Update of MAES planning and implementation agenda in Greece. An example of ES provided by Natura 2000 sites in Greece

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The Greek landscapes & Natura 2000

- A country of 131,957 km$^2$; 1,310 km$^2$ inland waters; 16.67% island territories and 13600 km of coastline (the largest in the Mediterranean)
- Two types of bioclimate (Mediterranean, Temperate) with a wide range of subtypes across the country. The Mediterranean-type ecosystems cover more than 90% of Greece; the vegetation belts range from xero-thermic- to cryo- Mediterranean.
- Highly heterogeneous landscape with a diversity of ecosystem types.
- Up to 2017: 419 Natura 2000 sites (2017: +39 SCI/SPA + 61 Marine SCIs) / 30 % and 17 % of the national territory

The island of Irakleia (Kiklades)

Crocus goulimyi  Phrygana in Karpathos
The Greek landscapes

- Areas with high value for ecosystem services provision, ranging from agricultural provision of commodities to recreation and water regulation services.
- The resources are not always sustainably used and the human impacts in some cases exceed the ecosystems’ resilient capacity.

**Objective of the MAES-GR team:** a) to use ES assessments to highlight the value of the country’s landscapes b) to incorporate the decision-makers to MAES, c) to ensure that the ES research gives advice to decision-making.
Recent MAES-related progress in Greece

(to be updated also in the BISE platform)
Title: Integrated actions for the conservation and management of NATURA 2000 sites, species, habitats and ecosystems in Greece (LIFE-IP 4 NATURA)

Partnership:
1. Ministry of Environment & Energy
2. University of Patras
3. Democritus University of Thrace
4. WWF Hellas
5. Hellenic Ornithological Society
6. Region of Crete
7. Region of East Macedonia and Thrace
8. Region of Attica
9. Decentralized Administration of Epirus and Western Macedonia
F1. Overall project management and coordination

A1. Development of Action Plans (APs) for species and habitats of Community Interest
A2. Optimizing specifications of the existing NATURA 2000 monitoring data
A3. Mapping and Assessment of Ecosystems and Ecosystem Services (MAES)
A4. Implementing MAES at pilot studies
A5. Stakeholder mapping and analysis

C1. Field implementation of Action Plans (APs) for species and habitats
C2. Pilot implementation of NATURA 2000 site management plans
C3. Development of a Decision Support System (DSS) for NATURA 2000 site management
C4. Creation of an interactive and interoperable ppGIS-webGIS for Ecosystem Services visualization and monitoring
C5. Capacity building

D1. Monitoring of the project’s environmental impact
D2. Monitoring the impact of the implementation of the MPs at the 4 selected Regions and of the APs at national scale
D3. Monitoring the effectiveness of the capacity building and training system of the project
D4. Monitoring of the project’s environmental impact
D5. Monitoring of the project’s socio-economic impact

E1. Communication and Dissemination
C5. Capacity building

Complementary action I. Monitoring Program for species and habitats of Community Interest (national scale)
Complementary action II. Management Plans for the Natura 2000 sites (national scale)
Natura 2000 sites’ assessment
Natura 2000 sites’ assessment

a) Habitat type- and ecosystem type- level approach

- National scale Natura 2000 habitat type data
- Habitat types to Ecosystem types typology
- ES rating procedure (0-5 rating scale)
- Certainty of rating
- Ecosystem types map
- Provisioning services map
- Regulating & Maintenance services map
- Degree of certainty maps

b) Site-level approach

- National scale Natura 2000 data
- All other spatial referenced data
- Indicators at site-level
- Rating procedure (0-3 rating scale)
- Certainty of rating
- ES Map / ES hotspot map
- ES ID for each site

Schematic representation of the proposed methodological approach
Outside Natura 2000 sites’ assessment
Establishment of a Scientific - Technical Committee

**Aim:** to coordinate Ecosystem Services research and all activities towards the Mapping and Assessment of Ecosystems and their Services (MAES studies) in Greece.

**Board members:**

- Prof. Panayotis Dimopoulos (Coordinator) National Representative for the MAES implementation in Greece / University of Patras (Patras)
- Dr. Evangelia Drakou / University of Twente (contact person and link to ESP)
- Assoc. Prof. Stelios Katsanevakis / University of the Aegean (Lesvos)
- Assoc. Prof. Konstantinos Kormas / University of Thessaly (Volos)
- Dr. Maria Tsiafouli / Aristotle University of Thessaloniki (Thessaloniki)
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Members

