APPLICATION OF SPACE TO THE SUSTAINABLE DEVELOPMENT GOALS

Space applications and technology directly and indirectly prevent and reduce poverty, for example, through disaster monitoring and response – and through supporting other Sustainable Development Goals. Earth observation data is used to improve coffee quality and productivity in Timor-Leste, increasing the revenue of coffee growers.

Space increases agricultural yields through: precision and sustainable farming, optimizing crop productivity through efficient land monitoring and management (e.g., where to fertilize and irrigate) and improving livestock management. A specific example is the detection of anomalies and stress in olive groves.

Space life sciences are an important aspect of the work done by astronauts. Microgravity research in space observes physiological changes in the human body. Space-derived data is used to monitor and map yellow fever mosquito populations (which can spread dengue fever) and cases in Argentina, Chile and Paraguay.

Satellite-enabled remote learning has helped reduce the disruption of education for millions of children during the COVID-19 pandemic. E-learning and related programmes, such as virtual internships, enabled through satellite technology, increase the accessibility of educational opportunities for rural communities and people from developing countries.

Space is a motivational area for girls and women to pursue a career in science, technology, engineering and mathematics. Connecting female role models and leaders with students and graduates in mentor-mentee programmes boosts the participation of women and girls in these fields. Space technology, such as geolocation, is also an important element in eliminating gender-based violence.

Earth observation satellites are crucial in analysing global water cycles, mapping water courses and water pollution and monitoring and mitigating the effects of floods and droughts. Satellite data collected on total suspended (organic and inorganic) matter in water act as a proxy for water quality.

Research and development into solar panels for satellites contribute to boosting the efficiency of solar cells and the development and deployment of solar panel farms on Earth. Global navigation satellite systems (e.g., GPS) provide the accurate timing that smart grids require for synchronization.

Space is a multiplying force for national and global economies. Every $1 spent on the National Aeronautics and Space Administration (NASA) creates a return or investment of $7–$14. Space data assists policymakers in crafting better economic policies: satellite data contributed to measuring the impacts of COVID-19 lockdowns and post-lockdown recoveries.

The space economy is booming. Opportunities to tap into the space market for developed and developing countries are at their highest point ever, and continued growth is expected. Increasing private capital and public expenditure creates jobs and boosts industrialization and innovation by supporting space start-ups and small and medium-sized enterprises.

Unlocking access to space- and Earth-based research facilities, infrastructure and information for people from developing countries can assist in bridging the equality divide. Space technologies also connect remote and isolated communities to services, education and work opportunities.

Space is utilized for urban planning and smart, sustainable cities, which is vital for climate action as cities are responsible for more than 70 per cent of global emissions. Identifying heat spots in cities, monitoring the cooling effect of green spaces, analysing air quality and crime trends are among other examples of how space improves life in urban areas.

Satellite imagery can help monitor the efficient use of natural resources in a consistent and repeatable manner across the Earth. Space assets are widely used for resource analysis towards the sustainable management of forests, open-air mines, water reservoirs, logging, fisheries, crops and many other resources.

Space technology and applications are crucial for effective climate action, for instance, through climate change monitoring, weather forecasting, disaster management and response. More than half of the essential climate variables (characterizing Earth's climate) are monitored from space.

Satellite data are essential for mapping and monitoring natural and protected areas, fishing vessel tracking and navigation, monitoring illegal fishing, assessing marine and coastal health and identifying algal blooms.

Land surface monitoring, biodiversity monitoring, the monitoring of poaching and smuggling routes, deforestation, forest fire risk, vegetation health and the protection of endangered species all benefit from space-derived data.

Satellite data have enabled real-time monitoring and response to illegal deforestation, fishing and poaching. It has also been demonstrated that Earth observation sensors and precision navigation can be combined to enable the safer identification and clearance of landmines. Space assets are also utilized for verification of treaties and international agreements.

The Committee on the Peaceful Uses of Outer Space has 102 members and more than 50 observer organizations. Its unique convening power benefit space and the other Sustainable Development Goals writ large: all 17 Goals are positively impacted by space; almost 40 per cent of the targets directly benefit from space-derived information and earth-observation data.