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Adaptation, Resilience, Environment, and National Heritage in Greece

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ELLINIKI ETAIREIA Society for the Environment and Cultural Heritage (ELLET)

This research is part of the Sub-Action C4.2 coordinated by ELLET in the framework of the “**LIFE-IP AdaptInGR—Boosting the implementation of adaptation policy across Greece**” programme, LIFE17 IPC/GR/000006.

RATIONAL & OBJECTIVES

Climate change is increasingly threatening cultural heritage.

Greece's national tangible and intangible heritage (i.e. archaeological sites, traditional settlements, historic cities, monuments) are highly exposed.

Greek landscapes are also highly exposed to multiple hazards.

Our project develops a comprehensive methodology to:

- Assess future climate risks (temperature, rainfall, extremes).
- Evaluate vulnerability of heritage sites.
- Propose adaptation and resilience strategies.
- Provide decision-making tools for prioritization.



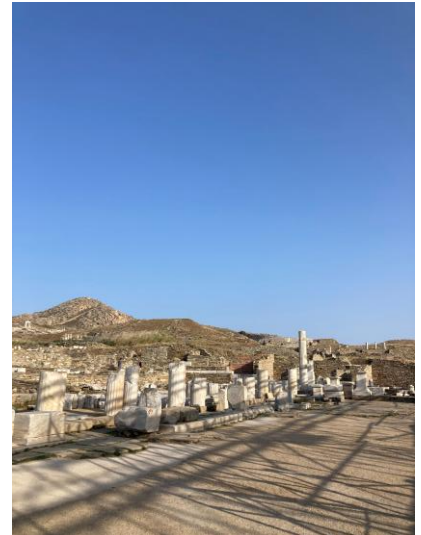
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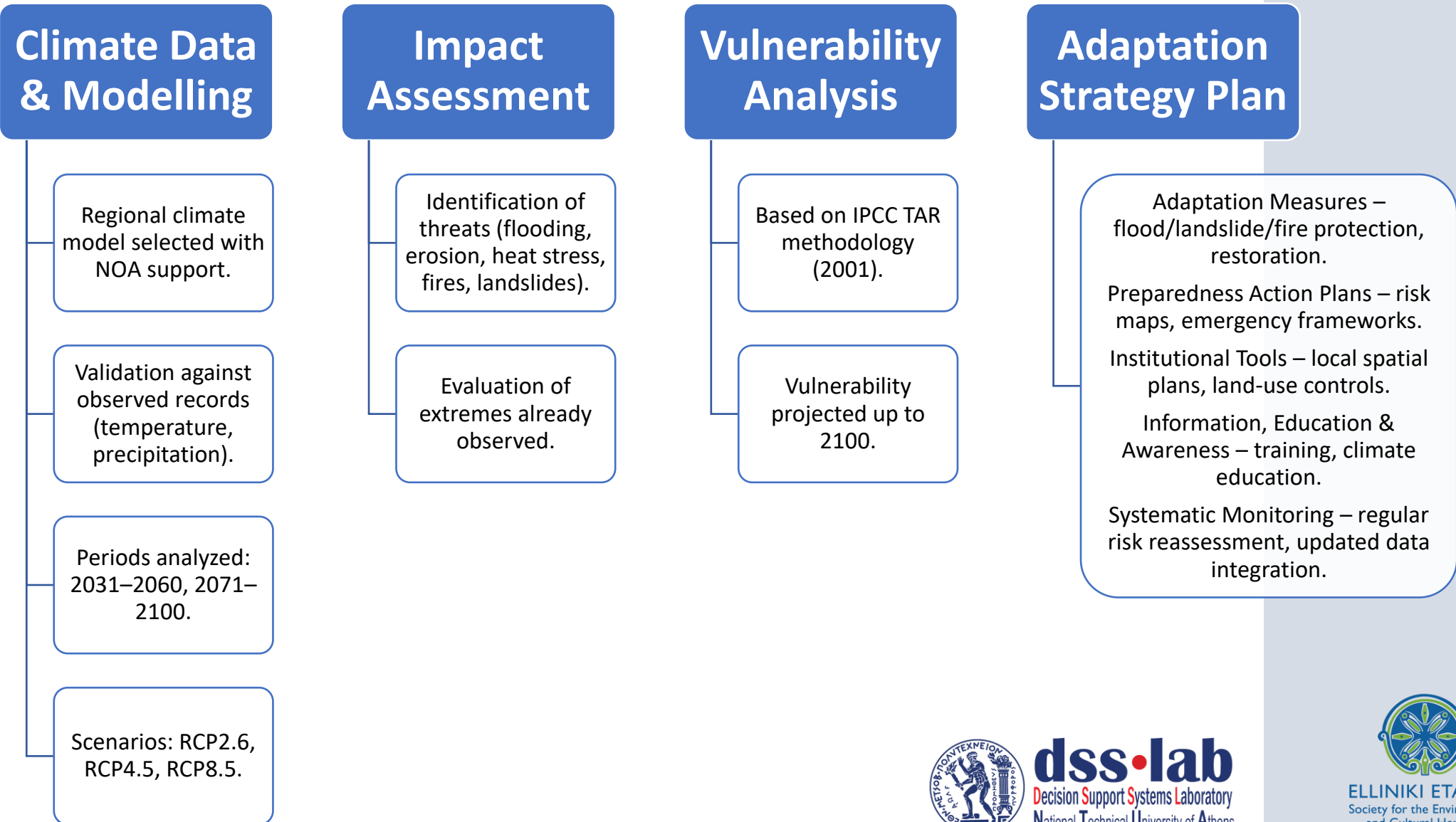
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CASE STUDIES