6. Jeroen Arends MSc. SEEDEV, agricultural and environmental consultancy.
7. Dr. Nikoleta Jones. Anglia Ruskin University, Cambridge, United Kingdom
8. Assoc. Prof. Athanasios Kallimanis. Aristotle University of Thessaloniki, School of Biology, Department of Ecology, Thessaloniki
9. Dr Constance Demasthas. University of Avignon, France
10. Dr Ioanna Grammatikopoulou. Natural Resources Institute Finland (LUKE) and Research Scientist in CzechGlobe Research Institute, Department of Human Dimensions of Global Change, Prague, Czech Republic
11. Dionysia Markopoulou, MSc. Marathon Data Systems
12. Dr Nefta Votsi. Post-Doc researcher, Aristotle University of Thessaloniki
13. Prof. Maria Moustaki -Gouni. Aristotle University of Thessaloniki, Department of Botany
14. Dr. Ioannis Kokkoris. Post-Doc researcher. University of Patras, Department of Biology, Division of Plant Biology/Institute of Botany, Patras
15. Ass. Prof. Maria Panitsa. University of Patras, Department of Biology, Division of Plant Biology/Institute of Botany, Patras
16. Dr. Eleni Iliadou. Post-Doc researcher. University of Patras, Department of Biology, Division of Plant Biology/Institute of Botany, Patras
17. Vassiliki Vlami. University of Patras, Department of Environmental and Natural Resources Management, Laboratory of Ecology and Biodiversity Conservation
18. Eleanna Technitou. University of Patras, Department of Biology, Division of Plant Biology/Institute of Botany, Patras
MAES-GR Workshops preparation

We intend to organize two (2) Workshops within 2017

a) 1st in Athens (June/September 2017), 2 days

b) 2nd in Thessaloniki (November/December 2017), 2 days

1st Day: EU and National invited experts & trainers; decision makers presentations / (policy oriented)

2nd Day: Applied at regional and local needs; regional and local stakeholders’ presentations (needs and application)
Main Goals of HESP

A. Research advancements

- Ecosystem Services Assessment and mapping in Greece
- Identification of data gaps
- Development of relevant typologies and methodologies
- Assess synergies and trade-offs among ES
- Scientific publications linked to policy and methods
- Implementation of MAES in Greece
Main Goals

B. Policy Support

• Offer advice and support to the Ministry of Environment
• Disseminate research through Newsletter, the ResearchGate, the MAES.GR and the HESP website
• National guide with best practices
• Workshops with state agencies and stakeholders (e.g. Management bodies of the protected areas) to raise awareness and educate
• Education and raising awareness through capacity building
The Roadmap of the MAES-GR Working Group

Ministry of Environment & Energy

State level:
Ministry policies
- Environmental legislation
- Natura 2000 Network management

Regional level:
Regional policies

Local level:
Municipality policies

MAES-GR working group
Scientific & technical committee acting as a possible advisory council
Action Plan of the MAES-GR Working Group

**2017**
- Bio-physical
  - Data harmonization
  - Land-cover based
  - ES potential supply

**2018**
- **Societal**
  - ES flow
  - ES use
  - Societal perception of ES
  - Stakeholder involvement

**2019-2020**
- **Economic**
  - ES benefits
  - Economic valuation
  - Stakeholder involvement

**Action Plan’s steps**
- Biophysical Assessment & Mapping
- Social Assessment & Mapping
- Economic valuation
- Future Scenarios

Decision making
**TRAIN:** MAES Hands-on mapping workshop
Alterra, Wageningen University & Research Centre

- **Potential timber production**
- **Qualified crop production**
- **Erosion risk prevention**
- **Potential recreation map**
Inventory, Delineation and Assessment of Cultural Landscapes in the Natura 2000 ecological network

Dimopoulos P., V. Vlami, I. Kokkoris (2016)

Cultural landscapes and attributes of “culturalness” in protected areas: An exploratory assessment in Greece


Science of the Total Environment (accepted)
Mapping and assessment of ecosystems and their services at the mountainous Natura 2000 sites of Greece

Fig. 2: Map of ecosystem types at 89 mountainous sites (SACs) in Greece

Fig. 3: Distribution (%) of each ecosystem type in the study area
Mapping and assessment of ecosystems and their services at the mountainous Natura 2000 sites of Greece

**Fig. 4:** Spatial distribution of Provisioning ES at 89 mountainous sites (SACs) in Greece. The proximity to major urban centers is also indicated in the map.
Mapping and assessment of ecosystems and their services at the mountainous Natura 2000 sites of Greece

Fig. 8: The measured ES provided by the Natura 2000 sites that are the hotspots for total ES supply (graphic representation of the ES multi-criteria matrix). Each line represents the secondary ES indicator for each site.

