

Forget Earth! Humanity on cusp of losing night-sky!

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IF

the custodians of humanity ever thought that they just need to grapple with apocalyptic phenomena like COVID, insufferable slow-roasting in a string of heatwaves and the climate change and their tushies would be saved, then they were light year away from the not-so-hedged truth! They have sadly missed out on the most crowded and disaster-prone place than even the Times Square in New York or Shibuya Crossing in Tokyo or Piccadilly Circus in London! That is our sky! The *homo sapiens*

have veered too far in the space! What was, about five decades back, seen as a largely fool's errand, is now guesstimated to be worth USD 3 trillion space economy

! India, a late runner in the maze, also pegs it at USD 5 bn dollar market. But the planet-hugging race has become as enormous as its revenue potential is and so has become the risk to the planet earth! Humanity in the future would be reduced to a 'pit of bones' like the one in Spain unless timely actions to decongest space are globally thrashed out! The astronomers' associations have given a siren call to regulate the night-sky-eating space tourism and broadband industry whose satellites have begun to block the views of powerful telescopes used for scientific studies!

Let me begin with the latest siren being hooted about a mountain of debris of a Chinese rocket which may fall on earth at unidentifiable places! When? A rush to a cloister or a large concrete canopy would not help! The rocket-launching scientists are not sure of when a large piece of rocket debris may come back to earth at a skull-breaking speed but they would bet dollars to doughnut the debris would fall on our head! China had, last Sunday, launched its second module for its Space Station called '**Tiangong**

' - Heavenly Palace! Three modules are needed for this Space Station. The first one was off in April last year. The Station would be operational by the year-end and will have own power, propulsion, life support systems and living quarters. Normally, expelled first stage rocket burn up as they accelerate through the atmosphere. But, what constitutes a different atmospheric in this case is the large package of 23000 kgs besides the rocket, Long March 5B, which is 176 feet tall and weighs more than 1.8 mn pounds. A popular astronomer from Harvard-Smithsonian Centre, Mr Jonathan McDowell, has tweeted that the rocket will split and a bunch of 30-meter-long metal pieces would crash into the ground at a few hundred km/hr!

Apart from commissioning a Space Station, China is eyeing to come up with a solar power plant in space by 2028. It may sound an expensive indulgence but it was announced in 2014 and like any other infrastructure project on the ground, China is running two years ahead of its timeline. It spent USD 9 bn in 2020. It intends to transmit solar power from space to earth! The three steps it is trying to implement are - to store the sun energy; convert it into electrical energy and then transmit it home! NASA also launched a similar project in 2019. NASA had said that if the project succeeds it would be able to send 1000s megawatts of energy using wireless power transmission to markets on earth and missions in space. As per NASA, from its space station, China is bulleye-ing to send its astronauts (called **taikonauts**) to moon before 2030 and may 'take over' the moon as it has unquenchable territorial, including extra-terrestrial, appetite. Though China has laughed it off but the truth is - all space expeditions of China are military programmes unlike other countries.

One such unnotified military programme of Russia recently sent gallons of chills down the spine of astronomers across the world when it fired a missile at its own inoperative Cosmos 1408 satellite to demonstrate its belligerent military might. The debris storm originating from the broken satellites put in danger the safety of the International Space Station and its crew, including the Russian cosmonauts. A gigantic number of shards of broken satellites are now speeding down to earth at thousands of kilometres an hour

and they pose huge risk of collision with satellites-gridlocked space, known as Kessler Syndrome. Named after NASA scientist Donald Kessler, this syndrome refers to possible chain reaction of cascading collisions which may one day make low earth orbit (LEO - the area between 150km and 2000km altitude) inaccessible and even prevent manned spaceflight from leaving earth.

