



GEO-ACADEMY

GEO-Hub for teachers in Europe

Παιδαγωγικό Ινστιτούτο Κύπρου

**Innovative digital GEO-Tools for
enhancing teachers' digital, green and
spatial skills towards an effective STEAM
Education for Sustainability Development**

13 – 14 Δεκεμβρίου, 2024

GEO-Academy

Ενίσχυση των χωρικών, ψηφιακών και πράσινων δεξιοτήτων
των εκπαιδευτικών για την Εκπαίδευση για την Βιώσιμη
Ανάπτυξη (ΕΒΑ) του μέλλοντος

Δρ. Λουκάς Κατίκας

Εθνικό Μετσόβιο Πολυτεχνείο – Εργαστήριο Χαρτογραφίας ΣΑΤΜ/ΜΓ



Βήμα 1ο

ArcGIS Pro download

- <https://drive.google.com/file/d/14V7qKneP7ytsgPZcqVNQBXezdUDGudqg/view>
- https://drive.google.com/file/d/18xumJ3UuqYn-gLETSBHyL2ebc9bAJTI_/view



Περιγραμμά

- Το έργο GEO-Academy
- Γιατί τα ΣΓΠ και οι χωρικές δεξιότητες;
- Γεωχωρικές θεματικές ενότητες;
- Η μεθοδολογία του GEO-Academy
- Παραδείγματα δραστηριοτήτων
- Εργαστήριο στα ΣΓΠ με το λογισμικό ArcGIS Pro





Το έργο GEO-Academy



Η διαδρομή



Semantic Pathways for Building a Spatially – Thinking Society



Empowering Spatial Thinking of Students with Visual Impairment



Use of GIS applied to the impact of climate change on the environment in order to improve STEAM's learning

The logo for CLiC-PoLi features the text "CLiC-PoLi" in a large, bold, yellow font. To the right of the text is a blue icon of a street lamp with two yellow light beams emanating from it.

CLiC-PoLi



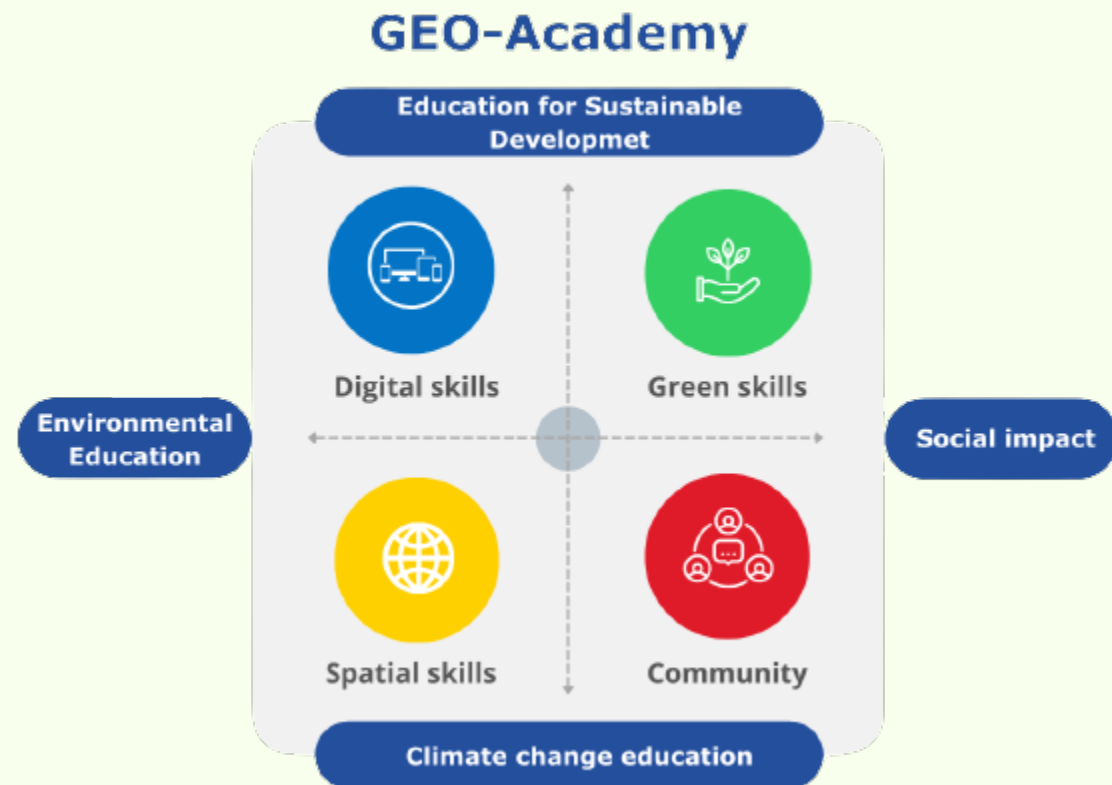
GEO-ACADEMY
GEO-Hub for teachers in Europe

