As we move further into the 21st century, space is becoming an increasingly important part of modern-day life. Satellites support communications, navigation, weather forecasting, environmental monitoring, disaster response and scientific research. However, the growing number of human-made objects in orbit has raised concerns about pollution in space. Orbital pollution refers to the accumulation of these human-made objects and debris in Earth's orbit that could threaten the safe and sustainable use of space. Experts and international organisations have warned that worsening conditions in Earth’s orbital environment could affect the services upon which governments, businesses and individuals rely.

The most significant source of orbital pollution is space debris, which includes old satellites, spent rocket stages, mission-related objects and fragments created by collisions or explosions. Since the beginning of the Space Age in the late 1950s, more than 27,000 satellites have been launched into orbit, creating an increasingly crowded environment around Earth. According to the European Space Agency (ESA), approximately 46,760 objects are currently tracked by space surveillance networks, while an estimated 1.2 million debris objects between 1 and 10 centimetres in size, and around 140 million smaller fragments, remain in orbit. Many of these objects are too small to be monitored individually, yet they can still cause serious damage to spacecraft because of the extremely high speeds at which they travel.

Furthermore, the new commercial space age has intensified concerns surrounding orbital pollution. In recent years, both governments and private companies have launched growing numbers of satellites, particularly as part of large constellations designed to provide global communications. ESA reports that the number and scale of these constellations continue to increase each year. Particularly because of accidental collisions, spacecraft explosions and anti-satellite weapon which have all generated thousands of pieces of debris contributing to a more congested orbital environment. These developments have led experts to question whether current practices are sustainable.

In response to these challenges, the international community has developed several frameworks aimed at promoting the sustainable use of outer space. The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) has adopted both Space Debris Mitigation Guidelines and Long-Term Sustainability Guidelines, encouraging states and satellite operators to limit debris creation and safely dispose of spacecraft at the end of their operational lives. However, these measures remain largely voluntary, and implementation varies considerably between countries. As a result, debate continues over whether existing regulations are strong enough, how responsibility for orbital pollution should be shared between established and emerging space powers and what obligations private companies should bear in protecting the orbital environment for future generations.

Useful sources to get you started:

Stats for space debris: Space Environment Statistics · Space Debris User Portal

Background info + some interesting videos What is space junk and why is it a problem? | Natural History Museum

Good video on the topic: https://youtu.be/yIsPbysinKw?si=8RfJnKeILv8k0jS6

A number of interesting news articles on the topic: Space debris - BBC News