The quantum of space junk is a serious threat and no less hazardous than what we globally generate on earth - 3.5 mn tonnes of garbage a day as per a World Bank Study! As per NASA, the space around earth is littered with over 9000 metric tonnes of debris and they are orbiting

around earth at 25000 km/hr. About 70% of such garbage is in LEO. As per latest data, there are about 5000 operational satellites in orbit. In addition, about 3000 corpse-satellites are also circling the planet

. The scale and speed of debris poses serious challenge to the flourishing global space economy. SpaceX's vehicle Starlink alone has received authorisation for 12000 satellites and has sought fresh nod for more than 30,000 satellites. Its rival Amazon has earmarked USD 10 bn to construct 3200 satellites through its Project Kuiper Program. Its target is to launch 7000 satellites. Only two days back, the Eutelsat and OneWeb have merged in a billion-dollar deal and is resolved to give a hot chase to SpaceX with over 6000 satellites. UK is keen to launch about 7000 second generation satellites. China's Guo Wang Project aims at a constellation of over 13000 satellites. Rwanda has plans for over 3.27 lakh satellites in the future. If one goes by space programmes of about 80 countries, the LEO and outer space will be home to about 100,000 satellites by 2030. Such a ginormous number mau-maus the safety of the space economy and also lives of people on earth.

Not long back in 2016, the European Space Agency had detected that the solar panel of their Copernicus Sentinel-1A was underperforming. From the onboard camera footage, it was dug out that it was due to the impact of collision with a 1mm piece of junk! One of the worst collisions happened in 2009 when a dead Russian satellite bumped into a spacecraft operated by Iridium Communications at an altitude of 800km.

That created 1800 pieces of trackable junk larger than 10cm - the smallest that can be gauged from earth. A part of debris flew above 1000km where the atmosphere is thinner and the fragments consume longer time to decay and will certainly pose risks to other satellites in neighbourhood for centuries. The US Surveillance Network has identified over 23000 pieces of junk bigger than 10cm. ESA puts this figure at over 36000. Scientists say that over 130mn additional pieces smaller than 1cm exist in space but the existing technology cannot identify them.

Assessing the soaring risk, the US recently declared a ban on anti-satellite weapon tests - a giant step in the direction of cleaning space. But, who will perform the role of a municipality and clean the debris? Cleaning indeed costs oodles of money! Some start-ups in Japan, US and EU have experimented some latest technology including the use of harpoon by the Boeing but it costs billions of dollars. India has also licensed some start-ups working in the area of gathering space junk. But, in the absence of any enforceable mechanism at the global level, none would like to spend a few billions to cull space garbage. It is presently free for all and each country is trying to own the space which is a common good for humanity!

The UN had framed some Outer Space Rules in late 50s and a working group last year but the UN system is so sluggish that it may lose the race to the US which is working with allies to join the 'Artemis Accords' - a series of bilateral pacts that would regulate peaceful use of space and govern responsible behaviour on the surface of the moon.

Given the geopolitical tensions which would not abate for decades to come, China would not follow any rules framed by the US-led camp. With Russia announcing, last Tuesday, to withdraw from the US-led International Space Station which would be retiring in 2030 and its inoperative parts would be crashing into the Pacific in 2031. One predictable inference may be made that Russia would join the Chinese Space Station post-2024! My fear is that even the

US-led loosely-aligned body, mirroring like OECD, would not be able to do justice to late catchers like India, Rwanda and others who are also spending billions on their space programmes. Secondly, the real fall guy is going to be the community of global scientists who need clear sky to closely study if an asteroid is zooming perilously close to earth! One such asteroid - Apophis - might hit earth in 2036 or 37. If it rocks earth it would create 510 megaton blast, massacring millions of people. Our scientists are bracing up to use solar-powered laser ablation to destroy the asteroid - solid to be converted into gas! However, all such chances of averting cataclysmic disasters in the future would not stand any blip of hope if our maddening race to colonise the skies continues unregulated. For effective regulation and a common debris-picking agency, it is high time that the UN and the global community start mulling over a SPACE TAX to be collected by the filing agency the International Telecommunications Union as our future is going to be too devastatingly 'intoxicating'! Nope! Cassandra is going to be right! A tinderbox is ballooning to explode! A case of digging own grave! Humanity may run out of puff! Yup! Too much pain in tushies!