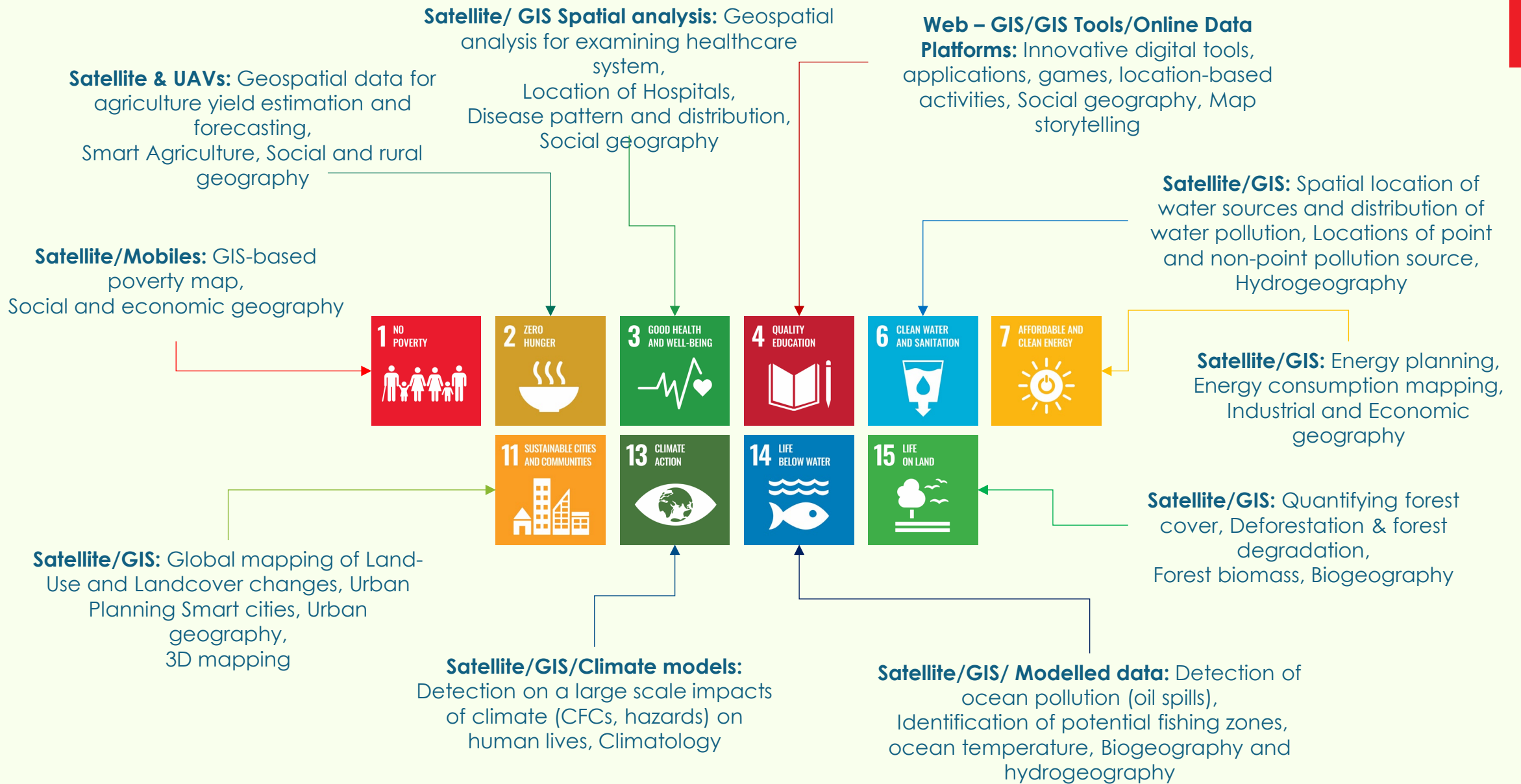
Co-funded by the
Erasmus+ Programme
of the European Union



