

# Υβριδικό Πανεπιστήμιο ΑΣΤΕΡΟΥΣΙΩΝ 2022



## Θαλάσσιος Εγγραμματισμός και Αποθέματα Βιόσφαιρας

12 -14 ΣΕΠΤΕΜΒΡΙΟΥ 2022  
ΚΡΗΤΗ

**Presentation's Title: «Ecosystem Services and NATURA 2000 Network: Environmental, social and economic values in marine areas and the climatic crisis challenges»**

**Name and title of lecturer: Michalis Probonas, Physicist PhD, University of Crete – NHMC**



# Biodiversity

**Biodiversity – Biological diversity:** the variety of life (of the living organisms in the planet)

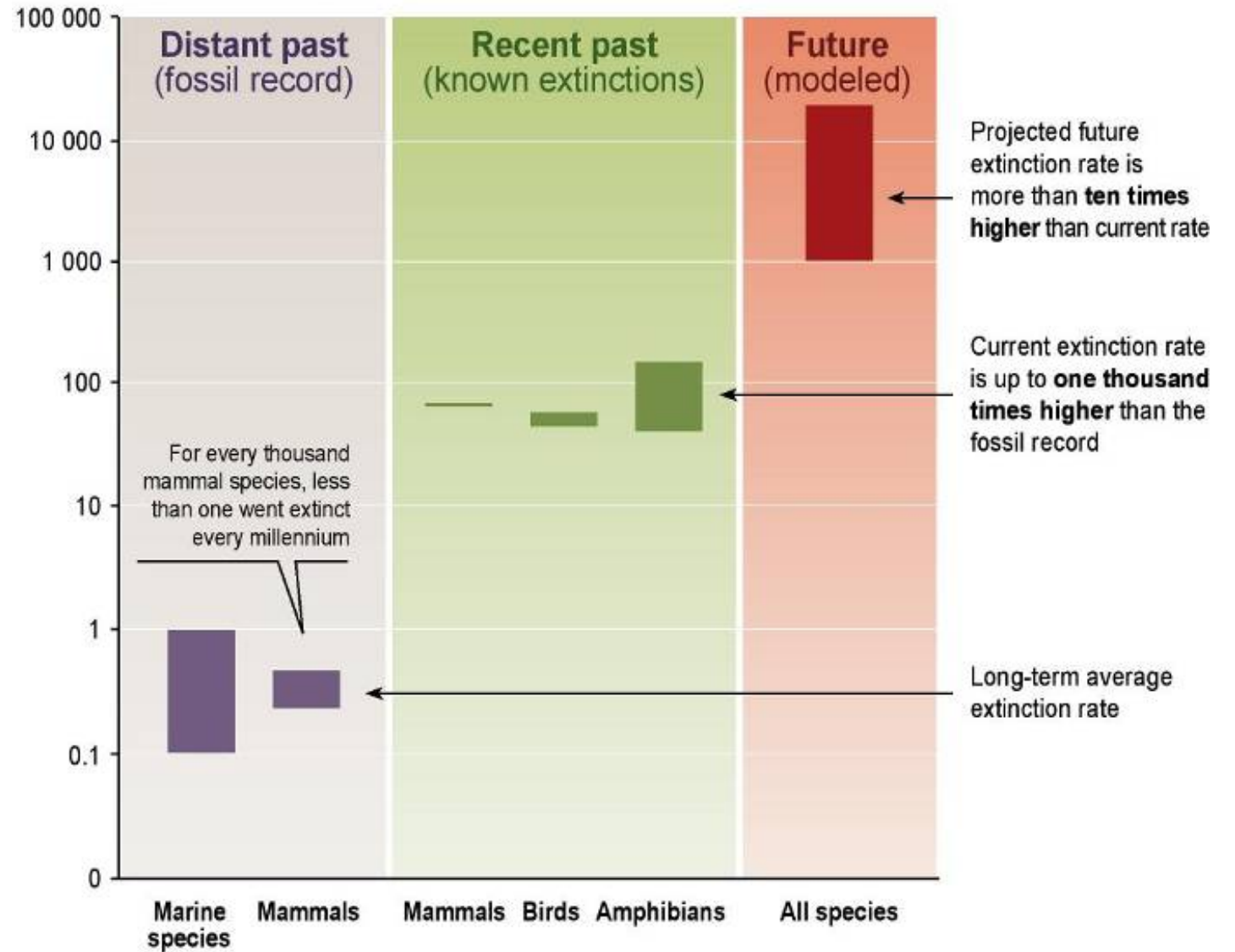
- Variety of species
- Variety of genes
- Variety of ecosystems

**Loss of biodiversity:** the loss of species, genes and ecosystems



# Loss of Biodiversity

Extinction of species per thousand species per millennium



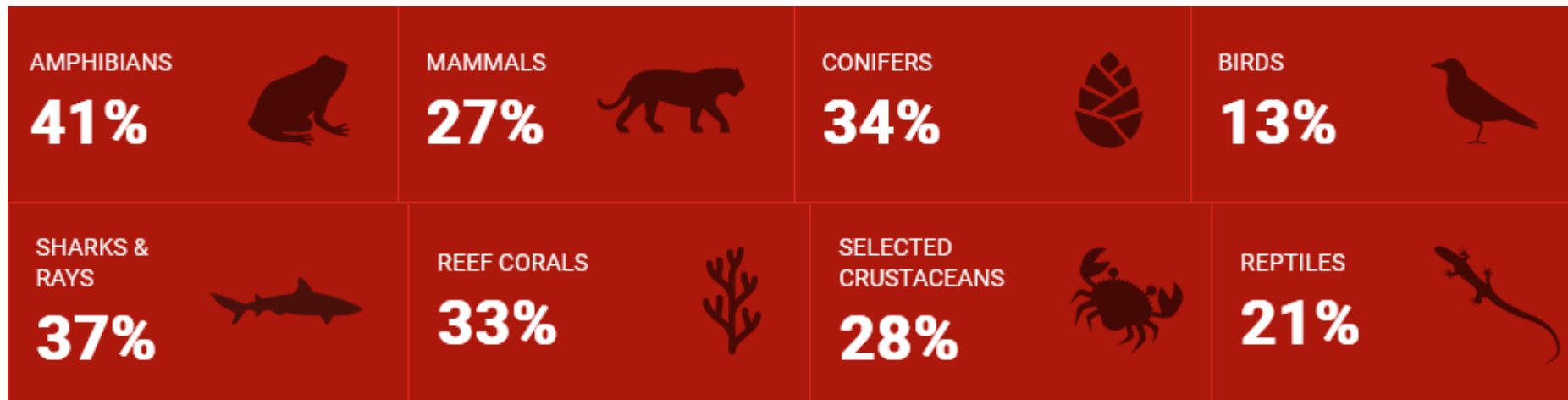
The rate of species loss is 1,000-10,000 times higher than geological data

