SELINA
SCIENCE FOR EVIDENCE-BASED AND SUSTAINABLE DECISIONS ABOUT NATURAL CAPITAL

Earth Observation for Ecosystem Accounts in SELINA

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SELINA

Science for Evidence-based and sustainabLe decIsions about NAtural capital

What? Horizon Europe Project

Call: Biodiversity and ecosystem services (HORIZON-CL6-2021-BIODIV-01)

Topic: HORIZON-CL6-2021-BIODIV-01-07 Ecosystems and their services for an evidence-based policy and decision-making

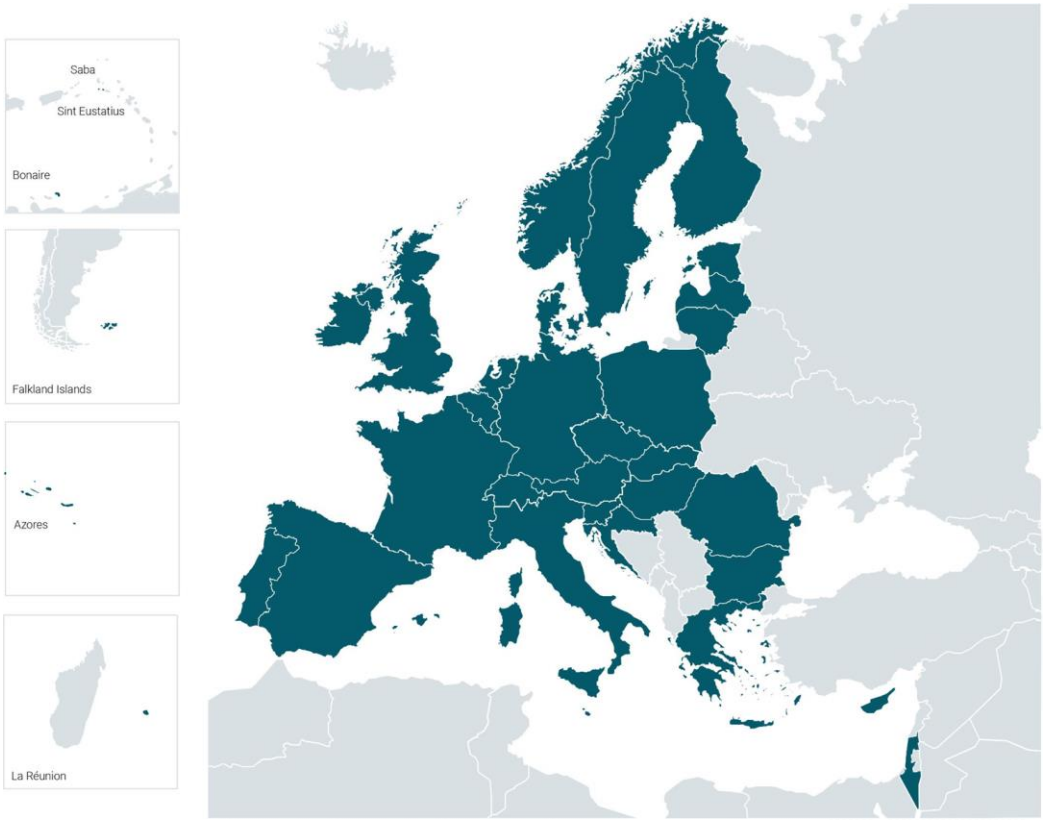
When? Duration: July 2022 – June 2027 (60 months)

How much? Overall budget: 13 Mio €

Who? 50 partners and associated partners from altogether 31 countries

Project Consortium

- covers all 27 EU member states
- including selected EU Outermost Regions and Overseas Countries and Territories
- + Norway, Switzerland, Israel and the United Kingdom
- pan-European network of renowned professionals from academic and non-academic sectors with various backgrounds



