From Orbits To Oceans: Outer Space Technology A Facilitator Or Silent Threat To Marine Ecosystem Sustainability?

RACHITA AGRAWAL
INDRAPRASTHA RESEARCH FELLOW
DELHI, INDIA

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Space Technology and Marine Ecosystems

Exploring how **space technology** presents both a **threat and an opportunity** for the delicate balance of our marine ecosystems, highlighting the vital role of governance of satellites monitoring ocean health.

Understanding Space Technology in Marine Disaster Resilience

Satellites play a vital role in **monitoring marine ecosystems**, providing data on ocean temperatures, currents, and pollution levels, helping scientists **protect and manage** marine resources effectively. By leveraging satellite data, we can enhance preparedness and response strategies, ensuring the sustainability of marine resources in the face of escalating threats.

Timeline: Satellites and Oceans

Launch of TOPEX/Poseidon

This satellite was launched in 1992 to monitor ocean surface topography.

SeaWiFS Mission

Launched in 1997, it provided critical data on ocean color and productivity.

Jason-1 Launch

Jason-1, launched in 2001, improved sea-level measurements and climate monitoring.

Introduction of Copernicus

The Copernicus program began in 2014, enhancing satellite technology for environmental monitoring.

Sentinel-1 Operations

Launched in 2014, Sentinel-1 provided radar data for detecting ocean hazards.

Present

Today, satellites play a vital role in **disaster preparedness** and response for marine ecosystems.

Steps in Space Technology Impact

Step 1: Observation

Satellites capture real time images of ocean conditions.

Step 2: Data Processing

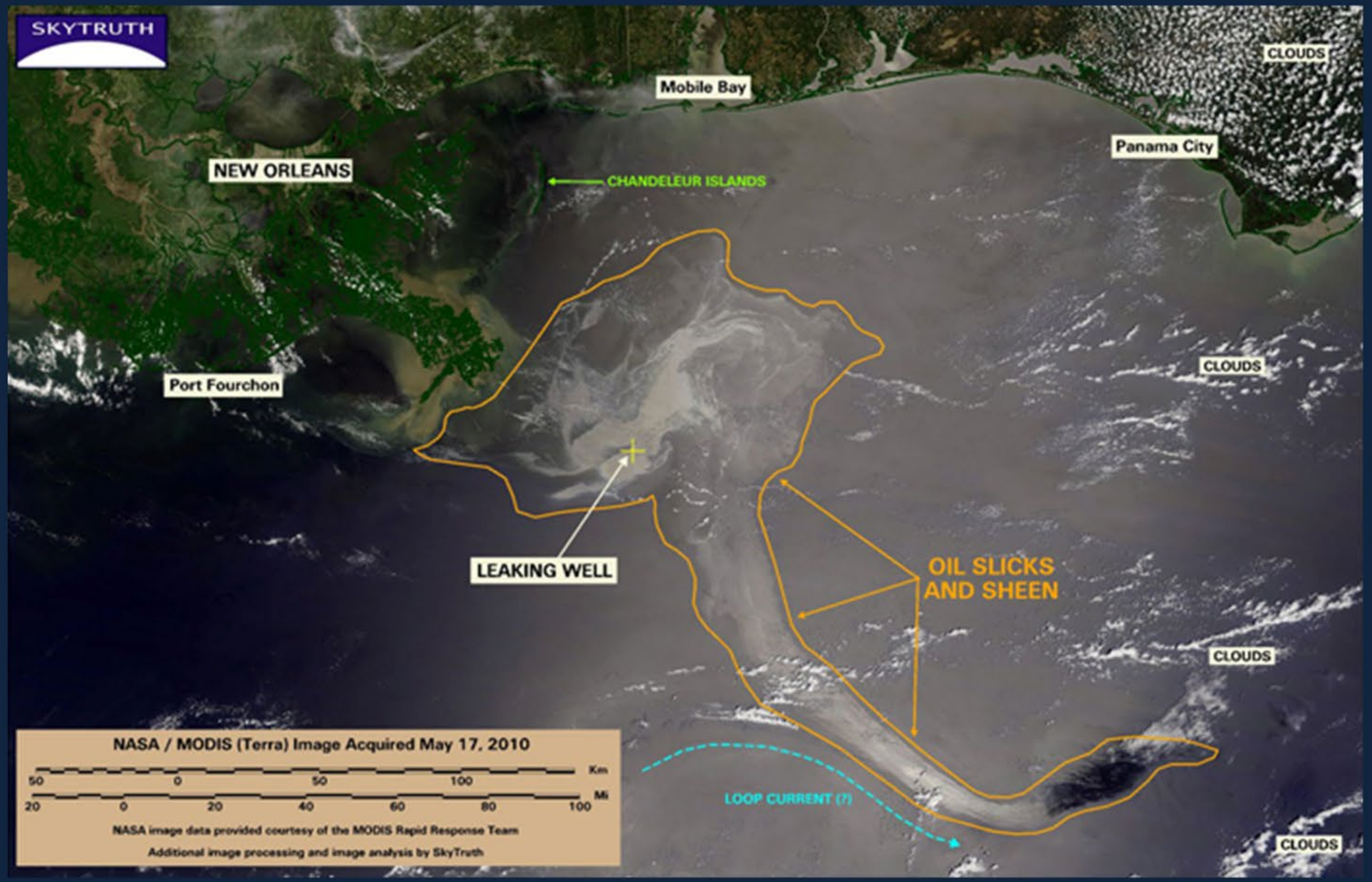
Collected data is processed to extract relevant information.