# Loss of Biodiversity

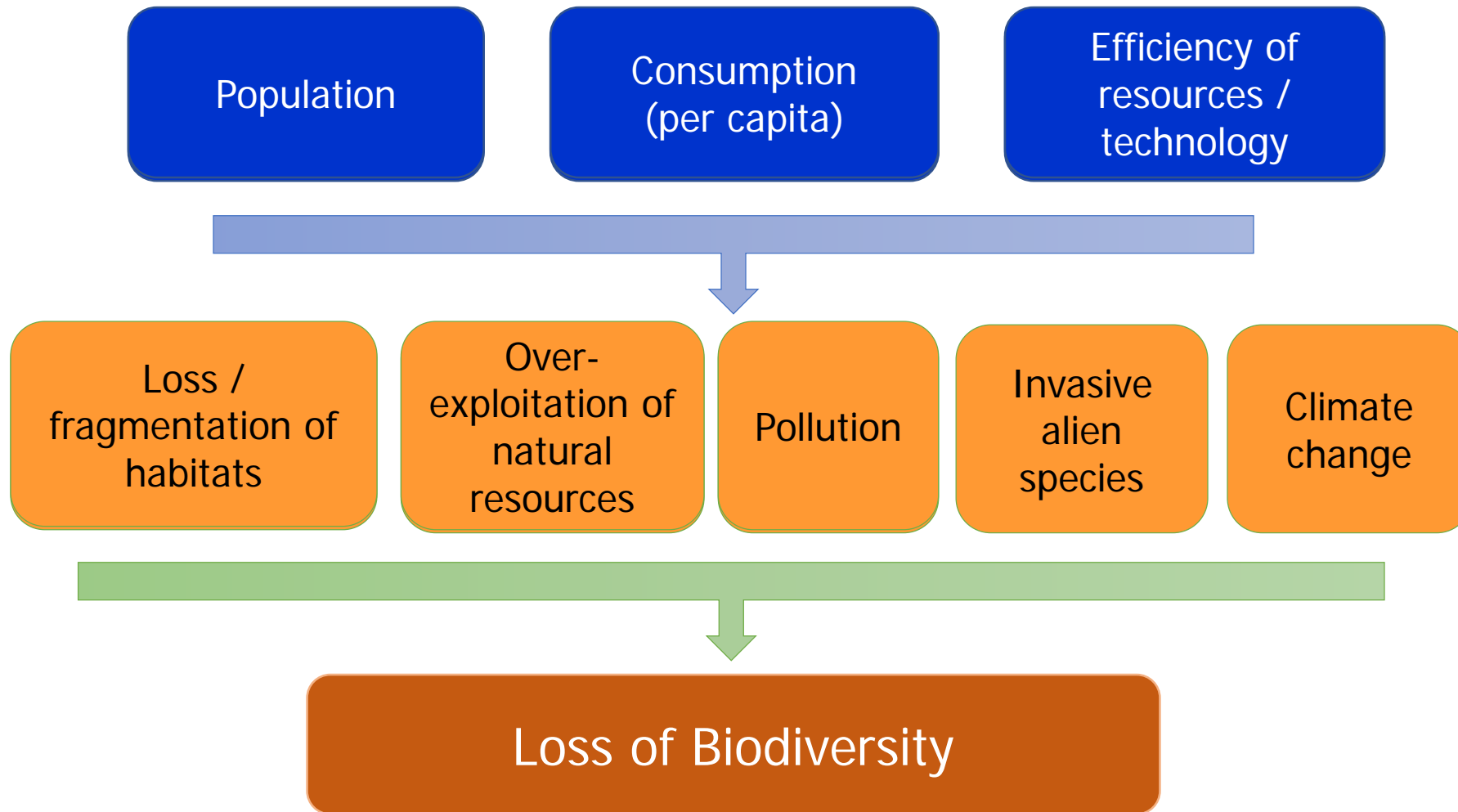


THE IUCN RED LIST  
OF THREATENED SPECIES™

**More than 41,000 species** are threatened  
with extinction  
That is still 28% of all assessed species.



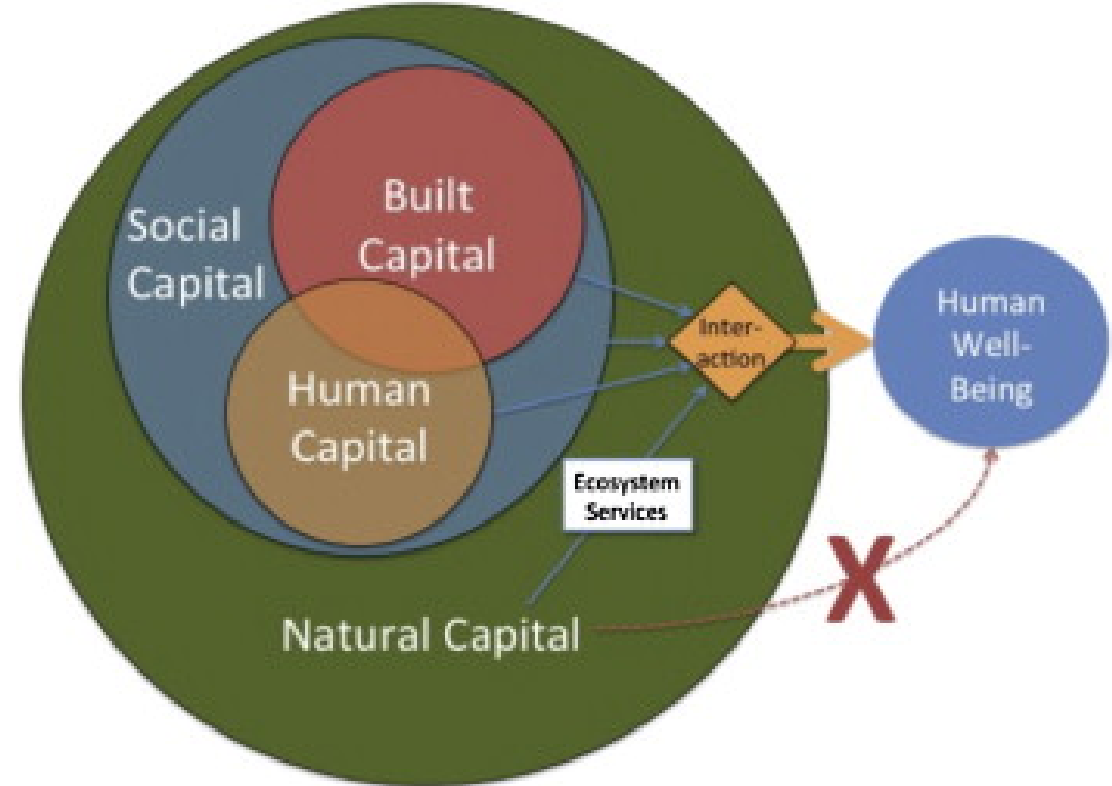
# Direct and indirect threats to biodiversity



## Ecosystem Services:

The contribution of “ecosystems” in “benefits” that are acquired during economic, social, cultural and other human activities.

