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MAIA
Mapping and Assessment for Integrated ecosystem Accounting

The MAIA country fact sheets summarize the state of affairs on natural capital accounting (NCA) in the countries connected to the MAIA project. They serve as an accessible overview and entry point for collaboration. The factsheets describe the needs from policy, society, science and business for the use of NCA, give an overview of the ongoing and published research -including knowledge gaps- in the country, include contact details and an overview of national partners and stakeholders involved in the accounts. Information in this document is based on MAIA Deliverables and exchanges, and the content is reviewed, co-authored and updated by MAIA-liaison persons in the participating country. This version was updated on 15 December 2020.

Country fact sheet:

Greece (EL)

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Summary

Ecosystem accounting in Greece is currently in its infancy. However, the policy relevance is clear. The development of environmental accounts will help the government, public administrative institutions, NGOs and the private sector in making informed decisions. Furthermore, it will favor system thinking. When publicly accessible, these accounts are hoped to empower the informed, aware citizen in the chain of decision making.

Up to now, no accounts have been finalized yet in Greece. However, a national ecosystem extent account, an ecosystem monetary asset account and a thematic biodiversity account, all for woodland and forest, are under development and expected to be published soon. Regarding accounts for ES, a methodological framework is being designed for physical as well as for monetary accounting of water-related ecosystem services (i.e. water regulation).

The data needed for setting up natural capital accounting in Greece is scarce and unavailable. Methodologies have been worked out to gather missing information and start the development of accounts on ecosystems, ecosystem services and biodiversity.

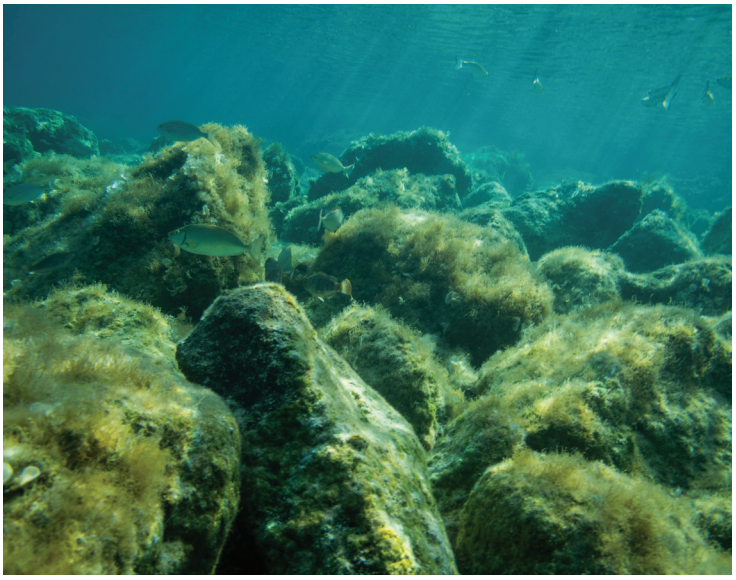
The main obstacles for the SEEA EEA implementation in Greece are the available capacity and expertise of the involved stakeholders and state agencies, along with data gaps. Knowledge sharing among MAIA partners is hoped to address these shortcomings and provide guidance via each country's pilot accounts.

Country policy priorities for developing natural capital accounts

Based on MAIA D5.1 (Annex 7 section 3)

Ecosystem accounting in Greece is currently in its infancy. However, the policy relevance is clear. The development of environmental accounts will help the government, public administrative institutions, NGOs and the private sector in making informed decisions. Furthermore, it will favor system thinking. When publicly accessible, these accounts are hoped to empower the informed, aware citizen in the chain of decision making.

The development of environmental accounts will help establish a common database that government, public administrative institutions, NGOs and the private sector can employ for informed decisions and action plans drafting and implementation, with the minimum environmental cost. Furthermore, it will favor system thinking, evaluating and highlighting all aspects of an issue, instead of focusing only on e.g. one or two parameters. Publicly accessible, these accounts can be a valuable tool to scrutinize any actions, weigh pros and cons, thus enhancing the role of the informed, aware citizen in the chain of decision making.



