-Companies like SpaceX have dramatically lowered launch costs, driving this wave of activity.

To know more about the role of moon in the development of life on earth click [here](#)

How space junk is created?

- **Launch**- Space junk is the result of us launching objects from Earth, and it remains in orbit until it re-enters the atmosphere.
- **High altitude**- Some objects in lower orbits of a few hundred kilometres often re-enter the atmosphere after a few years and, for the most part, they'll burn up, so they don't reach the ground.
- But debris or satellites left at higher altitudes of 36,000 kilometres where communications and weather satellites are often placed in geostationary orbits, continue to circle Earth for hundreds of years.
- **Anti-satellite test**- Some space junk results from collisions or anti-satellite tests in orbit. When two satellites collide, they can smash apart into pieces, creating lots of new debris.

To know more about space junk click [here](#)

What are the risks posed by space junk?

- **Collision**- These satellites have to move out of the way of all this incoming space junk to make sure they don't get hit and potentially damaged or destroyed.
- **Creation of debris**- It creates hazards and debris. Humans have left a lot of junk on the Moon.
- **Lack of responsibility**- No one owns the Moon, hence no one is responsible for keeping it clean and tidy.
- **Speed of debris**- Tiny pieces of junk might not seem like a big issue, but that debris is moving at 15,000 mph (24,140 kph), 10 times faster than a bullet.
- At that speed, even a fleck of paint can puncture a spacesuit or destroy a sensitive piece of electronics.
- **Kessler syndrome**- This is an idea proposed by NASA scientist Donald Kessler in 1978.
- If there was too much space junk in orbit, it could result in a chain reaction where more and more objects collide and create new space junk, to the point where Earth's orbit became unusable.

Why there is lack of responsibility of space junk in moon?

- **Outer space treaty 1967**- It says that no country can "own" the Moon or any part of it, and that celestial bodies should only be used for peaceful purposes. It is established

by *United Nations (UN)*

- The treaty is silent about companies and individuals, and it says nothing about how space resources can and can't be used.
- **UN Moon Agreement of 1979** - It held that the Moon and its natural resources are the common heritage of humanity.
 - United States, Russia and China didn't sign the agreement.
- **Artemis Accords**- It is created by NASA which is a *nonbinding* principles for cooperating peacefully in space.
 - They have been signed by 28 countries, but the list does not include China or Russia and private players.
- **Poor regulation**- Because of its lack of regulation, space junk is an example of a "*tragedy of the commons*".

What lies ahead?

- Hundreds of collision avoidance manoeuvres are performed every year, including the International Space Station (ISS), where astronauts live.
- Scientists argue that to avoid a tragedy of the commons, the orbital space environment should be seen as a global commons worthy of protection by the United Nations.

References

1. [The Hindu- Increase in space junk in future](#)
2. [The Hindu- Small debris threat to space assets](#)

