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COPERNICUS-BASED APPROACH TO ASSESS LAND-COVER CHANGES IN EU-FUNDED LIFE PROJECTS

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Native species plantation area in the Azores | Area under ecological restoration in São Miguel Island, where native species are planted as part of the LIFE Laurissilva Sustentável project. The aim is to help recover native forests, strengthen biodiversity, and restore ecosystem balance
Credits: Rafaela Tiengo

The EU Outermost Regions are particularly vulnerable to climate change, invasive species, and changes in land cover. This case study uses a remote sensing-based approach to assess and monitor changes in land cover resulting from EU-funded conservation projects.

THE CHALLENGE

Over the years, various EU-funded LIFE projects have been implemented on São Miguel Island (Azores, Portugal) by the Portuguese Society for the Study of Birds (SPEA), with direct support from the Azores Regional Government, focusing on habitat and species conservation. These projects primarily aimed to conserve and restore the habitat of the Azores bullfinch (Pyrrhula murina), also known as Priolo, a critically endangered bird species unique to the Azores and one of Europe's rarest birds. Applying a remote sensing-based change detection approach, strongly supported by Sentinel-2's Copernicus data, allows for a cost-effective assessment and monitoring of the impacts of these conservation efforts on land cover.

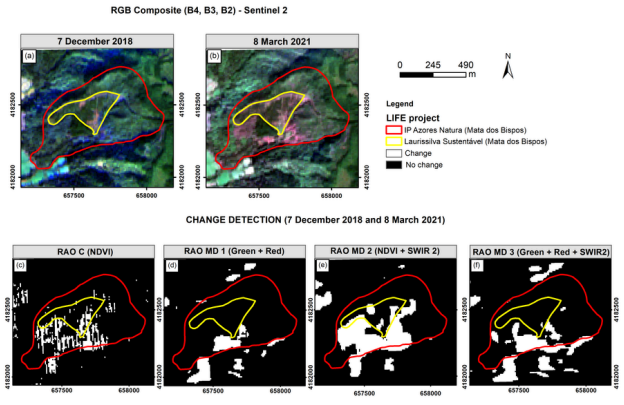
THE SPACE SOLUTIONS

The Copernicus Program has proven invaluable for land-cover monitoring in remote areas due to its ability to provide comprehensive and systematic data at no cost.

By using freely accessible sensors, platforms, and software, this methodological approach becomes even more appealing to decision-makers, as it minimizes cost while maximizing effectiveness. In this case study, the local environmental authority (Direção Regional do Ambiente dos Açores) is allowed to use this remote sensing-based approach to support the monitoring of Protected Areas.

The methodology enables the synergistic use of historical satellite data (e.g., ASTER, Landsat), recent Sentinel-2 Copernicus imagery, and both past and ongoing fieldwork data provided by SPEA. This combination allows for a cost-effective and accurate assessment of conservation efforts under EU-funded LIFE projects, both during and after implementation.

Sentinel-2 imagery was utilized to map land cover changes over time at high spatial and temporal resolutions, enabling authorities to identify trends, detect degradation, and assess the success of restoration efforts in protected habitats.



Intervention area of LIFE IP Azores Natura | Sentinel-2 false color composites before (a) and after (b) initial actions. Change detection using classic Rao's Q with NDVI (c); MD Rao's Q with green and red (d), NDVI-SWIR 2 (e), and green-red-SWIR 2 (f). Images: 7 Dec 2018 and 8 Mar 2021.

The workflow, implemented on cloud-based platforms such as Google Earth Engine, enables the automated processing and visualization of large datasets, facilitating routine monitoring without the need for local high-performance computing resources.

THEMATIC AREA

Biodiversity and Environmental Protection

REGION OF APPLICATION

São Miguel Island, Azores

SENTINEL MISSION USED

S2

COPERNICUS SERVICE USED

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THE BENEFITS AND THE BENEFICIARIES

The use of Copernicus data for environmental monitoring in the Azores has brought substantial benefits to both society and public management. By leveraging cost-effective, high-resolution satellite imagery, regional authorities are able to conduct more efficient and accurate conservation practices in Protected Areas, overcoming geographic isolation and resource limitations.

This facilitates better protection of biodiversity and natural habitats while reducing operational costs. For society, this data-driven approach fosters greater transparency and accountability in conservation efforts, reinforcing public trust and engagement in environmental protection.

For public authorities, Copernicus-based remote sensing enables timely and informed decision-making. It enables the regular assessment of large-scale EU-funded projects, such as LIFE initiatives, with enhanced precision and speed.

Access to reliable, near real-time data supports compliance monitoring, strategic adjustments, and long-term planning. Ultimately, this strengthens ecosystem resilience and contributes to more proactive and adaptive environmental governance in the Azores.

	TIER 1 SERVICE PROVIDER	TIER 2 PRIMARY USER	TIER 3 SECONDARY USER	TIER 4 END USER BENEFICIARIES
SERVICES AND BENEFITS	Sentinel-2 Landsat 8 ASTER	Monitoring conservation projects	Understanding the effectiveness of conservation projects	Understanding the effectiveness of conservation projects remotely
BENEFICIARIES	SPEA Environment and Climate Action at the Azores Regional Government	SPEA Environment and Climate Action at the Azores Regional Government	SPEA Environment and Climate Action at the Azores Regional Government	SPEA Environment and Climate Action at the Azores Regional Government

EU POLICY / DIRECTIVE

Biodiversity Strategy

TYPE OF SERVICE PROVIDER

Public Service

TYPE OF FUNDING SOURCE

Other

USAGE MATURITY LEVEL

4

A FUTURE WITH COPERNICUS

Copernicus provides high-resolution satellite data through its Sentinel missions, offering frequent, accurate observations of land cover, vegetation health, and environmental changes. By integrating these resources, users can gain real-time insights into environmental dynamics, enhancing monitoring capabilities and supporting informed decision-making for sustainable land management and conservation efforts. Automating periodic land cover assessments and integrating Copernicus data into local environmental monitoring systems would enhance long-term planning and response to environmental challenges.

DID YOU KNOW?

The EU-funded LIFE program was established in 1992 and has since co-financed thousands of projects. The LIFE program aims to support the implementation and development of environmental and climate actions, projects, policies, and legislation.

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