- **Mapping & assessment** of ecosystems and their services → sustainable conservation of natural resources → social and economic prosperity.
- Ecosystems (**Natural Capital**) cannot provide any benefit to humans, without the presence of: **a)** humans (**Human Capital**), **b)** their societies (**Social Capital**), and **c)** the built environment (**Built Capital**).
- Built and Human Capital (the Economy) are embedded in Society, which is embedded in the rest of Nature. **Ecosystem services** are the relative contribution of natural capital to human well-being, they do not flow directly. It is therefore essential to adopt a broad, transdisciplinary perspective in order to address ecosystem services.



*Interaction between Built, Social, Human and Natural Capital required to produce human well-being (Costanza et al. 2014. Global Environmental Change 26: 152-158).*

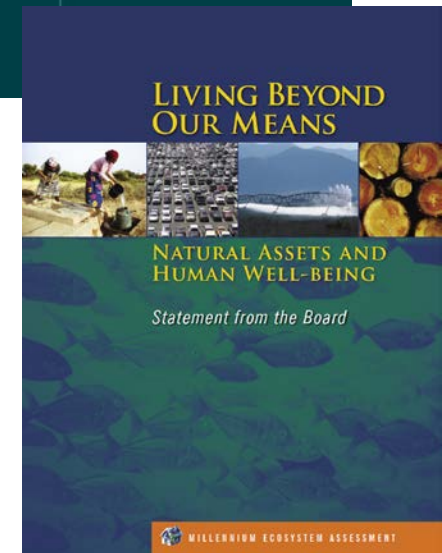
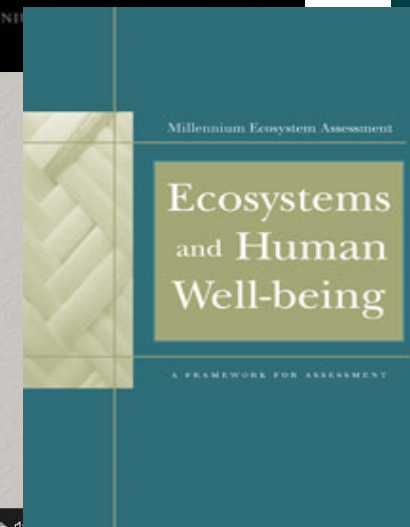
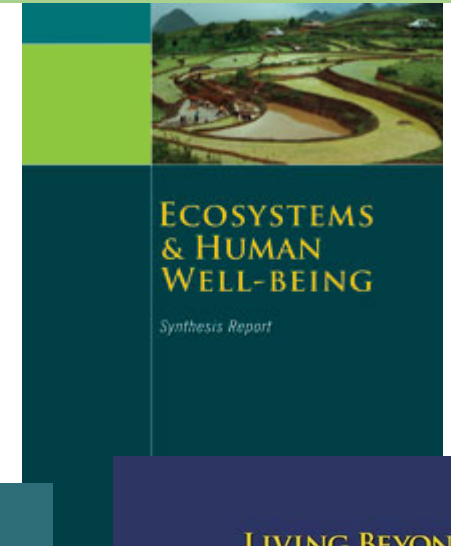
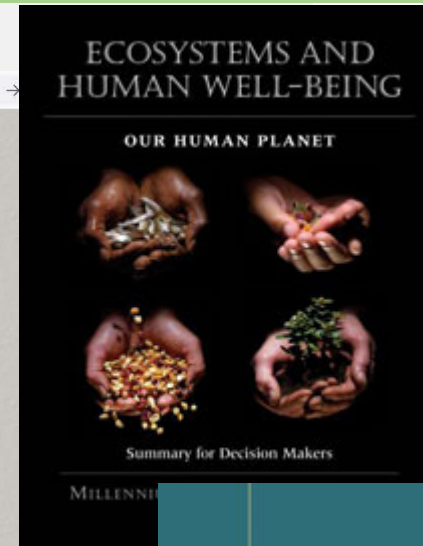
# Millennium Ecosystem Assessment (MA or MEA)

The Millennium Ecosystem Assessment assessed the consequences of ecosystem change for human well-being. From 2001 to 2005, the MA involved the work of more than 1,360 experts worldwide. Their findings provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide, as well as the scientific basis for action to conserve and use them sustainably.

The screenshot shows the website <https://www.millenniumassessment.org/en/Index-2.html>. The page features a navigation menu with links for Home, About, Reports, Newsroom, Resources, Contacts, and Sitemap. A language selector is set to English. The main content area is titled "Guide to the Millennium Assessment Reports" and is divided into several sections:

- Full Reports:** Describes the Working Group assessment reports, which are 500-800 pages long. It includes links for "Learn more", "Current States & Trends", "Policy Responses", and "Multiscale Assessments".
- Synthesis Reports:** Describes the first set of assessment reports, which consist of an overall synthesis and 5 others. It includes links for "Learn more", "Overall synthesis", "Biodiversity", "Desertification", "Business & Industry", "Wetlands and Water", and "Health".
- Statement of the MA Board:** Describes the MA Board of Directors' interpretation of the key messages. It includes links for "Learn more", "Download the Statement", and "About the MA Board of Directors".
- A Framework for Assessment:** Describes the framework developed in late 2003. It includes a link for "Learn more".

At the bottom of the page, there is a "Useful Links" section with links to Island Press, GreenFacts.org, and USGS. Below that is an "Also on This Site" section with links to a Directory of Authors, Slide Presentations, Graphic Resources, and Donors & In-Kind Contributors. The footer includes the copyright notice "© 2005 Millennium Ecosystem Assessment" and a row of logos for various partner organizations like UNEP, ICSU, and IUCN.



# Classification of Ecosystem Services

(MA = Millennium Ecosystem Assessment, 2003 & 2005, United Nations)

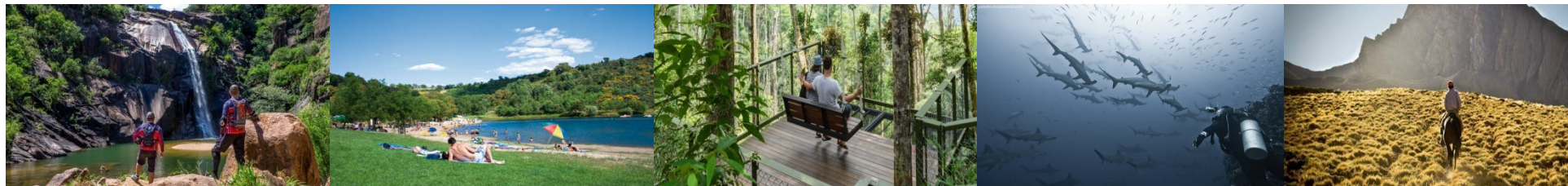
## Provisioning Services



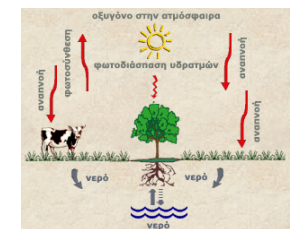
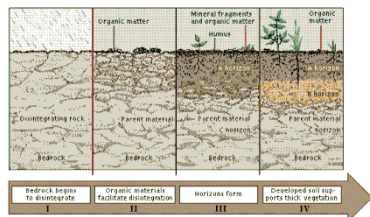
## Regulating Services