Το έργο

- Erasmus+ Teachers Academies project
- Χρονική διάρκεια από το 2023 μέχρι το 2026 (36 μήνες)
- Βασίζεται σε 3 πυλώνες δεξιοτήτων
 - Πράσινες
 - Ψηφιακές
 - Χωρικές
- Απευθύνεται σε εν δυνάμει και εν ενεργεία εκπαιδευτικούς που έχουν ενδιαφέρον για την Περιβαλλοντική Εκπαίδευση και την Εκπαίδευση για τη Βιώσιμη Ανάπτυξη.

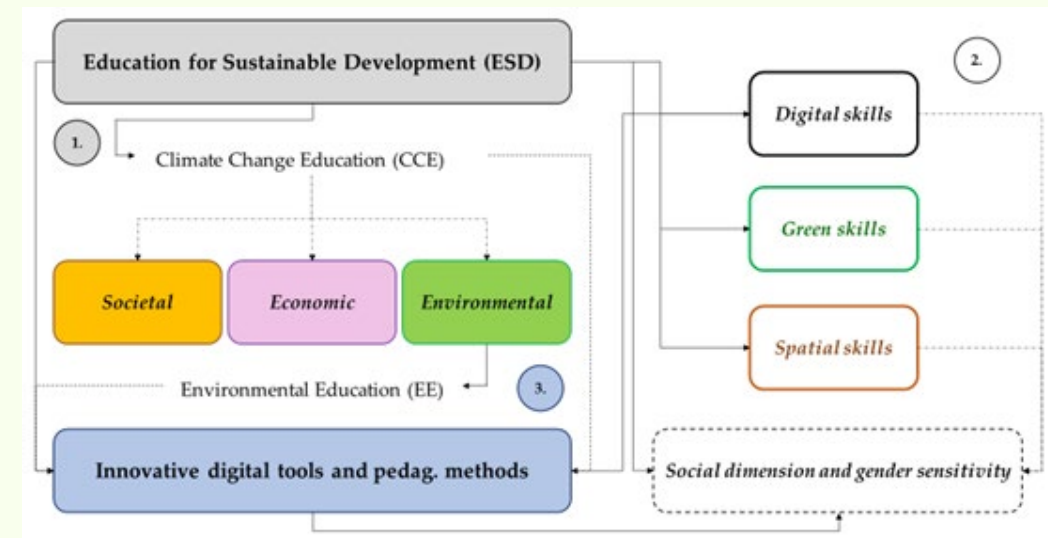




Στόχοι

- Ενισχύει τις δεξιότητες των εκπαιδευτικών μέσα από 5 θεματικές ενότητες:

- Συστήματα Γεωγραφικών Πληροφοριών (ΣΓΠ),
- Χαρτογραφία και Οπτικοποίηση Χωρικών Φαινομένων,
- Δορυφορικές Παρατηρήσεις και Τηλεπισκόπηση,
- Γεω-Αφηγήσεις (Geo/Map Storytelling)
- STEAM, Προγραμματισμός και Ρομποτική



- Αξιοποίηση καινοτόμων εκπαιδευτικών μεθόδων και ενίσχυση της διαθεματικότητας.
- Ανάπτυξη κοινότητας πρακτικής με τη χρήση σύγχρονων εκπαιδευτικών προσεγγίσεων, μεθοδολογιών και εργαλείων.
- Εκπαιδευτικό υλικό και δραστηριότητες διαθέσιμα σε 7 γλώσσες (Αγγλικά, Γερμανικά, Πορτογαλικά, Ελληνικά, Βουλγαρικά, Γαλλικά, Σουηδικά)