Pilot accounts under development

Summary table of accounts

Account		Ecosystem Types / Ecosystem Services	Link to research
Accounts for ecosystem assets	Ecosystem extent account	**All ecosystems***	
	Ecosystem condition account		
	Ecosystem monetary asset account	*Forest and woodland*	
Accounts for ecosystem services	Ecosystem services supply and use table - physical terms	**Water regulation***	
	Ecosystem services supply and use table - monetary terms	**Water regulation***	
Thematic accounts		**Biodiversity**	

Scale	State of development
National	Finished
Regional	Ongoing
Local	None ongoing or published
*Highlighted in the fact sheet	

Summary overview of highlight accounting projects

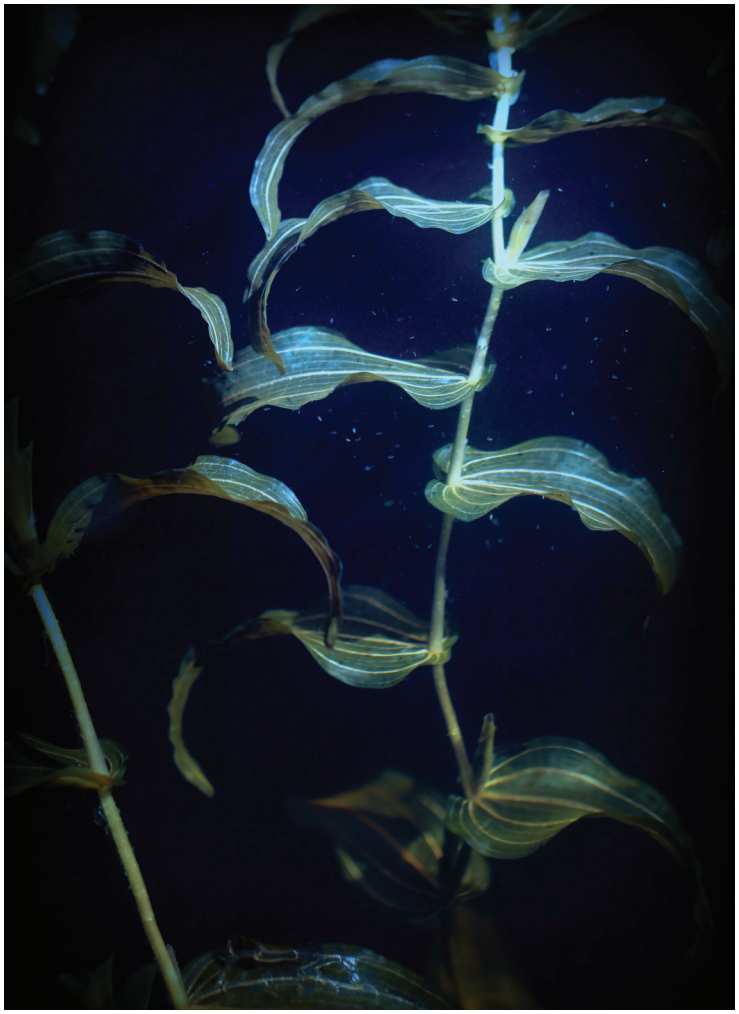
Ecosystem Extent Accounts

The first phase of Ecosystem Extent Accounting is expected to be finished by the end of November 2020. It will cover the last 30 years, for which, robust, digitized information is publicly accessible. For the purposes of MAIA, it is focused on the region of Peloponnese; however, extent accounts are being prepared for the entire country. The accounts will assess:

- Extent in physical terms for each ecosystem type (including urban ecosystems);
- Changes in the extent of each ecosystem type, throughout the years

Water Regulation Accounts

The application of the accounts of water regulation ecosystem services in terms of physical and monetary terms will be applied to Peloponnese. More precisely, the river basin scale has been selected, focusing on the biggest river basin of this region, being the Alfeios river basin with a drainage area of 3660 km2 and a 112 km watercourse (Bekri and Yannopoulos, 2012). Alfeios is situated in the Western and Central Peloponnese, passing through Ancient Olympia just before its estuaries to Kyparissiakos Gulf. It is considered as the most significant ecosystem and natural resources system of this region.



