



Amplifying the Global Value of Earth Observation

For Prelims: Earth Observation Data, [Greenhouse Gas Emissions](#), [Artificial intelligence \(AI\)](#), [Indian Space Research Organisation](#), [VEDAS](#), [Earth Observation satellites](#), [Early warning systems](#)

For Mains: Economic impact of Earth Observation (EO) Data, Environmental benefits of EO, Managing natural resources and hazards.

Source: [ET](#)

Why in News?

Recently, a new report titled **“Amplifying the Global Value of Earth Observation”** by the [World Economic Forum](#) has shed light on the immense potential of **Earth Observation (EO)** data to drive economic growth and sustainability worldwide.

Note

Earth observation data involves collecting, analysing, and presenting information about the Earth's physical, chemical, and biological systems using remote sensing technologies.

- It involves acquiring information about the Earth's surface, such as land cover, oceans, agriculture, and forestry, through energy emission and processing of reflected images.
- It is achieved through [remote sensing](#), which is a [geospatial technology](#) that collects data about an object, place, or phenomenon without making physical contact with it.

What are the Key Highlights of the Report?

- **Potential Economic Impact of EO Data:** EO data could generate over **USD 3 trillion** in economic benefits globally by 2030.
 - The global value of EO data is expected to grow from USD 266 billion currently to over USD 700 billion by 2030.
 - This could contribute a cumulative USD 3.8 trillion to the [global Gross Domestic Product \(GDP\)](#) by 2030.
- **Environmental Benefits:** EO data can help eliminate **2 gigatonnes of greenhouse gas emissions** annually by 2030.
 - This is equivalent to the estimated combined annual emissions of **476 million gasoline-powered cars**.
 - EO can monitor climate variables, emissions, ecosystems, and biodiversity to inform actions to mitigate [climate change](#) and protect natural habitats.
- **Regional Opportunities:** The [Asia Pacific region](#) is poised to capture the largest share of EO's value by 2030, reaching a potential value of USD 315 billion.

- **Africa and South America** are positioned to realise the largest percentage growth in EO data value.
- **EO Blended with Enabling Technologies:** Enabling technologies like [artificial intelligence \(AI\)](#) and [digital twins](#) can catalyse the adoption of EO data.
 - A digital twin is a **virtual representation of an object or system that accurately reflects a physical object**. It covers the object's entire lifecycle, is updated with real-time data, and utilises simulation, machine learning, and reasoning to aid in decision-making.

What are the Key Areas of Application of Earth Observation Data?

- **Environmental Monitoring and Management:** Monitoring [deforestation](#) and illegal logging activities in the forests like [Amazon rainforest](#) using satellite imagery.
 - Tracking the **spread of deserts and monitoring** [desertification](#) in regions like the [Sahara](#).
 - Monitoring the coastal areas and marine ecosystems, such as [coral reef bleaching](#) and [oil spills](#).
- **Agriculture and Precision Farming:** Using multispectral imagery to monitor crop health, estimate yields, and optimise precision agriculture practices for crops like [wheat](#), [rice](#), and [corn](#).
 - Assessing soil moisture levels in agricultural fields and identifying areas requiring irrigation in regions prone to drought.
 - Detecting and mapping the spread of **pests and diseases** affecting crops.
- **Urban Planning and Development:** Mapping urban areas and monitoring urban sprawl in rapidly growing cities like **Shanghai(China) and Mumbai(India)**.
 - Identifying suitable locations for infrastructure development, such as new roads, airports, and housing projects.
 - Monitoring changes in land use patterns and urban growth in megacities like **Tokyo (Japan)**.
- **Natural Resource Management:** Mapping and monitoring mineral resources and mining activities in regions like the **Permian Basin** in the US (second-largest shale gas producing region in the US).
 - Monitoring water resources, such as lakes, rivers, and groundwater levels in areas prone to water scarcity, like parts of **Africa and the Middle East**.
- **Climate Change Studies:** Monitoring changes in glaciers, sea ice, and polar regions, such as the [Arctic](#) and [Antarctic](#).
 - Tracking global temperatures and atmospheric conditions, including greenhouse gas emissions and their impact on climate.
- **Disaster Management and Emergency Response:** Assessing the extent of damage caused by natural disasters like [hurricanes](#), [earthquakes](#), and [wildfires](#).
 - Identifying areas affected by disasters for targeted relief efforts, such as the **2004 Indian Ocean tsunami**.
- **Defence and Security:** Monitoring borders and detecting unauthorised activities, such as illegal border crossings and smuggling operations.
 - Tracking troop movements and military activities during conflicts and tensions, like the [Russia-Ukraine war](#).
- **Archaeology and Cultural Heritage:** Identifying and mapping archaeological sites and ancient structures, like the ancient [Maya civilization](#).
 - Monitoring the preservation of historical sites and cultural heritage.