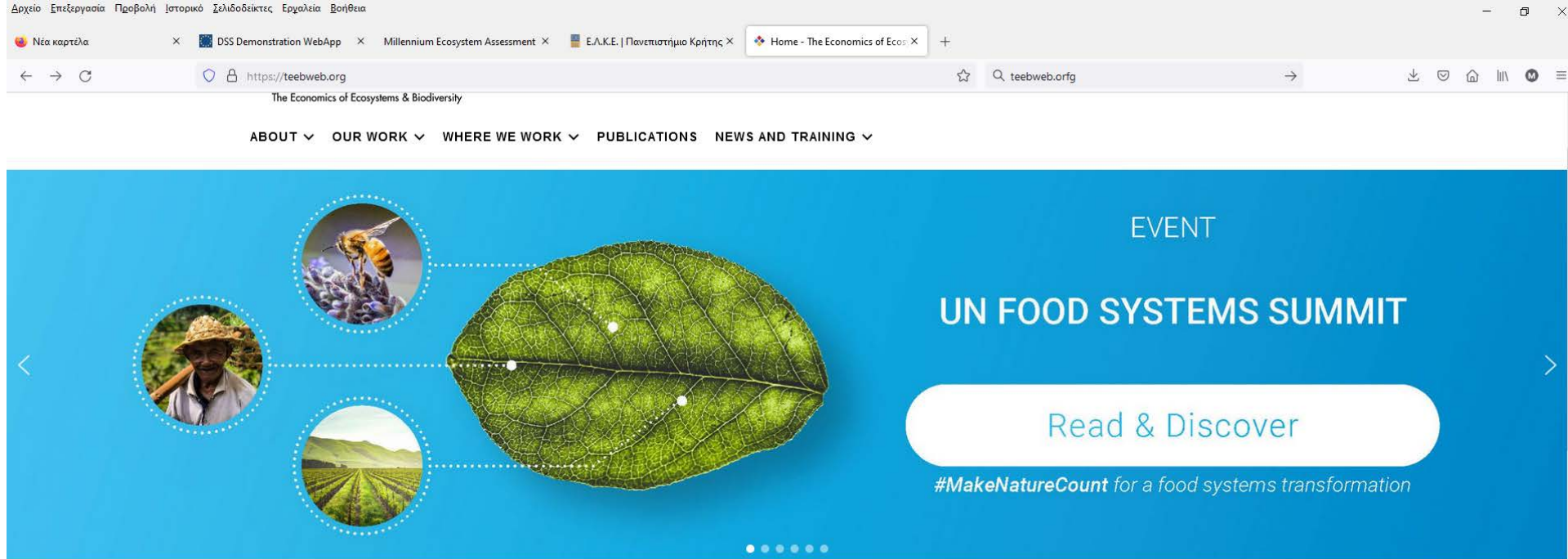
## Cultural Services



## Supporting Services







Ministers of Environment of G8 (Canada, France, Germany, Italy, Japan, United Kingdom, USA, and Russia) and of the 5 biggest developing countries (Brazil, China, India, Mexico and South Africa), Meeting G8+5, 16-17 March 2007, Potsdam, Germany.

**MAKING NATURE'S VALUES VISIBLE**  
The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on "making nature's values visible". Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision-making at all levels.

**NATURAL CAPITAL ACCOUNTING**

**WHERE V**

The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on "making nature's values visible". Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision-making at all levels.



### March 2007: TEEB is commissioned

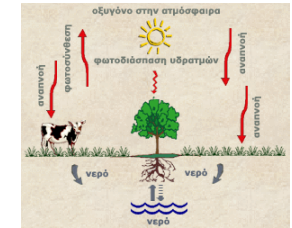
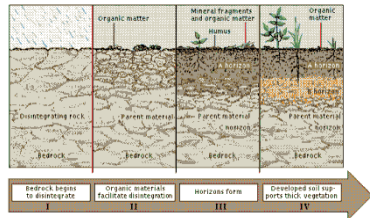
At the G8+5 Potsdam Meeting of Environment Ministers, a call was launched for a global analysis of the **economic significance of biodiversity, the costs of the loss of biodiversity and the failure to take protective measures versus the costs of effective conservation**. **Sigmar Gabriel** (then Minister for the Environment in Germany) and **Stavros Dimas** (then European Commissioner for the Environment) agreed to take forward and launch the TEEB initiative under the leadership of **Pavan Sukhdev**.

# Classification of Ecosystem Services (TEEB = The Economics of Ecosystems and Biodiversity)

## Provisioning Services



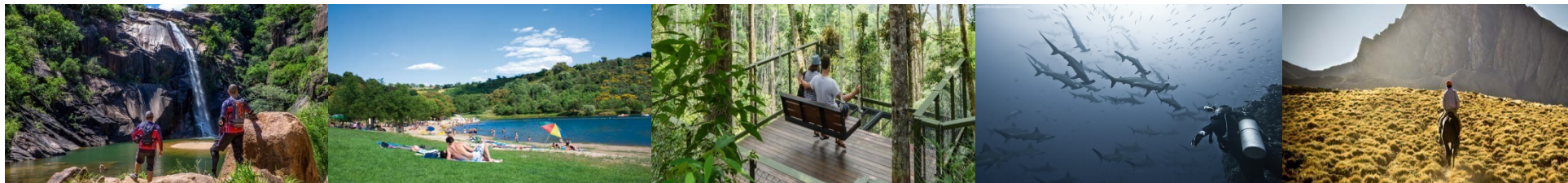
## Regulating Services



## Services of Habitats



## Cultural & Recreation Services



# CICES

Towards a common classification of ecosystem services

European Environment Agency



Hosted on Behalf of the EEA

- Home
- Revision Highlights
- Structure of CICES
- Supporting Services & Functions
- Applications of CICES
- Resources
- Contacts

## CICES Version 5.1 now available

### News

*CICES V5.1 which updates and extends V4.3 is now available. The new version and the associated technical guidance can be downloaded [here](#).*

*See revision highlights for an overview of the changes*

The Common International Classification of Ecosystem Services (CICES) developed from the work on environmental accounting undertaken by the European Environment Agency (EEA). It supports their contribution to the revision of the System of Environmental-Economic Accounting (SEEA) which is currently being led by the United Nations Statistical Division (UNSD).