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ETH Zürich
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UNEP-WCMC
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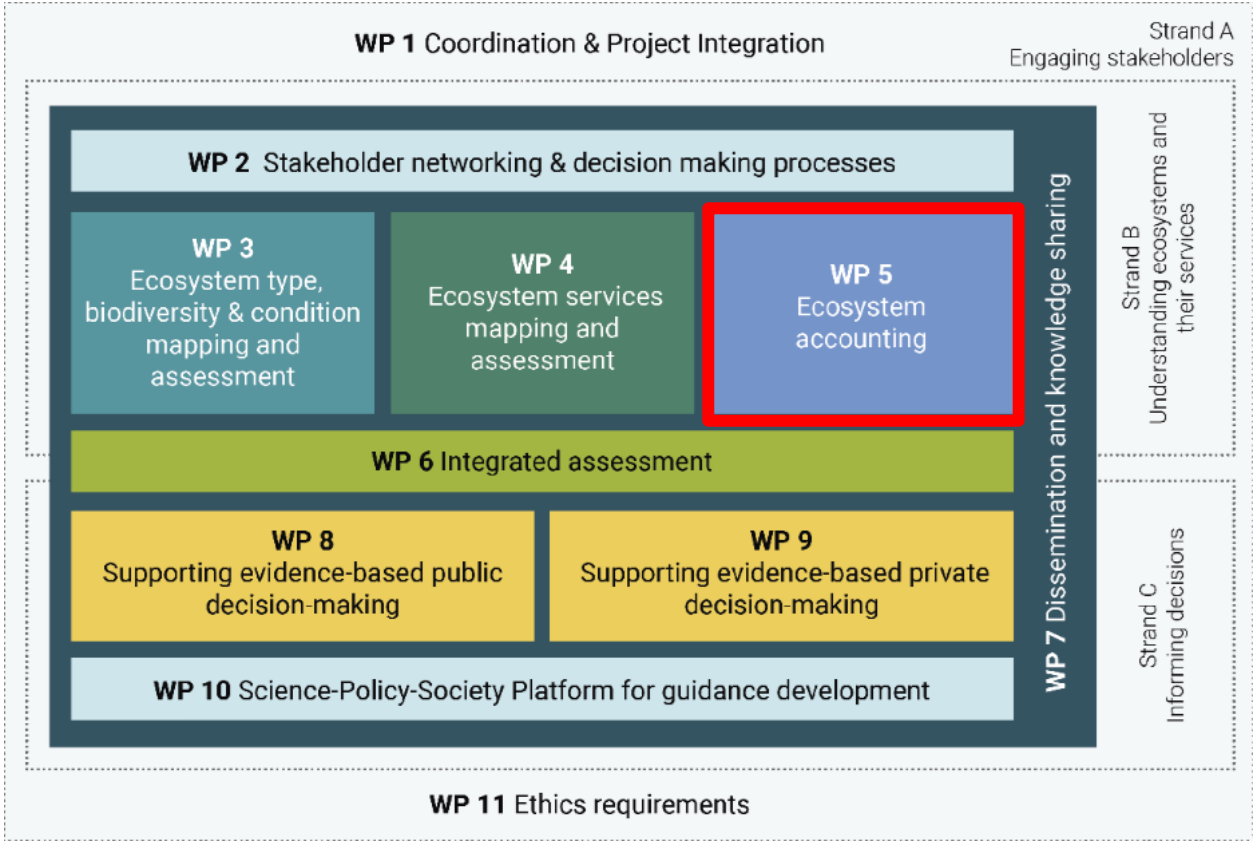
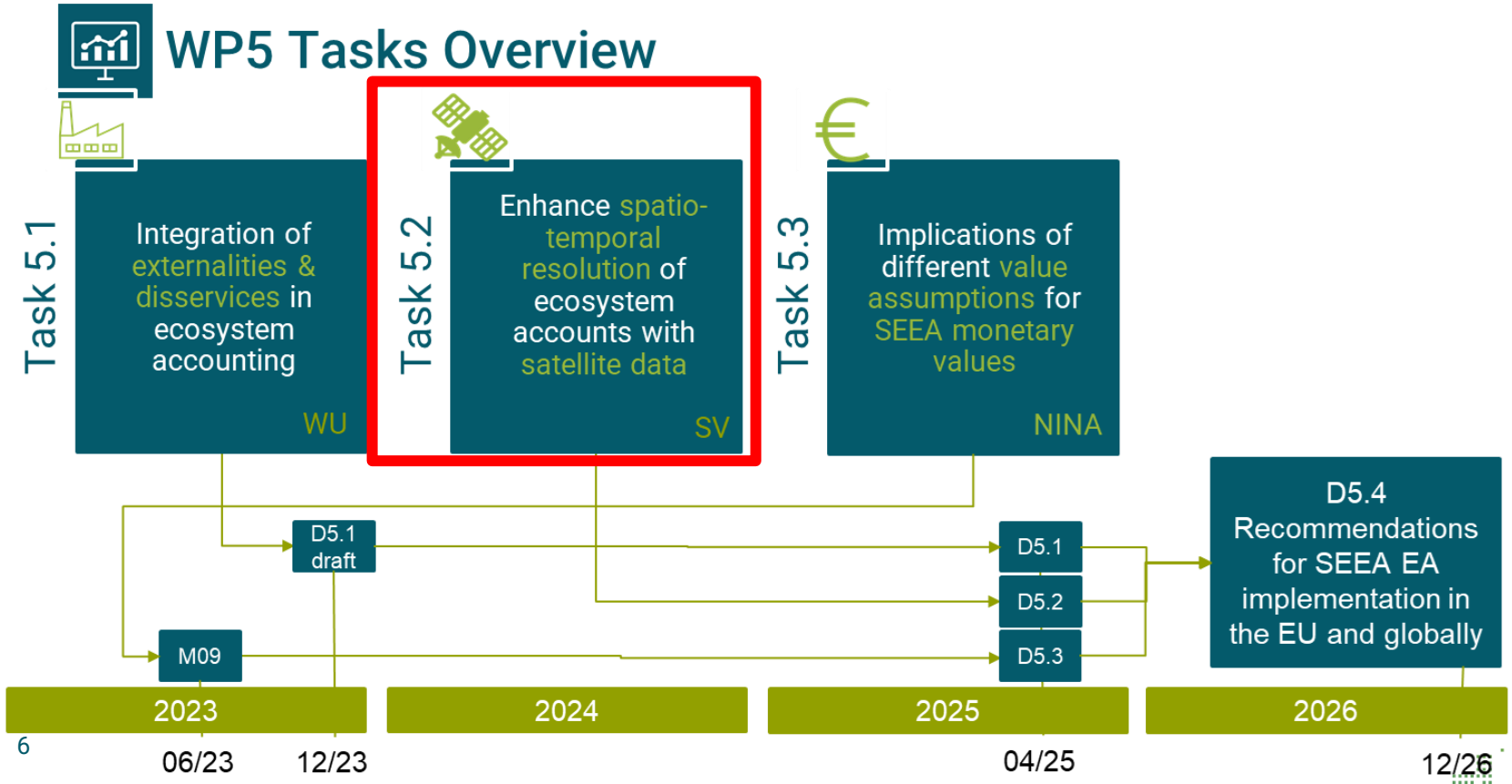
Project implementation



