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Space for All: Promoting Inclusive Practices in Space Exploration (2)

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EARTH OBSERVATION FOR ENVIRONMENTAL JUSTICE IN GAZA: TECHNICAL, ETHICAL, AND LEGAL IMPLICATIONS

Abstract

Earth Observation (EO) has the potential to play a transformative role in documenting war-related environmental destruction, supporting accountability efforts, and guiding post-war recovery. However, access to satellite imagery and the ability to analyze it remains highly unequal. The communities most affected by war often lack the resources, funding, and political leverage needed to obtain and utilize EO data effectively. As a result, environmental damages remain underreported or invisible, limiting the ability of local actors to advocate for justice and sustainable rebuilding efforts.

Despite the availability of EO technologies, significant barriers exist in applying this data for humanitarian purposes. High-resolution satellite imagery is often restricted, leaving affected populations reliant on lower-resolution or outdated datasets. By highlighting these barriers, this research underscores the urgent need for ethical frameworks that ensure EO is used for environmental justice rather than reinforcing existing power asymmetries.

Furthermore, this study explores the legal applications of satellite imagery as evidence in international accountability mechanisms, including its potential role in supporting cases at the International Court of Justice (ICJ). Satellite data has increasingly been used as evidence in war crimes investigations, and its integration into environmental justice frameworks could strengthen efforts to hold responsible parties accountable for ecological destruction. However, geopolitical control over EO data raises ethical concerns about whose experiences are validated and whose remain obscured. Beyond legal applications, EO can empower local communities by providing scientific evidence of environmental harm, supporting advocacy efforts for remediation and rebuilding.

This work examines the technical, ethical, and legal dimensions through a case study focusing on Gaza. By using Sentinel-2 satellite imagery, environmental degradation in Gaza is assessed, focusing on key indicators such as vegetation and land health. This study calls for a decolonial approach to space technologies, where EO is leveraged not as a tool of surveillance and geopolitical control, but as an instrument of justice and resilience for those most impacted by war. By addressing both the technical and ethical challenges of EO for war-affected regions, this research advocates for a more inclusive and ethical use of space technology, ensuring satellite data is leveraged to document war crimes and actively support recovery efforts.