The idea of a common international classification is an important one, because it was recognised that if ecosystem accounting methods were to be developed and comparisons made, then some standardisation in the way we describe ecosystem services was needed. Standardisation was seen as especially important where the link to economic accounting has to be made. Since the original proposal interest in CICES has grown. It has now become clear that in addition to the need for standardization in the context of environmental accounting, work on mapping and valuing ecosystem services and ecosystems assessments more generally would benefit from more automatic approaches to naming and describing ecosystem services.

The **Common International Classification of Ecosystem Services (CICES)** developed from the work on environmental accounting undertaken by the **European Environment Agency (EEA)**. It supports their contribution to the revision of the **System of Environmental-Economic Accounting (SEEA)** which is currently being led by the **United Nations Statistical Division (UNSD)**.



# Classification of Ecosystem Services

*(CICES = The Common International Classification of Ecosystem Services, 2013)*

## Provisioning Services



## Regulating & Maintenance Services

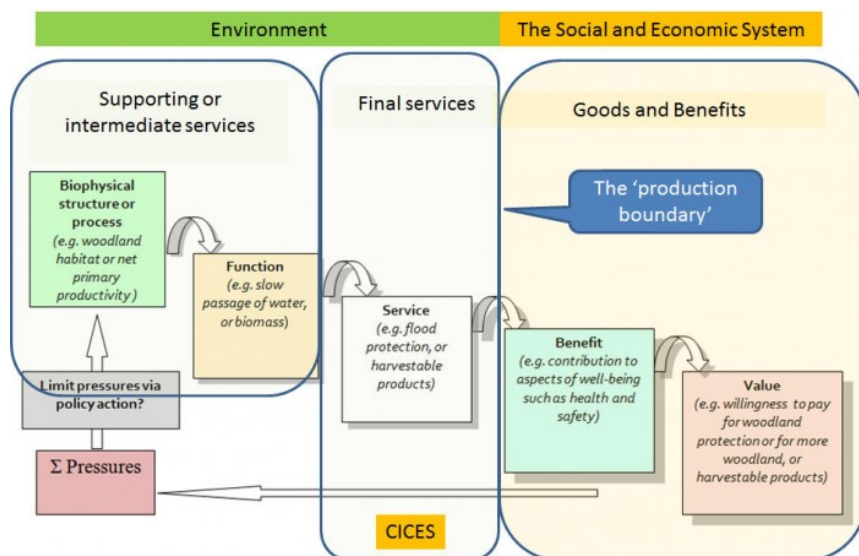


## Cultural Services



Provisioning services	Regulating services	Cultural services	Habitat services
Providing food	Regulating local climate and air quality	Recreation	Providing species with habitat
Providing raw materials (e.g. wood)	Capturing and storing carbon	Tourism	Protecting genetic biodiversity
Providing fresh water	Protecting against impacts of extreme weather events (such as floods)	Spiritual experience	
Providing medicinal resources	Preventing soil erosion	Aesthetic value	
	Treating waste water		
	Pollinating		

Source: [The Economics of Ecosystems and Biodiversity \(TEEB\)](#).



## Ecosystems services according to CICES (2017)

Regulating and Maintenance Services	Necessary for the operation of all other services such as oxygen production and soil formation. Benefits from ecosystem functions such as climate regulation and extreme weather protection.
Provisioning services	Products obtained from ecosystems such as food, water and timber.
Cultural services	Sensory pleasure, artistic inspiration and recreation.

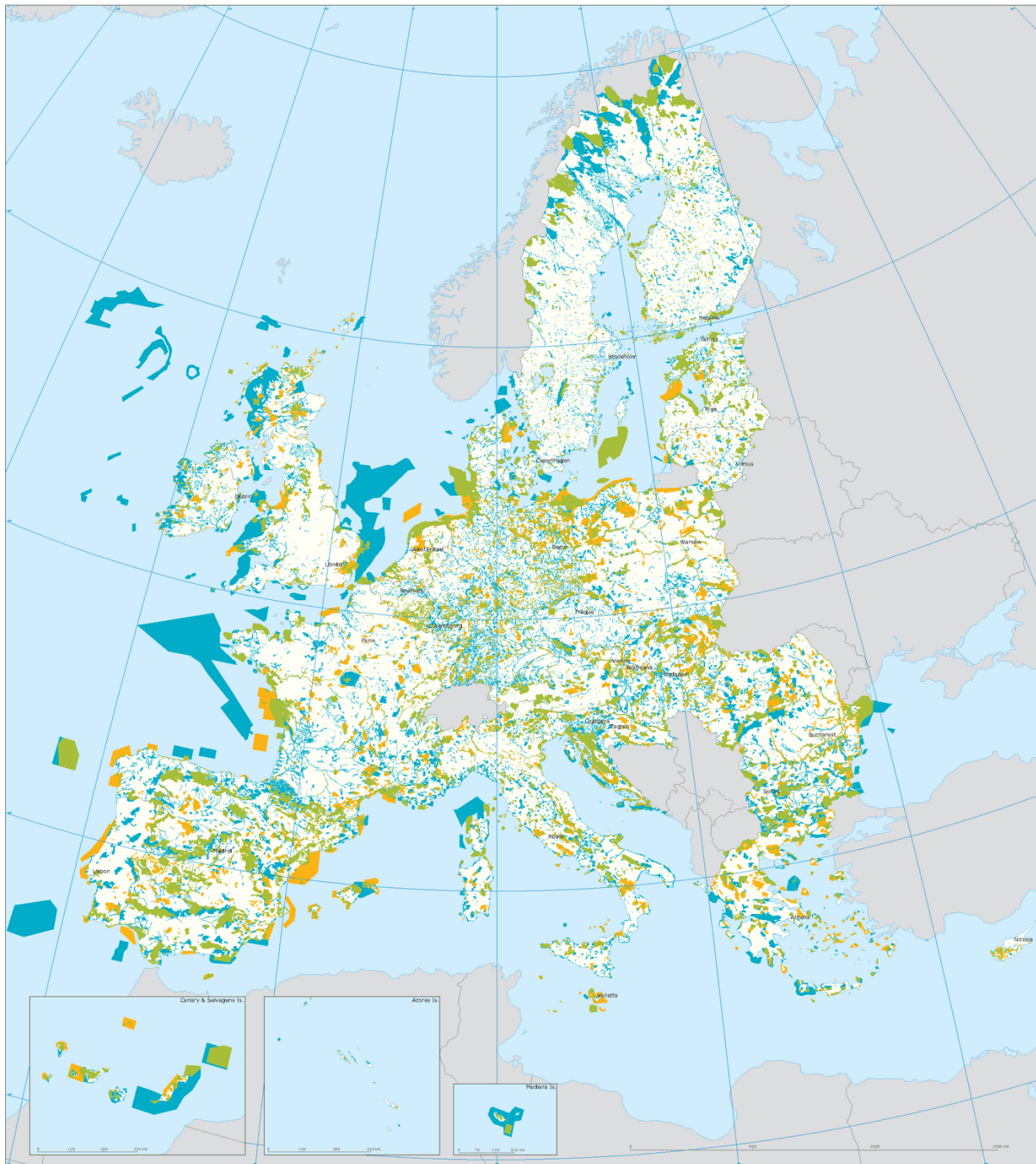
**TABLE 2. The most important ecosystem services of coastal ecosystems.**