- 3 Strands
  - ‘people’
  - ‘science’
  - ‘applications’
- 11 Work Packages

SELINA WP5 Ecosystem accounting



Earth Observation for Ecosystem Accounts in SELINA

- EO for ecosystem extent accounts
- EO for forest ecosystem condition
- EO for forest global climate regulation ES

applied at two SELINA test sites:

Peloponnese island, Greece

São Miguel island, Azores, Portugal

Ecosystem Extent mapping following the EU typology (1)

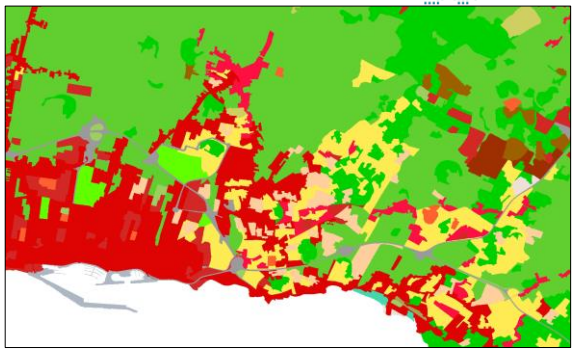
Ecosystem extent map following the European Typology (ETA) with Copernicus Land Monitoring Services (CLMS) products + existing national data