Step 3: Analysis

Analyzed data helps identify trends and potential threats.

Step 4: Marine Application

Findings inform conservation efforts and sustainable practices.

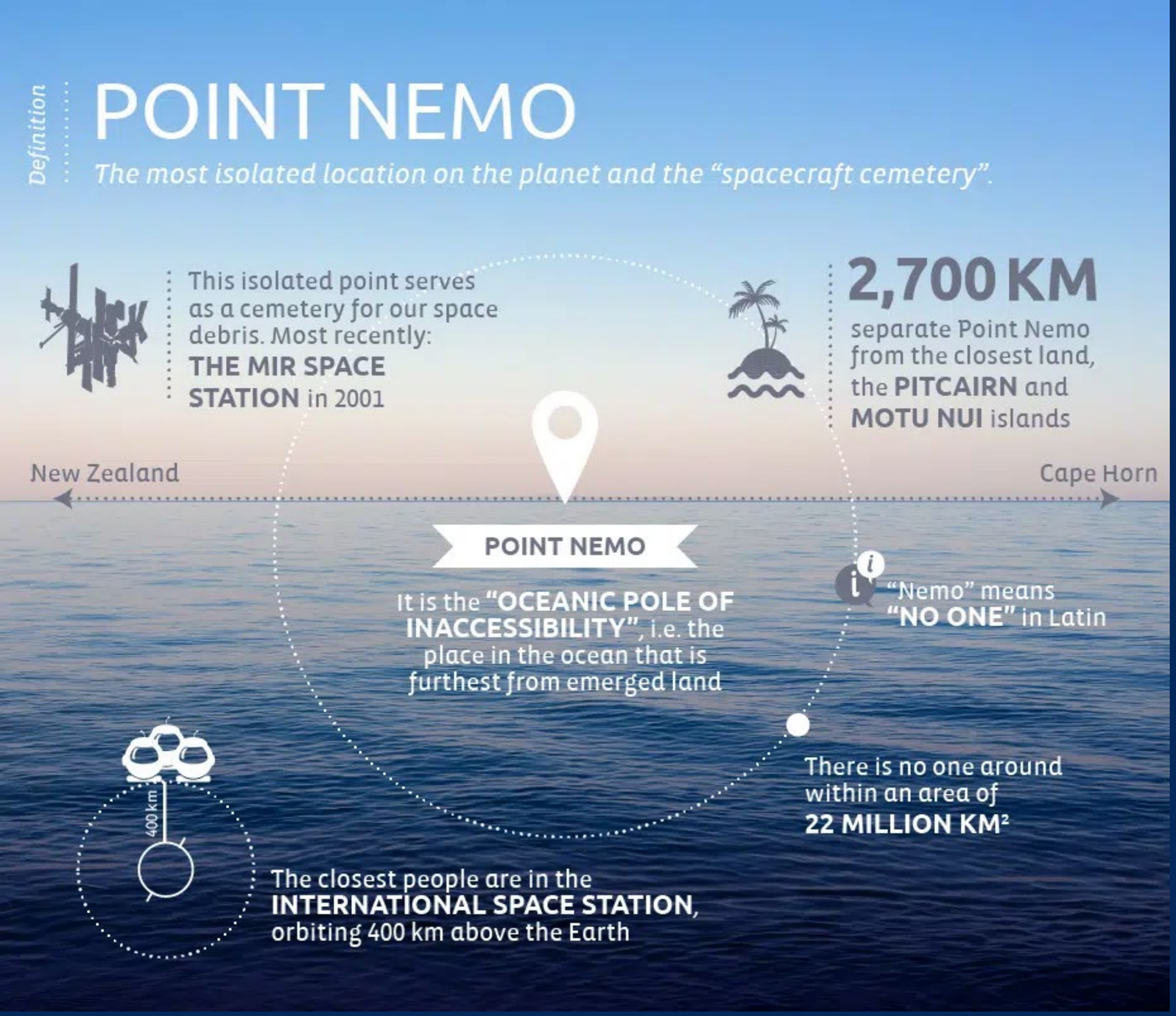


On April 20, 2010, an explosion occurred on the British Petroleum (BP) Deepwater Horizon Macondo oil well drilling platform in the Gulf of America (formerly Gulf of Mexico). The explosion, which tragically killed 11 workers, caused the rig to sink and started a catastrophic oil leak from the well.

A view of the Deepwater Horizon oil spill from NASA's Terra Satellites on May 24, 2010. When oil slicks are visible in satellite images, it is because they have changed how the water reflects light, either by making the sun’s reflection brighter or by dampening the scattering of sunlight, which makes the oily area darker. (NASA)

Threats from Outer Space Satellite Debris

Space debris poses a **significant threat** to marine ecosystems, as technology waste can result in ocean pollution and disrupt the delicate balance of marine life.



source: https://escales.ponant.com/en/point -

Increasing incidents of uncontrolled deorbiting and dumping exceeds Nemo Point's long -term capacity for safe disposal.

Potential pollution of ocean ecosystem from toxic materials, unburned fuel, and spacecraft remnants compromises sustainbility .

PARADO

X

We are using outer space technology to protect earth’s environment - while risking another part of it in the process.

Legal Milestones

National and international **laws and treaties** are crucial for ensuring **effective governance**, data sharing, and liability management in space technology affecting marine ecosystems.

1967

Outer Space Treaty establishes basic space principles.

1982