Physical water flow accounting

In terms of the physical water flow accounting, the proposed tables (https://ec.europa.eu/eurostat/documents/1798247/6664269/Manual+for+Physical+Water+-Flow+Accounts+%28draft+version+18+Nov+2014%29.pdf/) present row-wise the flows of water as natural inputs, water products, and water residuals. The natural water input flows for the pilot study will be computed based on the available historic and modelled (using the calibrated simple lumped conceptual river basin ZYGOS model (Kozanis and Efstratiadis, 2006)) time series of precipitation and river discharge (monthly and annually) (Bekri et al., 2015a;b). Water products are classified on the basis of the Statistical Classification of Products by Activity in the European Economic Community (CPA). For the examined pilot study, the considered water products are, mainly, drinking water, hydropower energy production and irrigation. The available data include water use data, crop and soil data, as well as hydropower energy production time series (Bekri et al., 2015a). Finally, water residuals are classified according to their state and quality. For the pilot study, the treated and untreated wastewater, the hydropower energy, the irrigation water and losses in distribution are considered. The main sources of data are the river basin management plans, and the EU databases (e.g.WISE, OECD).

Monetary accounting

In terms of the monetary accounting of water related ecosystem services, the economic valuation methodology incorporated within the River Basin Management Plans will be used and is described shortly below. In 2017 the National Water Committee of Greece set forward rules for the cost assessment and the pricing of water services (Joint Ministerial Decision 135275/2017). These rules constitute the framework within which River Basin Management Plans work their economic evaluation for the second revision. The cost assessment of water services evaluates three distinct cost elements, according to a Water Framework Directive guidance: (a) the financial cost, (b) the environmental cost, and (c) the resource cost. This assessment supports the estimation of the unit cost, the cost-recovery and the decision related to the optimum pricing of the resource. In a broader context, cost assessment and pricing provide inputs for the calculation of the cost-efficiency of various alternative measures in a cost-benefit framework. The financial cost consists of all types of accounting costs that are involved in the infrastructure, processes and projects that are necessary for providing water supply services for municipal, agricultural and industrial use. The financial cost includes an accounting assessment of: Capital cost. The capital cost consists of two essential cost elements: depreciation costs and the opportunity cost of capital. This accounting evaluation assumes that there exists a good knowledge of the invested capital and its value. The Committee suggests an average of 2% for depreciation. As concerns the opportunity cost of capital, since most water supply projects are state-owned, a good approximation may be the rate at which the country is borrowing from international markets. Operations cost. The operations cost includes all necessary expenditures for the provision of water supply services excluding maintenance and administration. Thus, this includes costs for human resources, energy, consumables, external services, and others. Maintenance cost. The costs for maintenance include all expenditures that are necessary to keep the infrastructure in good working condition throughout its expected lifetime. These costs include consumables, outsourcing and labour that is specific to maintenance and does not include permanent staff. Administrative cost. Administrative costs include all expenditures for the administration that cannot be assigned either to operations or maintenance, including office rents, accounting personnel, and others. The environmental cost is the cost of the proposed accompanying set of Measures aiming to reinstate the water resource to Good Ecological and Chemical Status. These measures, and their cost, accompany the River Basin Management Plan. The environmental cost is applied only if: 1. The surface water of the water system (River Basin or other) is of less than Good Ecological status, 2. The surface water of the water system (River Basin or other) is of less than Good Chemical status, 3. The surface water of the water system (River Basin or other) is of unknown Ecological or Chemical status, 4. The groundwater system is of Bad Chemical condition that is not due to natural causes. The resource cost is the cost of the proposed accompanying set of Measures aiming to save water resources and promote their rational use by combating over-abstraction practices. The resource cost is applied only if: 1. The groundwater system is of bad condition as concerns its quantitative status, 2.There is evidence of water shortage for primary human needs and especially if this is due to irrational use and bad management of the resource. As an example, based on the approved