Methodology

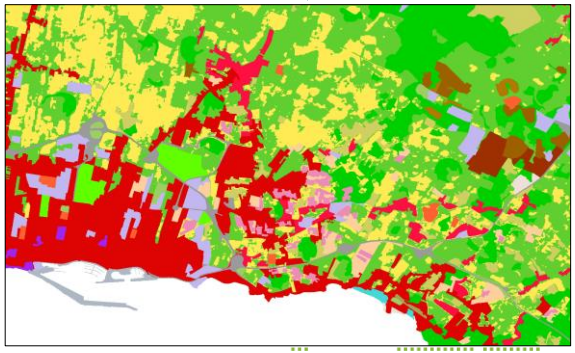
- Crosswalk between official Land Use map (2018) of São Miguel and the European Ecosystem Typology
- Use of CLMS data for discriminating more detailed classes:
  - Coastal Zones (CZ) → map greenhouses, transitional forest, etc.
  - CLC + Backbone & CZ → discriminate cropland from grassland
  - High Resolution Layer Imperviousness → discriminate between continuous and discontinuous artificial areas

First results

- São Miguel → Ecosystem extent map developed with more detailed classes according to ETA
- Peloponnese → starting data review



Sao Miguel ecosystem extent map
National data only



Sao Miguel ecosystem extent map
National & CLMS data

Ecosystem Extent mapping following the EU typology (2)

Habitats mapping to Level 3 using EUNIS habitat classification, in line with the European Ecosystem Typology

Model's training input

- Sentinel 1, Sentinel 2, DEM/Lidar, Biophysical and/or field dataset

Methodology

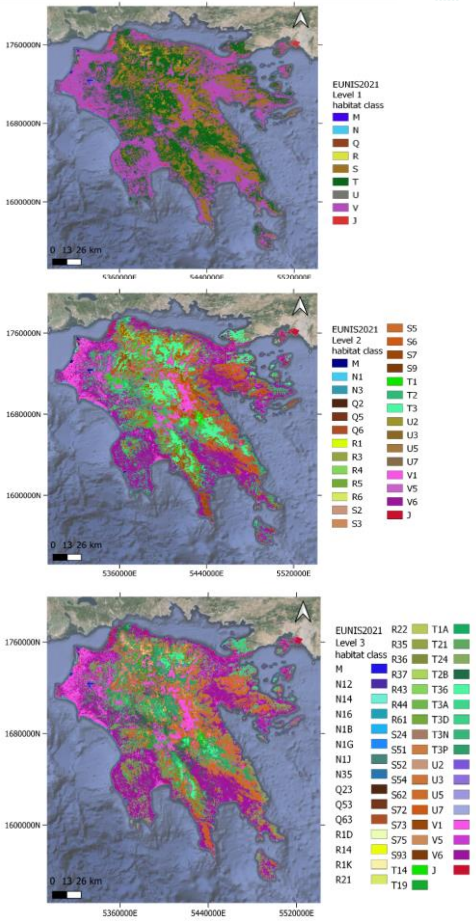
Target detail up to Level 3 habitat classes with a hierarchical workflow:

- Level 1 mapping: initial classification
- Levels 2 and 3 mapped independently; then merged with Level 1 for alignment

First results

Peloponnese → Habitat mapping on EUNIS Level 3 for classes: coastal zone, peatlands, grasslands, shrubs, and forests.