UNCLOS outlines marine resource management and rights.

1992

Biodiversity Convention promotes ecological protection efforts.

Recent

UN Space Debris Guidelines address orbital debris concerns.

Balancing Risks and Rewards of Space Technology

This section explores how **advancements in space technology** can both threaten and benefit our marine ecosystems. By understanding these dynamics, we can harness technology for **sustainable ocean management**.

01

Effective universal policies can mitigate risks while promoting technological advancements.

02

Collaboration between stakeholders enhances monitoring and conservation efforts for marine ecosystems.

03

Responsible innovation is crucial for ensuring the health of our oceans.

Proposal: Marine Conservation Laws from dumping Space Debris

✅ Mandatory eco-impact assessments for deorbit missions

✅ Designated protected marine zones off-limits to debris disposal

✅ Binding international regulation under UN COPUOS and UNCLOS

✅ Encourage green satellite design & reusability

Innovation vs. Impact

"As we launch further into space, are we overlooking the depths of our oceans —is space technology becoming a guardian of marine sustainability, or its silent threat?"

In conclusion, let's explore our path forward

SAFEGUARDING OUR OCEA

Thank You for Your Attention

I appreciate your engagement in discussing **space technology's impact** on marine ecosystems. Your questions and insights are invaluable as we explore this critical intersection between innovation and environmental stewardship. Let's continue the conversation!

Let’s act before the deep sea becomes the next space junkyard.

Get in touch!

Rachita Agrawal

rachita.agrawal20@nludelhi.ac.in

https://www.linkedin.com/in/rachita-agrawal-2aab571b1/