- Ancient Messene – prime example of a Southern Greek archaeological site, including significant ancient monuments, vulnerable to wild fires and floods.
- Old Town of Corfu – UNESCO World Heritage Site, also a modern, vibrant city.
- Zagori Traditional Settlements (Dilofo, Papigo, Tsepelovo) – traditional stone-built villages in mountainous terrain.
- Delos – archaeological site, highly exposed to sea-level rise and erosion.
- Porta Panagia (Byzantine church) – single monument, river proximity, sensitive materials.



METHODOLOGY OVERVIEW



SYNTHESIS OF CASE STUDY FINDINGS

Climate drivers:

- Temperature rise: +2–4 °C (scenario-dependent)
- Rainfall: lower totals, higher variability; more frequent extremes (floods, heatwaves, fires, landslides)

Material & infrastructure sensitivity:

- Historical structures affected by thermal stress, humidity swings, salt crystallization, and erosion
- Surrounding infrastructure (roads, drainage, protective works) often insufficient

Topography & ecosystem interactions:

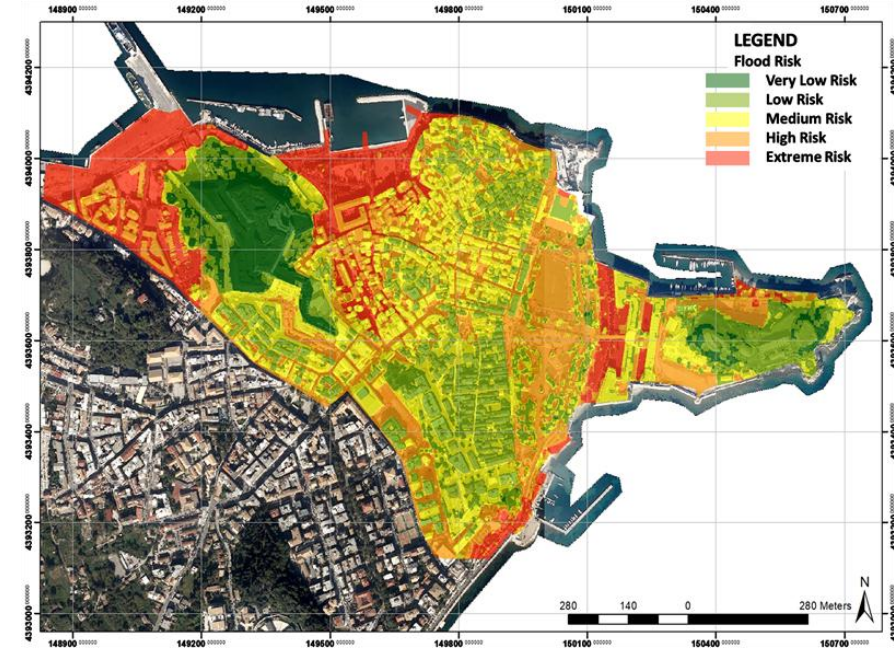
- Slope instability, river/coastal proximity influence hazard severity
- Vegetation and soil conditions modulate erosion, fire risk, and microclimate resilience