Η ομάδα έργου

12 Εταίροι από 7 χώρες

- **National Technical University of Athens, Greece**
- **Ellinogermaniki Agogi, Greece**
- Lund University, Sweden
- **Cyprus Pedagogical Institute, Cyprus**
- Eurisy, France
- University College of Teacher Education Tyrol, Austria
- University of Coimbra, Portugal
- **European University Cyprus, Cyprus**
- Austrian Space Forum, Austria
- **Spotlight on Innovation, Greece**
- Núcleo Interativo de Astronomia, Portugal
- Professional Forum for Education, Bulgaria



Αποτελέσματα

- Τα σχολεία ως **GEO-Labs**, (kit of digital resources and sensors for Arduino, Raspberry Pi and/or MicroBit).
- Εθνικά **GEO-Hubs** συνδέοντας εκπαιδευτικούς, κοινότητες, και εκπαιδευτικούς φορείς .
- Διεθνείς ευκαιρίες κατάρτισης, συμπεριλαμβανομένων **θερινών και χειμερινών σχολείων**.
- Η πλατφόρμα **GEOBSERVE**, που θα φιλοξενεί όλο το εκπαιδευτικό υλικό.

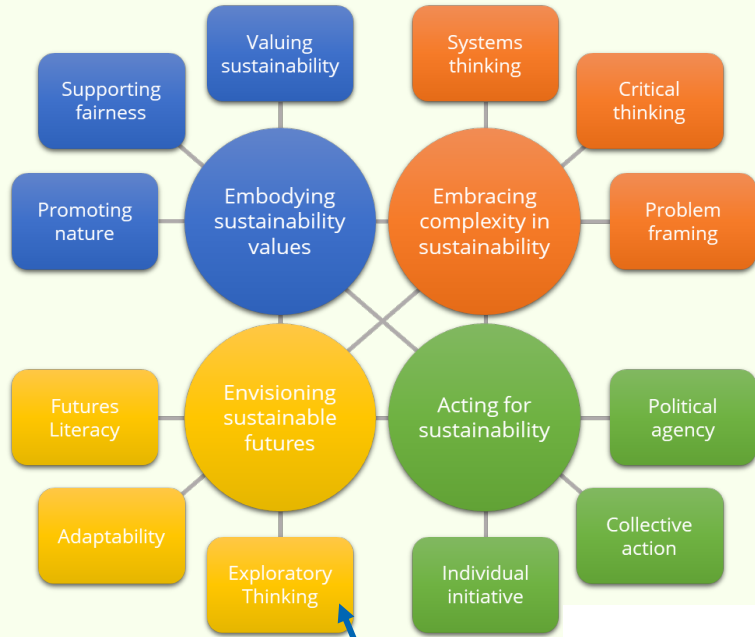




Η Μεθοδολογία του GEO-Academy



Δεξιότητες

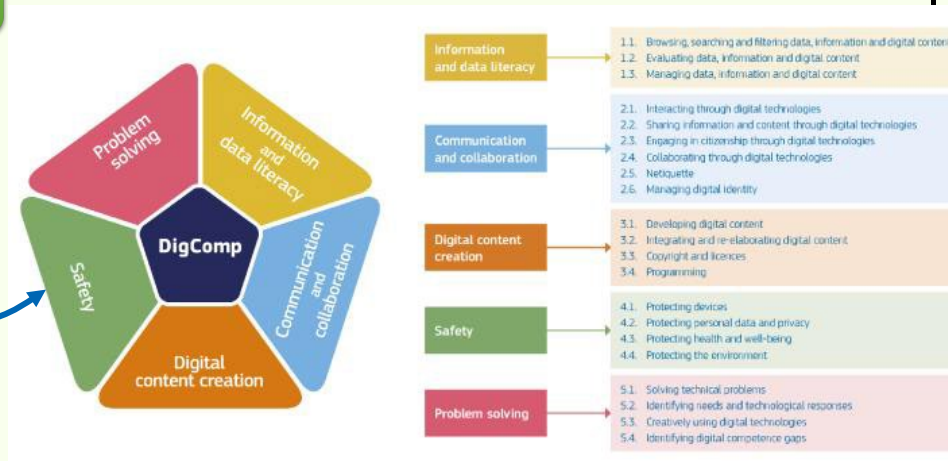


GreenComp (Knowledge, Skills)