Management Plans of Greece, for the River Basin District of Western Peloponnese, the total financial cost of potable water rises up to 15,95 million Euros, corresponding to an average unit financial cost of 0,64 €/m3. The total mean income is 14,22 million Euros, corresponding to average unit income of 0,57 Euros/m3. For irrigation, the total financial cost of water rises up to 5,94 million Euros, corresponding to the average unit financial cost of 0,11 €/m3. The total mean income is 3,11 million Euros, corresponding to mean unit income of 0,058 Euros/m3. The annual environmental cost at the level of the water body (mainly associated with irrigation) is 150.000€, and the unit environmental cost 0,0005 €/m3. The annual resource cost at the level of the water system rises up to 12,500 Euros, and the corresponding unit cost to 0,04 €/ 1000 m3.

For the Alfeios River Basin, which is one of the river basins composing the River Basin District of Western Peloponnese and is chosen as the pilot case study (Peloponnese), the above mentioned costs are given in the following table.

	Total financial cost (€)	Unit financial cost (€/m³)	Total mean income (€)	Average Unit income (€/m³)
Potable water	5,960,353	0.626	4,567,992	0.480
Irrigation water	5,039,835	0.14	3,010,409	0.084
	Annual environmental cost (€)	Unit environmental cost (€/m³)	Annual recovery cost (€)	Mean Unit recovery cost (€/m³)
Alfeios water system	75,000	0.0006	0	0

Biodiversity account

Biophysical

Focusing both on flora and fauna, these accounts will inform the user on:

- **Species richness;**
- **Endemism (including exclusive per ecosystem type endemism);**
- **Changes in habitat types.**

An extensive database for vascular plants is available for Greece, and already a relevant pilot study is published, regarding floristic diversity indices (i.e. ecosystem asset proxy indicators) for woodland and forest ecosystems, framing the methodological approach (Kotsiras et al. 2020) (Figure 1). By the end of the first semester of 2021, relevant time series will be developed, including floristic diversity indices for all natural ecosystem types, integrating their area as a weight factor.

Available information on fauna is covering specific taxonomic groups, such as butterflies, birds and amphibians, as well as, ranges of roaming for bigger mammals.

By establishing an assessing methodology, we will be able to monitor the environmental importance of a spatial unit (10kmx10km grid cells are proposed). Each spatial unit will be assigned to a score according to a national or regional indicator, depending on the scale of the study. The comparison of the spatial units themselves is going to indicate areas of interest, like hotspots of biodiversity, and, in tandem with time series, will calculate and inform on significant changes, assessing ultimately the efficiency of established policies or the lack of them.

Monetary

Valuation of forest biodiversity will be conducted by implementing the methodology adopted by the Greek State (Albanis et al. 2015; Ciancio et al. 2007) which is based on the area size of each ecosystem type and as follows:

Vb = Area * N *Pb,

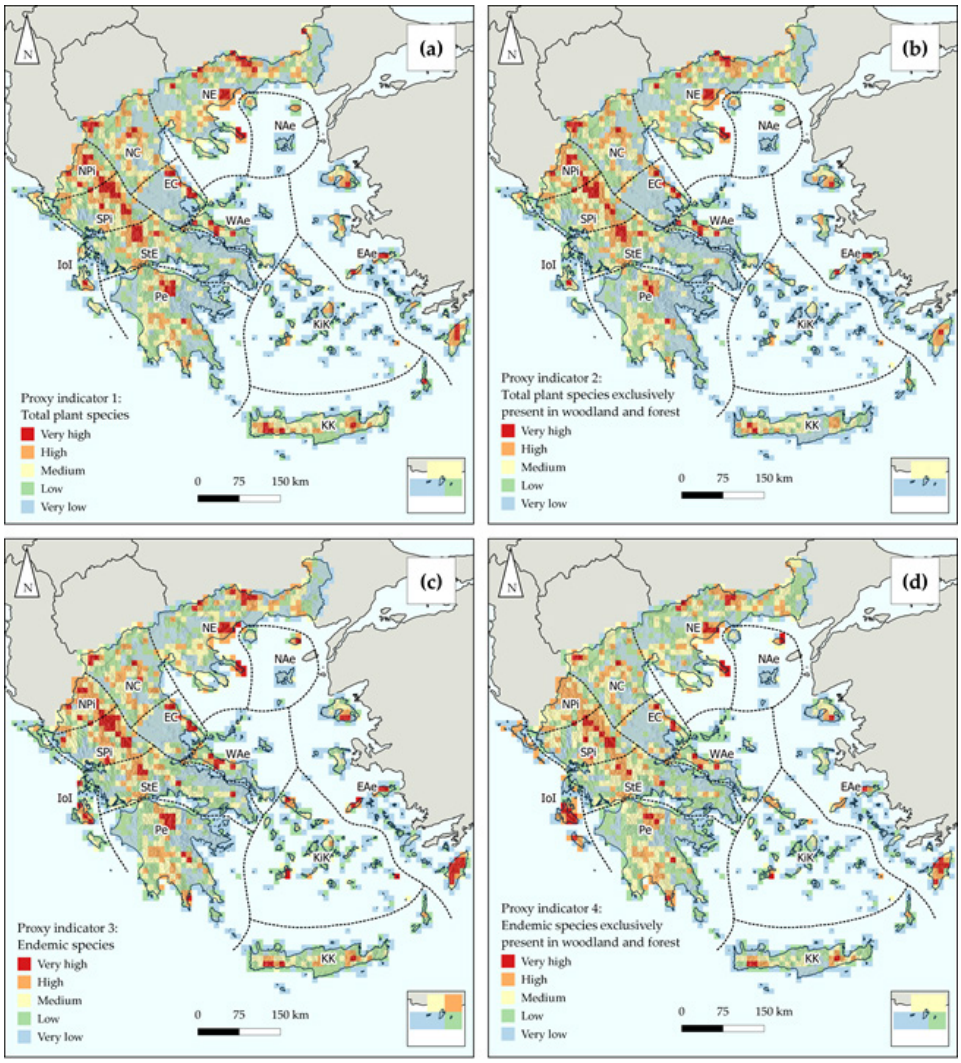
Vb = biodiversity value (euro)

Area = area in ha

N = naturalness coefficient (see Albanis et al. 2015, page 111)

Pb = forest biodiversity value (euro/ha per year) (see Albanis et al. 2015, page 113-113)

Relevant time series for forest biodiversity value will be developed based on the results of the ecosystem extent accounting process.



Figure

Thematic representation of the four ecosystem asset proxy indicators: (a) Total plant species index; (b) total plant species exclusively present in woodland and forest index; (c) endemic species index; (d) endemic species exclusively present in woodland and forest index. Floristic regions of Greece are also depicted: East Aegean islands (EAe), East Central Greece (EC), Ionian Islands (IoI), Kriti and Karpathos (KK), Kiklades (KiK), North Aegean islands (NAe), North Pindos (NPi), North Central Greece (NC), North-East Greece (NE), Peloponnisos (Pe), South Pindos (SPi), Sterea Ellas (StE), West Aegean islands, (WAe). (Source: Kotsiras et al. 2020).