<p><b>Regulating and maintenance services</b></p>	<ul style="list-style-type: none"> <li>• Habitat maintenance for animals and plants.</li> <li>• Oxygen production.</li> <li>• Genetic diversity.</li> <li>• Nutrient recycling.</li> <li>• Hydrological cycle – water cycle.</li> <li>• Diffusion of processed waste.</li> <li>• Water and air quality control.</li> <li>• Concentration of carbon dioxide (carbon sinks).</li> <li>• Protection from extreme weather phenomena (e.g. tsunami).</li> <li>• Climate regulation.</li> <li>• Biological control.</li> </ul>
<p><b>Provisioning services</b></p>	<ul style="list-style-type: none"> <li>• Food provision (fish, mollusks etc.).</li> <li>• Energy production.</li> <li>• Production of pharmaceutical raw material.</li> <li>• Building materials (e.g. limestone).</li> <li>• Aquaculture production.</li> <li>• Drinking water.</li> <li>• Algae production.</li> <li>• Production of sponges.</li> <li>• Production of material used for decorations, jewelry etc.</li> <li>• Sea salt production.</li> </ul>
<p><b>Cultural services</b></p>	<ul style="list-style-type: none"> <li>• Tourism.</li> <li>• Diving.</li> <li>• Wildlife observation.</li> <li>• Water sports.</li> <li>• Leisure.</li> <li>• Artistic inspiration.</li> <li>• Education and research.</li> </ul>



## NATURA 2000 Network (EU and Greece)

- ✓ **European Network of Protected Areas.** Basic EU legal / institutional framework for the protection of biodiversity. >27,800 areas – 18% of EU land area; 8,5% of EU marine area (data of year 2021).
- ✓ **Based in 2 European Directives: a) 92/43/EEC** “On the conservation of natural habitats and of wild fauna and flora” (Habitats Directive), and **b) 2009/147/EC** “On the conservation of wild birds” (codification of former Directive **79/409/EEC**) (Birds Directive).
- ✓ Includes 2 categories of protected areas: **a) Special Areas of Conservation** (SACs for habitats and species except avifauna), and **b) Special Protection Areas** (SPAs for avifauna). They often overlap.
- ✓ **In Greece**, following the revision of the list in December 2017, exist **446 areas** (from 419 that were before) – it covers 28% of the land area & 20% of the marine area. N2000 Network in Greece corresponds to 4.5% of EU N2000 (Greece is in the **10<sup>th</sup>** position within the EU-28 member states).
- ✓ **In Crete**, N2000 Network includes in total **54 areas**, with the addition of one broad marine zone (from 53 areas that were before December 2017).



## Habitats Directive & Birds Directive

Natura 2000 Network:

~ **18%** of EU land area

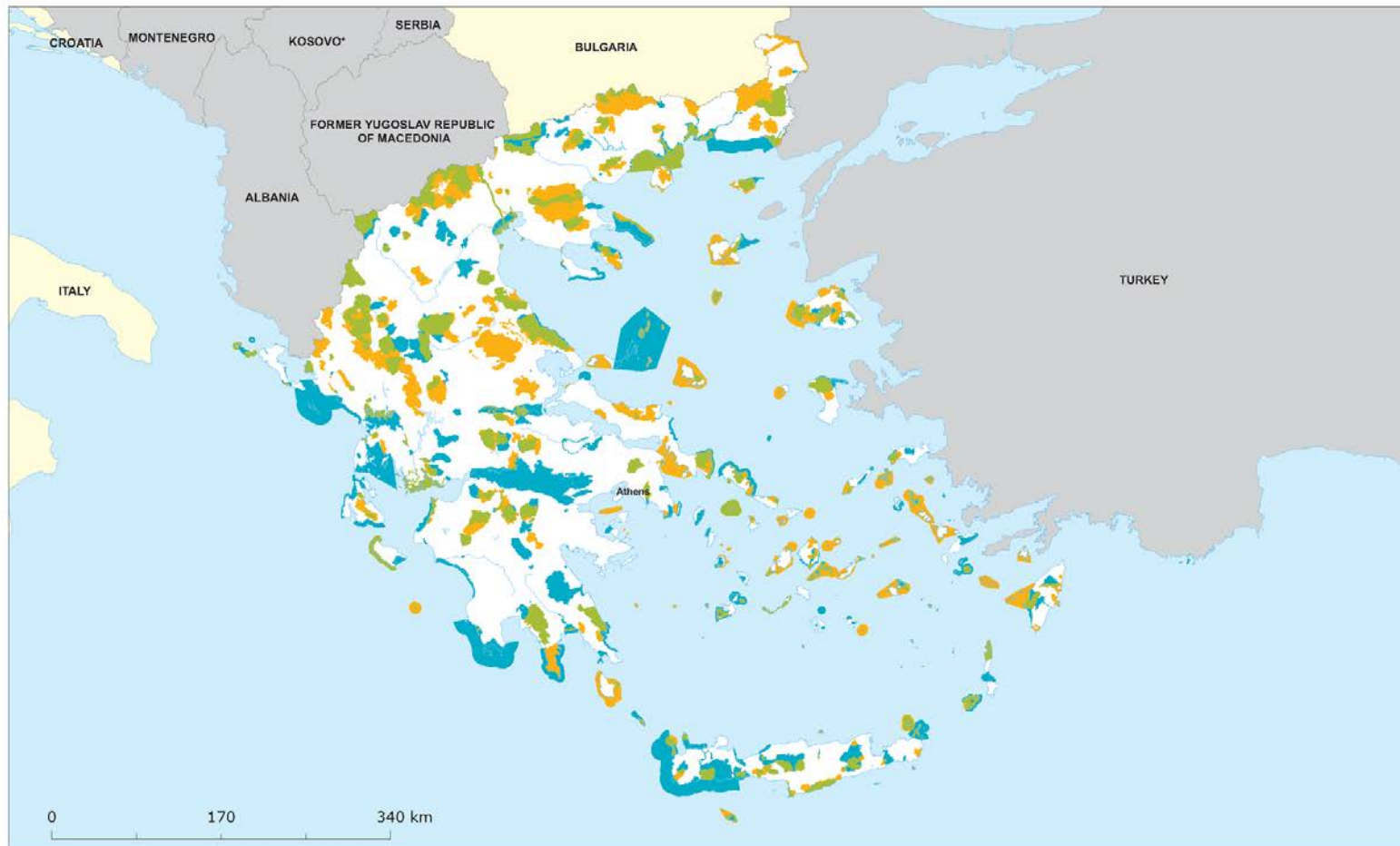
~ **8,5%** of EU marine area

European Environment Agency



Source :  
- NATURA 2000 - DG ENV, compiled from databases from the Member States.  
Sources background and map: © EuroGlobalMap/Eurogeographics and DG ESTAT.  
Validity of NATURA 2000 data for : Europe, Updated End 2017.  
Projection : Lambert Azimuthal Equal Area.