São Miguel → training data selection (ongoing field collection due to uniqueness of ecozone), investigation of cloudiness influence in mountainous areas, translation of classification national inventories to EUNIS classes



Forest ecosystem condition accounting

Evaluation of forest health

Methodology

- Gathering of remote sensing data
- Indicator development:
  - Identification of forest health characteristics (e.g. tree density, biodiversity)
  - Translate data into measurable indicators (e.g. leaf area, forest connectivity, water content)
- Combination of indicators:
  - Grouping of indicators into sub-indexes and then into a final index that summarizes the overall forest condition

Validation

- Comparison of results with deforestation, forest degradation, carbon stock & carbon sequestration maps on same areas

Results

- Final index summarizing overall forest condition

Forest ecosystem condition accounting

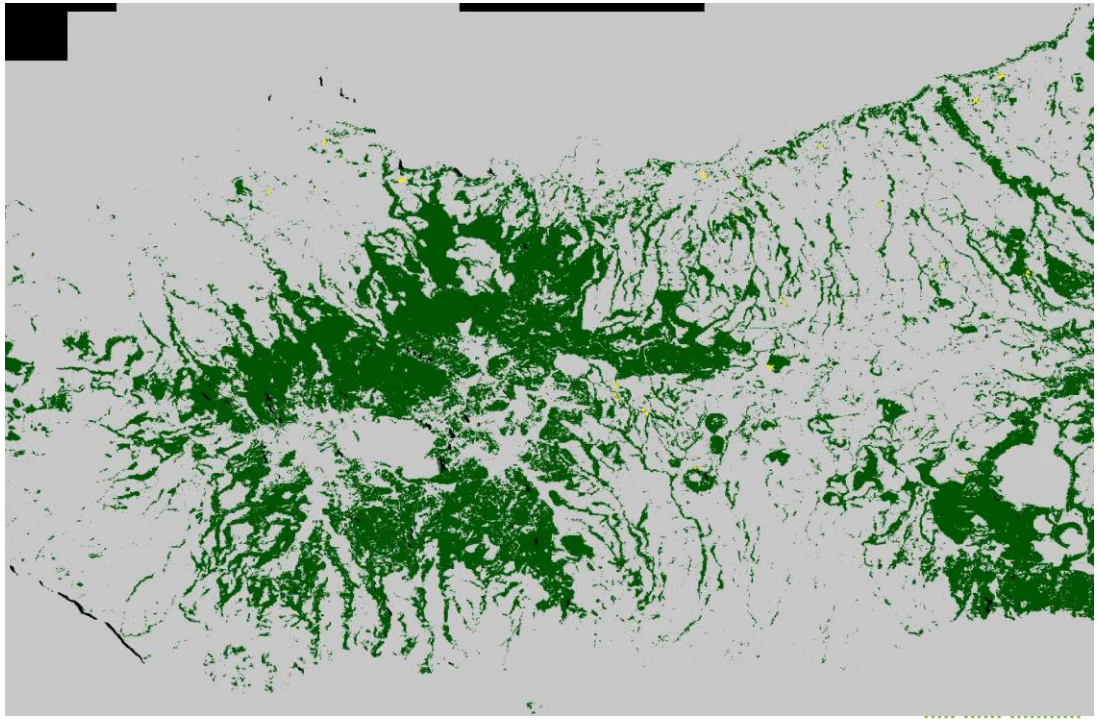
Historical deforestation and forest degradation mapping

Methodology

- Sentinel 1 (SAR) time series
- Baseline forest/non-forest maps, change detection

Results

Peloponnese & São Miguel → Completed historical deforestation and forest degradation time series maps



Sao Miguel Central Volcano

Forest global climate regulation ES

Carbon stocks mapping

Training input

- LIDAR derived height vegetation, Sentinel 2, field data

Methodology

- Multistep stratified approach:
  - Development of land cover maps
  - Data fusion → Interpolation techniques
  - Predictive model: allometric equation for biomass inversion
  - Validation use of available field data

Results

To be started for test sites Peloponnese & São Miguel

Forest global climate regulation ES

Carbon fluxes mapping

Training input

- Sentinel 2, weather data, habitat maps, field data

Methodology

- Light-Use Efficiency Model to map gross primary productivity (from HEU evoland project)
- Transformation into carbon
- Species information to convert Above Ground Biomass to Below Ground Biomass
- Comparison with stock-difference

Results

To be started for test sites Peloponnese & São Miguel

SELINA Deliverable Earth Observation for Ecosystem Accounts

UPCOMING!

Enhancing the temporal resolution of ecosystem accounts using satellite data

- public project report
- due in April 2025
- available via: https://project-selina.eu/library

Thank you!

https://project-selina.eu