Knowledge gaps and difficulties for developing natural capital accounts

Based on MAIA D3.2 (Annex 7 section 3.1, 3.2 and 3.5)

The data needed for setting up natural capital accounting in Greece is scarce and unavailable. Methodologies have been worked out to gather missing information and start the development of accounts on ecosystems, ecosystem services and biodiversity.

Data is available in respective agencies, but only for their internal use and time series are scarce. Efforts are ongoing to acquire more concrete databases. Therefore, data gaps are to be addressed through stakeholder engagement. This will be made possible by national workshops and personal contacts. Nonetheless, a coherent methodological approach for implementing NCA is currently missing. This creates misconceptions and misunderstandings, especially in Greece, where accounting has not been done so far.

Ecosystem accounting in Greece and especially for natural ecosystems is currently in its infancy. Only a few studies try to assess ecosystems, most of them under the perspective of the potential for the supply of recreational ecosystem services or by assessing one major resource (e.g. drinking and irrigation water supply). More data is available for forest productivity and their outputs, but this is also limited to the areas where timber production occurs. Adequate data for ecosystem accounting is available for agricultural ecosystems, but only for the monetary value of their products. Accounting for biodiversity and other regulating and maintenance services, as well as their cultural value (especially at traditional cultivated land) are unknown. One useful valuation approach for woodland and forest ecosystem type in Greece is the "Methodology for estimating the value of forest land in Greece" (Almpanis et al. 2015) which will be incorporated in the study. The proposed methodology for forest area valuation will be (a) used for forest ecosystems accounting in Peloponnese and (b) the basis for developing valuation models for all types of terrestrial ecosystems and in detail for the proposed case-studies (i.e. mountainous areas, wetland and a major river) as well as for their attributes (e.g. biodiversity, water quality and quantity).

Biodiversity accounting will be based on the information provided by (a) the Flora of Greece Web project, (b) fauna databases available for the Peloponnese, (c) habitats Directive database, (d) water framework directive dataset, (e) soil data and (f) climatic data. A literature review is ongoing (completed for biodiversity and ecosystem extent and partially for water related ecosystem services) aiming to assess the current state of the Art in the field. The above-mentioned data will be combined to initially assess the condition of biodiversity (at all levels from ecosystem type- to species- level) and thus provide a concrete indicator to be used for the accounting. This will result in a biodiversity-based accounting, following the EU MAES framework, which places biodiversity at the centroid of the natural environment attributes. Subsequently, a typology has been created and proposed linking biodiversity attributes to ecosystems (at MAES level 3) (Kokkoris et al. 2020). Cumulative accounting will be based on the aforementioned MAES ecosystem types' classification (Maes et al. 2013).

Support needs for developing natural capital accounts

Based on MAIA D3.2 (Annex 7 section 3.3)

The main obstacles for the SEEA EEA implementation in Greece are the available capacity and expertise of the involved stakeholders and state agencies, along with data gaps. Knowledge sharing among MAIA partners is hoped to address these shortcomings and provide guidance via each country's pilot accounts.

The main gaps are identified on valuation methods and modeling techniques. These data gaps and other shortcommings could be addressed with increased knowledge sharing among MAIA partners and the country's pilot studies could provide guidance. This ongoing process should include data and relevant information from other related projects, including different scientific fields which can provide input via their outcomes (e.g. time series on some specific biophysical attributes or conditions for selected taxonomic groups).

Involved partners and stakeholders

Based on D5.1 (Annex 7 section 2);
European NCA stakeholder day

Government	Research	Private sector or NGO
Decentralized administration of Peloponnese Western Greece and the Ionian: • Directorate of Forest coordination and supervision • Directorate of Agricultural Affairs • Directorate of civil protection • Directorate of Environment and land Planning • Water Directorate	University of Patras (UPAT)	WWF
		Hellenic Ornithological Society

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