European Environment Agency



Source :  
 - NATURA 2000 - DG ENV, compiled from databases from the Member States.  
 - © EuroGlobe@ip - eurogeographics  
 - Settlements - DG ECSTAT  
 Validity of NATURA 2000 data for Greece: National dataset situation End 2017.  
 Projection: Lambert Admralth Equal Area.

- 446 NATURA 2000 sites: 265 SCI/SAC – 207 SPA
- 28% of the land area & 20% of the marine area in Greece

## Natura 2000

ένα ευρωπαϊκό δίκτυο προστατευόμενων περιοχών που αποτελεί ασπίδα ζωής για απειλούμενα είδη και σημαντικές περιοχές

Στην Ελλάδα: **446** περιοχές

27,3% της στεριάς



Στην Ευρωπαϊκή Ένωση: **27.863** περιοχές

18% της στεριάς



Η διαμόρφωση και λειτουργία του βασίζεται στις Ευρωπαϊκές Οδηγίες για τους οικοτόπους (92/43/ΕΟΚ) και για τα πουλιά (2009/174/ΕΚ). Αποτελεί το μεγαλύτερο δίκτυο προστατευόμενων περιοχών στον κόσμο.

### Προστατεύουμε

στην Ελλάδα: **299** **128** **89**

στην Ευρωπαϊκή Ένωση: **1389** **500** **233**

Είδη φυτών και ζώων

Είδη πουλιών

Σημαντικούς οικοτόπους

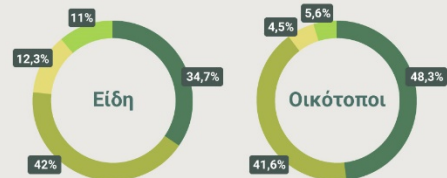


### Συναντάμε

άνθρωπο και φύση να συνυπάρχουν

### Προσπαθούμε

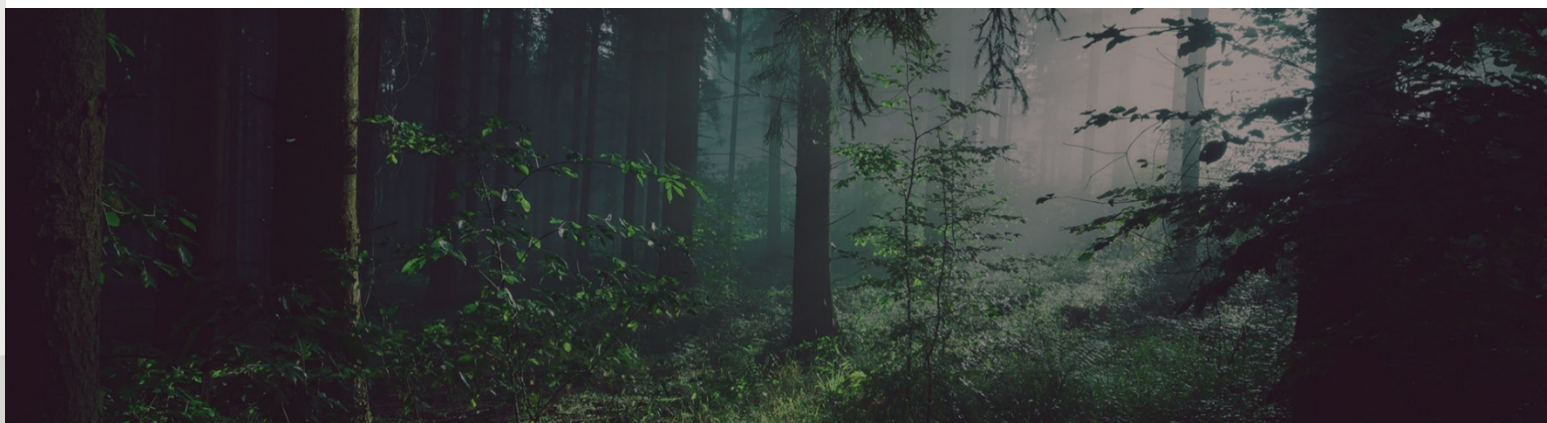
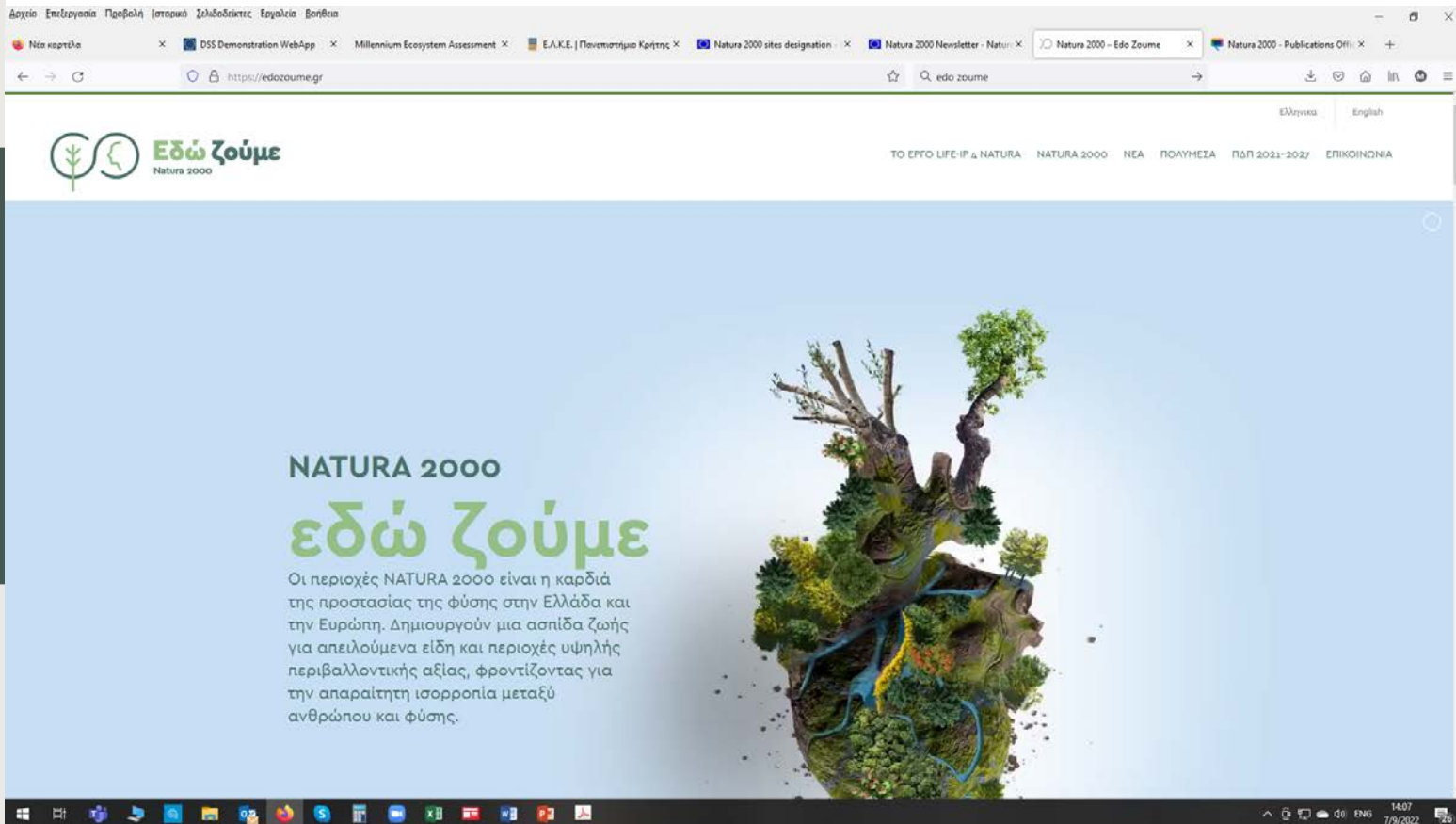
για την καλή κατάσταση των ειδών και οικοτόπων μέσα από διαχείριση, παρακολούθηση, και φύλαξη