Socio-economic & management factors:

- Urban density, tourism, seasonal populations, reduced local production heighten vulnerability
- Limited technical/human resources reduce adaptive capacity and emergency response

Key insight: Climate impacts are site-specific and multidimensional, requiring integrated strategies combining technical interventions, ecosystem management, and institutional capacity building.

This framework underpins AHP-based prioritization for targeted adaptation actions.



Example Figure: Flood risk map, in case of high rainfall velocity.
Data source. National Observatory of Athens, Greece.
Source. ELLINIKI ETAIRIA Society for the Environment and Cultural Heritage



PRIORITIZATION FRAMEWORK: MONUMENTS & MEASURES (AHP)

- Analytic Hierarchy Process (AHP): decision-support tool for adaptation planning.
- Hierarchical structure: monuments categorized as archaeological sites, traditional settlements, historic cities, or single monuments.
- Evaluation criteria:
 - C1: Human safety / usage frequency
 - C2: Cultural value (UNESCO, national, local)
 - C3: Rarity / uniqueness
 - C4: Economic / functional value
 - C5: Exposure to climate riskWeighting (based on literature & field analysis – Feilden, Riegl, Lemaire): Safety (C1) → Cultural value (C2) → Rarity (C3) → Climate risk (C5) → Economic value (C4)
- Extension to adaptation measures: Prioritization of interventions by cost (NPV, IRR, BCR), technical feasibility, risk reduction, cultural/social benefit (Example measures: fire protection, hydrological interventions, soil stabilization, material conservation)
- Output: ranked list of monuments and adaptation measures, guiding efficient resource allocation.



GREEK LANDSCAPES: SCOPE & CASE STUDIES

Expansion beyond monuments to landscapes and land uses

Completed studies:

1. The Transect of Pylos-Monemvasia
2. The Region of E. Macedonia and Thrace w/ selection and demarcation of Landscape Character Areas
3. Samothrace w/ selection and demarcation of Landscape Character Areas
4. The Transect of Ioannina-Zagoria-Konitsa
5. The Regional Unit of Central Greece w/ selection and demarcation of Landscape Character Areas
6. Delphic Landscape w/ Landscape Character Assessment.
7. The Transect of Delos-Rinia-Tinos
8. NATURA GR3000005 Sounio – Nisida Patroklou kai Paraktia Thalassia Zoni w/ Landscape Character Assessment
9. NATURA GR1340004 and GR1340007 Limnes Vegoritidas – Petron and Limni Petron w/ Landscape Character Assessment

Covers diverse natural and cultural contexts, integrating climate projections, land use, and cultural identity.



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GREEK LANDSCAPES: METHODOLOGY AND DATA

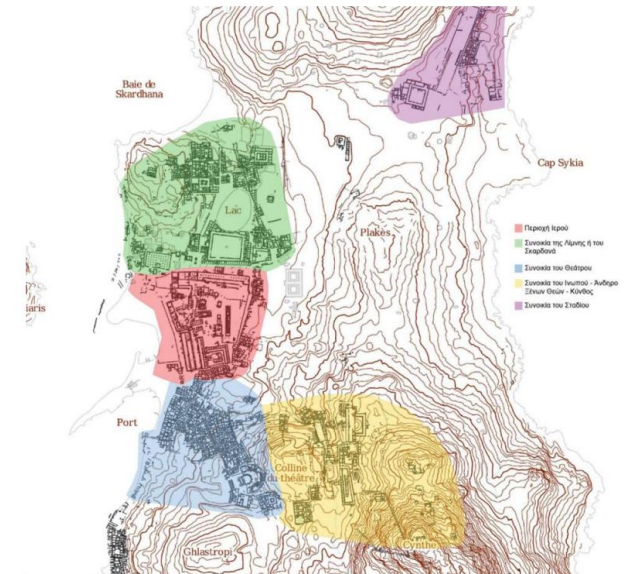
Methods:

- Transect analysis: linear, detailed sampling of subcomponents
- Landscape Character Assessment (LCA): classification of natural and cultural types
- Criteria: topography, land use, vegetation, hydrography, shared landscape identity

Data sources:

- Climate data (NOA)
- Field surveys and site visits
- GIS mapping & spatial analysis

Outputs: baseline vulnerability maps, identification of sensitive landscape elements, integration of ecological and cultural dimensions



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GREEK LANDSCAPES: ADAPTATION PROPOSALS

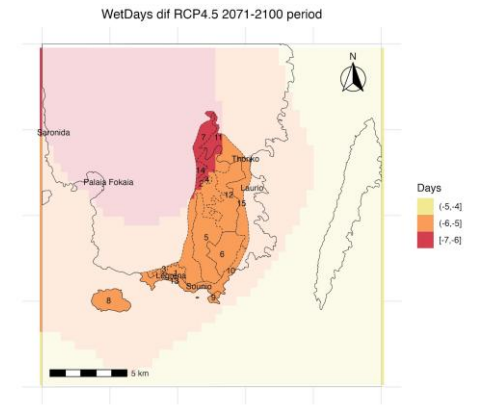
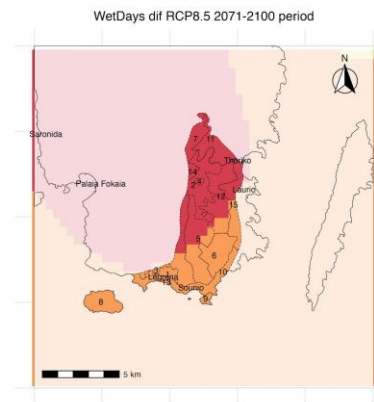
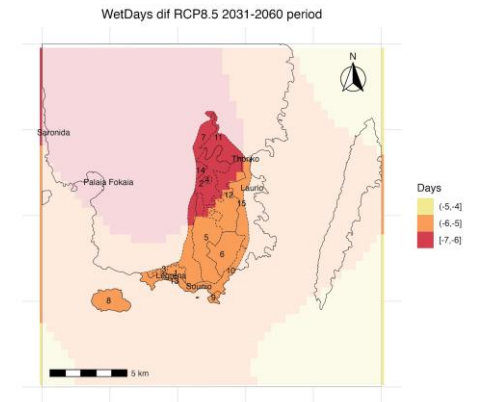
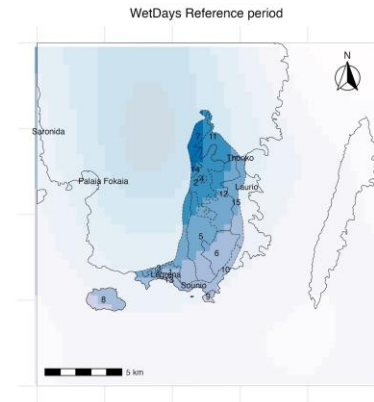
Climate scenarios considered: RCP4.5, RCP8.5 (periods 2023–2060, 2071–2100)

Key thematic areas for adaptation:

- Water management & flood risk mitigation
- Soil protection & erosion control
- Conservation of natural environment & biodiversity
- Sustainable agricultural practices

Integration with LIFE-IP 4NATURA and regional climate risk maps

Proposals combine technical, ecological, and socio-cultural measures, ensuring resilience of landscapes and linked heritage.



CONCLUSIONS AND KEY TAKEAWAYS

Holistic and Integrated Framework

The project establishes the first comprehensive framework for climate adaptation of Greek cultural and natural heritage, linking individual monuments, historical settlements, and broader cultural and natural landscapes.

Methodology

Combines rigorous climate science, detailed vulnerability assessments, AHP-based prioritization, and financial evaluation into a cohesive, decision-support tool.

Adaptable and Actionable Guidance

Provides site-specific and landscape-level recommendations, offering a transferable model for other Mediterranean contexts. Delivers practical tools for policymakers, planners, and local managers to enhance resilience and sustainable heritage and landscape conservation.



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THANK YOU!

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