How does India handle Earth Observation Data?

- **About:** Earth Observation (EO) data in India plays a crucial role in various applications ranging from disaster management to environmental monitoring.
 - The [Indian Space Research Organisation \(ISRO\)](#) has been at the forefront of deploying satellites for EO purposes.
- **Satellites:**
 - ISRO operates a series of [Earth Observation satellites](#), including the recent [EOS-07](#) launched in February 2023, and [EOS-06](#) in November 2022.
 - These satellites join the well-established fleet of [RESOURCESAT series](#) for land observation, and [OCEANSAT series](#) for ocean monitoring, providing a comprehensive

suite of space-based tools for studying and managing our planet.

- **EO Platforms:**
 - **VEDAS (Visualisation of Earth Observation Data and Archival System):** [VEDAS](#) is an initiative by the **Space Applications Centre (SAC)** of ISRO. It provides access to a vast repository of thematic spatial data derived from satellite imagery
 - **Bhuvan:** It is ISRO's geo-platform providing satellite imagery and thematic datasets for India.
 - **MOSDAC (Meteorological and Oceanographic Satellite Data Archival Centre):** It is a data repository for all the meteorological missions of ISRO.
- **Future Projects:**
 - **NASA-ISRO Synthetic Aperture Radar (NISAR):** It is a joint project between the [National Aeronautics and Space Administration \(NASA\)](#) and the ISRO to develop and launch an Earth-observing satellite with dual-frequency synthetic aperture radar.
 - The satellite will be the **first radar imaging satellite to use dual frequencies**.
 - **Synthetic aperture radar (SAR)** refers to a technique for producing fine-resolution images from a resolution-limited radar system.
 - NISAR's data can help people **worldwide better manage natural resources and hazards**, as well as provide information for scientists to better understand the effects and pace of climate change.

What are the Key Facts About WEF?

- **About:** The World Economic Forum is an international organisation based in **Geneva**, Switzerland, founded by **Klaus Schwab in 1971**.
- **History:** It originally focused on management but expanded to economic and social issues in 1973.
 - In 1973, the **Annual Meeting of the European Management Forum** expanded its focus to include economic and social issues due to events such as the collapse of the [Bretton Woods fixed exchange rate mechanism](#) and the **Arab-Israeli War**.
 - In 1987, the European Management Forum officially became the World Economic Forum and aimed to provide a platform for dialogue. In 2015, the **Forum was formally recognized as an international organisation**.
- **Annual Meeting:** WEF promotes stakeholder **capitalism and hosts the annual meeting in Davos**, with around 3,000 participants discussing global issues from various sectors including investors, business leaders, political leaders, economists, celebrities, and others.
 - The WEF is largely funded by its partnering corporations, which are generally global enterprises with annual turnovers exceeding **USD 5 billion**.
- **Major Reports:** [Global Competitiveness Report](#), [Global Gender Gap Report](#), [Energy Transition Index](#), [Global Risk Report](#), and [Global Travel and Tourism Report](#).

Drishti Mains Question:

Q. Evaluate India's role in utilising Earth Observation data for disaster management and environmental monitoring, considering ISRO's contributions and future projects.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q1. Which of the following gives 'Global Gender Gap Index' ranking to the countries of the world? (2017)

- (a) World Economic Forum
- (b) UN Human Rights Council
- (c) UN Women
- (d) World Health Organization

Ans: (a)

Q2. Who among the following is the founder of World Economic Forum? (2009)

- (a)** Klaus Schwab
- (b)** John Kenneth Galbraith
- (c)** Hobert Zoellick
- (d)** Paul Krugman

Ans (a)

Q3. The Global Competitiveness Report is published by the (2019)

- (a)** International Monetary Fund
- (b)** United Nations Conference on Trade and Development
- (c)** World Economic Forum
- (d)** World Bank

Ans: (c)

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