Fig. 9: Total scoring of the provided Ecosystem Services & Hot-Spots (in red) at 89 mountainous Natura 2000 sites (SACs) in Greece. The island of Crete (box at the bottom of the map) is identified as an ES hot-spot area. 1 - 6: sites with top total ES scores (1: Mt Belles & Lake Kerkini, 2: Mt Pilio, 3: Mt Parnon, 4: Mt Lefka Ori, 5: Mt Dikti, 6: Mt Idi)
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Impacts of invasive alien marine species on ecosystem services and biodiversity: a pan-European review (Katsanevakis et al., 2014)

**Provisioning**
- **Food provision**
  - New commodities
  - New food source for fish
  - Novel habitats
  - Algal blooms
  - Degradation of important habitats
  - Direct predation
  - Competition
  - Fouling shellfish, gear, equipment
  - Entanglement in nets
  - Disease transmission

- **Water storage/provision**
  - Clogging intake pipes

- **Biotic materials - biofuels**
  - New biotic materials - biofuels
  - Degradation of important habitats

**Regulating and Maintenance**
- **Water purification**
  - Increased biofiltration
  - Macroalgae function as biofilters
  - Biological Control
  - Degradation of important habitats
  - Food web shifts
  - Release of toxins
  - Massive mortality

- **Air quality regulation**
  - Algal blooms
  - Massive mortality
  - DMSP production

- **Coastal Protection**
  - New grass, seagrass, macroalgal beds
  - Reef creation
  - Degradation of important habitats

- **Climate regulation**
  - C sequestration in shells & skeletons
  - C sequestration via primary production
  - DMSP production
  - Degradation of important habitats
  - Emission of greenhouse gasses

- **Ocean nourishment**
  - Bioturbation of sediments

- **Weather regulation**
  -
  -

- **Life cycle maintenance**
  - Creation of novel habitats
  - Control other invasive species
  - Degradation of important habitats
  - Cascading effects on food-webs

- **Biological regulation**
  - Control other invasive species
  - Control parasites
  - Cause the decline of species that act as biological regulators

- **Symbolic-aesthetic values**
  - Creation of highly-valued habitats
  - Degradation of highly-valued habitats
  - Algae washed ashore on beaches
  - Damages in archaeologically valuable ancient shipwrecks

- **Recreation & tourism**
  - Creation of novel habitats of recreational value
  - Algal blooms
  - Degradation of important habitats
  - Grass formation in beaches
  - Jellyfish invasions
  - Injuries by sharp shells

- **Cognitive benefits**
  - Increased opportunities for ecological research
  - Materials for research (biology, medicine, pest control etc)
  - Biomonitor and indicator species
  - Reduced research possibilities in biogeography
  - Interference with long-term monitoring
  - Degradation of important habitats

**Figure 3.** Main mechanisms through which alien species impact ecosystem services (sensu Liquete et al. 2013a). Green cross: positive impacts; Red minus sign: negative impacts.
63.22 % of the country's territory has a medium potential in regulating services (score 10-20)

18.6 % of the country's territory has a very high potential (score 40-50)!

Only a small percentage (<5%) has a low or no potential (score <10)
67.70% of the country's territory has medium potential in provisioning services (score 10-20).

26.46% of the country's territory has a high potential (score 20-30).

Only a small percent (<6%) has a low or now potential (score <10).
Linked Activities

- Hellenic Ecosystem Services Partnership (HESP)
- **ESMERALDA** - Enhancing ecoSysteM sERvices mApping for poLicy and Decision mAking
- **ECOPOTENTIAL H2020 project**
- **SWOS H2020 project**
- **COST**: Climate-Smart Forestry in Mountain Regions: Country representative
- **ES projects coordination** (Cultural landscapes, Stymfalia Life, National scale habitats mapping)
- UPatras and other Universities Ecosystem Services Research Group
- Ecosystem Services Partnership Working groups (Mapping, Mediterranean, Marine etc)
- PhD dissertations, development of curricula (on mapping and assessment of ES)
National agenda

**Short-term objectives**
- Establishment of thematic research groups (based on expertise, i.e. for terrestrial, marine, urban etc.)
- Establishment of common techniques & methodology, based on the special characteristics of the Greek environment (national set of indicators, minimum mapping units etc.)
- Stakeholder involvement – Dissemination actions
- Identification of provided ES in Greece, with GR and EU importance and use them as an asset and strong argument in funding claiming
- Identify ES as the core of the National Capital

**Long-term objectives**
- Creation of a national geodatabase for all available ES data
- Detailed national set of indicators (contribution to IPBES)
- Detailed ES maps for all Greek territory
- Local scale ES studies at the protected areas level
- Identification of ES hot-spot areas
- Incorporate ES into legislative documents
- ES-based management plans
Thank you for your attention

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