Κατάσταση διατήρησης  
■ Ικανοποιητική ■ Ανεπαρκής ■ Άγνωστη ■ Κακή

Πουλιά που αναπαράγονται στην Ελλάδα (αριθ. ειδών)	Πουλιά που ξεχειμωνάζουν στην Ελλάδα (αριθ. ειδών)	Τάση πληθυσμού
21	07	↑
25	00	→
18	03	↓
28	22	?
01	00	↓

Τάση πληθυσμού  
↑ Αυξητική → Σταθερή ↓ Μειούμενη ? Άγνωστη ↓ Κυμαινόμενη



# MAP 1. The NATURA 2000 Network areas in Crete.



# NATURA 2000 SITES IN ASTEROUSIA

Αρχείο Επεξεργασία Προβολή Ιστορικό Σελιδοδείκτες Εργαλεία Βοήθεια

Ε.Λ.Κ.Ε. | Πανεπιστήμιο Κρήτης | Ηλεκτρονικές Υπηρεσίες Επιτροπής | NATURA 2000 sites in Crete | Ν... | UPS EATON - Αναζήτηση Google | +

www.ecovalue-crete.eu/en/natura-sites?field\_site\_type\_value=All&title=asterousia&field\_site\_code\_value=GR43 110% Αναζήτηση

Πιο συχνά αναγνωσ... Windows Media Windows Ελεύθερο Hotmail Προσαρμογή συνδέσε... http://shifts.nhmc.uo...

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The Project The Natura 2000 network Deliverables News



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## NATURA 2000 sites in Crete

3 sites

Type	Name of the Site	Code		
<input checked="" type="radio"/> - Any -	<input type="text" value="asterousia"/>	<input type="text" value="GR43"/>	<input type="button" value="Apply"/>	<input type="button" value="Reset"/>
<input type="radio"/> SPA	<small>Type a partial name</small>	<small>Type a partial or a whole site code</small>		
<input type="radio"/> SCI				
<input type="radio"/> SPA & SCI				



ASTEROUSIA (KOFINAS)



DYTIKA ASTEROUSIA (APO AGIOFARANGO EOS KOKKINO PYRGO)



ASTEROUSIA ORI (KOFINAS)

Environment Directorate-General

LIFE

NATURA 2000

Ministry of Environment and Energy

Natura mission



The value of the NATURA 2000 Network extends **beyond the protection of biodiversity**. In addition, it provides valuable **ecosystem services** to society, e.g. fresh water, carbon storage, protection from flood, avalanches and coastal erosion, tourism and leisure services, etc.





# CLIMATE CRISIS & GREECE

- ❖ The fact that climate change has already had major, dramatic consequences on the lives of billions of people around the world is not something that requires extensive documentation. The greenhouse effect has been well-known and well understood since the 1960s and the global scientific committee established under the aegis of the UN to monitor the phenomenon (the *Intergovernmental Panel on Climate Change*, or IPCC) has been in operation since 1988.
- ❖ The term "climate change" was initially coined to refer to **any change affecting the global climate and extending over long periods of time** (30 years or more). Today, however, the term is mostly used to describe the gradual rise of the planet's temperature observed steadily over the past 150 years. The reason behind this phenomenon is the **greenhouse effect**: as gases like CO<sub>2</sub> or methane gather in the atmosphere at increasingly higher levels, more of the Earth's radiation remains trapped in the lower atmosphere, therefore causing the temperature to rise.
- ❖ For most human activities, **atmospheric temperature** is the single most important factor climate change will affect. For individual sectors, however, other indicators emerge as equally important. **Agriculture and livestock farming, for example, are also severely impacted by** rainfall, extreme weather phenomena, drought, and soil erosion.

❖ According to many scientists, even an 2°C increase of global temperature puts **non-acceptable risks** in basic natural and human systems, including:

- ✓ Significant **losses of species**,
- ✓ Major decreases in **possibilities for food production** in developing countries,
- ✓ **Intensive pressures in water resources** for million of people, and
- ✓ Significant **increase in sea level and floods** in coastal areas.

**Table.** Physical impacts of climate change on the tourist sector

Physical impacts of climate change on the tourist sector
<b>Immediate impacts</b>
• Higher temperatures
• Rising sea levels
• Changes in humidity levels and air quality
• More dry spells
• More pollution
• Increased levels of visitor discomfort
• Reduced rainfall and snowfall
• More frequent appearance of photochemical smog
• Increased extreme weather events (storms, floods, hurricanes)
• Increased number of wildfires and diseases
• Destruction of sensitive ecosystems
<b>Indirect impacts</b>
• Damage to coastal tourism infrastructure
• Devaluation of tourist infrastructure which will remain unused due to the absence of physical conditions enabling its operation (e.g., lack of snow for ski centers)
• Sea water penetration into aquifers and drinking water supplies
• Reduced water reserves due to reduced rainfall
• Reduction/disappearance of eco-tourism infrastructure and activities

Source: Climate Change Impacts Study Committee, Bank of Greece, 2011.



# Υβριδικό Πανεπιστήμιο ΑΣΤΕΡΟΥΣΙΩΝ

2022



Thank you for your attention!!!!