Spatial skills: What spatial skills are being promoted through the material and resources? (if any)

Primitive	Identity	☐	Location	☐	Magnitude	☐	Space-Time	☐
Simple (1st order)	Arrangement	☐	Class/ Group	☐	Direction	☐	Distance	☐
	Distribution	☐	Edge	☐	Order	☐	Proximity	☐
	Shape	☐	Situation/Site	☐	Size/ Quantity	☐		
Difficult (2nd order)	Adjacency/ Contiguity	☐	Angle	☐	Area	☐	Center /Centroid	☐
	Change	☐	Grid	☐	Growth	☐	Polygon	☐
	Reference Frame	☐	Region/ Zone	☐	Rotation	☐	Spread/ Diffusion/ Dispersion	☐
Complicated (3rd order)	Buffer	☐	Connectivity	☐	Corridor	☐	Gradient /Slope	☐
	Scale	☐	Surface	☐	Representation	☐	Overlay	☐
	Network	☐	Navigation	☐	Heterogeneity / Diversity	☐		
Complex (4th order)	Activity Space	☐	Interpolation	☐	Projection	☐	Social Area	☐
	Spatial Autocorrelation	☐	Spatial Sampling	☐	Virtual Reality	☐		

DigiComp (Knowledge, Skills)



Επίπεδα χωρικών δεξιοτήτων

Αρχικά	Ταυτότητα	Τοποθεσία	Μέγεθος	Χώρος-χρόνος
Απλές (1 ^{ης} τάξης)	Διάταξη	Κλάση	Διεύθυνση	Απόσταση
	Κατανομή	Ακμή	Διάταξη	Εγγύτητα
	Σχήμα	Κατάσταση	Μέγεθος/Ποσότητα	
Δύσκολες (2 ^{ης} τάξης)	Γειτνίαση/Συνέχεια	Γωνία	Περιοχή	Κέντρο/Κεντροϊδές
	Αλλαγή	Grid	Αύξηση	Πολύγωνο
	Σύστημα αναφοράς	Ζώνη	Περιστροφή	Διάχυση/ Διασπορά
Περίπλοκες (3 ^{ης} τάξης)	Ζώνη επιρροής	Συνδεσιμότητα	Διάδρομος	Κλίση/Προσανατολισμός
	Κλίμακα	Επιφάνεια	Απόδοση/Αποτύπωση	Επικάλυψη/Επίθεση
	Δίκτυο	Πλοήγηση	Διαφοροποίηση/ Ετερογένεια	
Σύνθετες (4 ^{ης} τάξης)	Χώρος δράσης	Παρεμβολή	Προβολή	Κοινωνική περιοχή
	Χωρική αυτοσυσχέτιση	Χωρική δειγματοληψία	Εικονική πραγματικότητα	

Το ενοποιημένο πλαίσιο δεξιοτήτων

1. Systems Thinking under the lenses of Spatial Complexity, the use of Digital Tools and Information Systems

1.1 Applying ST for Sustainability Challenges using Geospatial Thinking and Digital Technologies

1.2 Framing Sustainability in its Spatial Complexity with the Aid of Digital Technologies

2. Critical Thinking and Problem-Solving for Sustainability Challenges

2.1 Develop and Implement Spatial Problem-Solving Strategies that value Sustainability

2.2 Creatively Use Digital Technologies, Information Systems, and Spatial Data to tackle Sustainability Issues

3. Spatial Information Management and Digital Literacy to reach Sustainability Goals

3.1 Critical Consumption and Interpretation of Spatial and Digital Information

3.2 Collect, Analyze, and Visualize Geospatial Data for Informed Decision-Making

4. Collaborative Use of Digital and Geospatial Tools for ESD Community Projects

4.1 Collaborative Use of Digital and Geospatial Tools for Community Projects

4.2 Communicating Sustainability Concepts Effectively



- 5 βασικές θεματικές ενότητες:

GEO-Concepts

1

Cartography and development of spatial thinking skills

2

Geographic Information Systems (GIS), Tools and techniques for Earth Sciences

3

Remote Sensing (RS) Earth Observation (EO), and Satellite applications

4

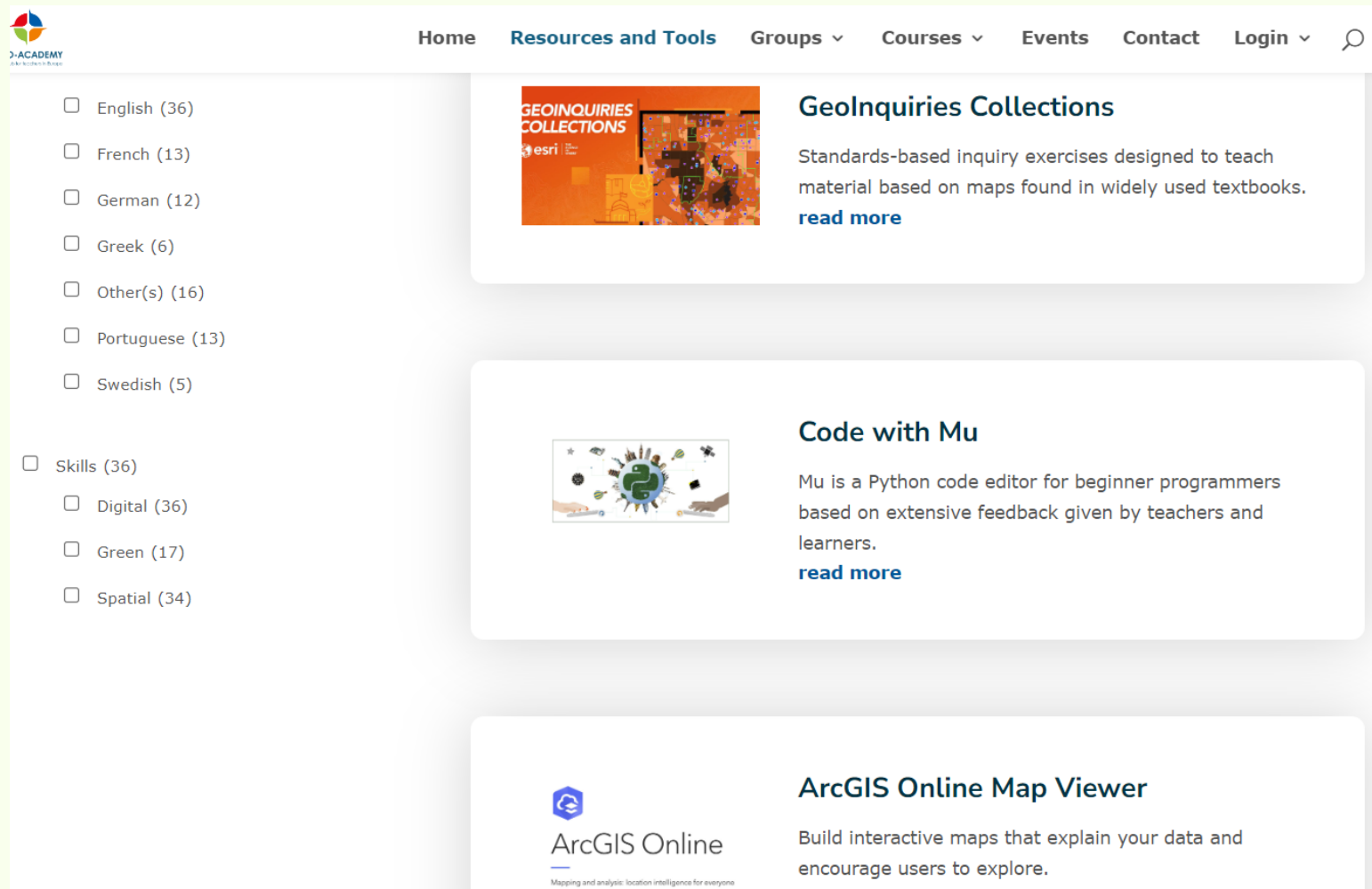
Visualisation and synthesis of information through the use of mapping technologies – Map Storytelling

5

STEAM education & robotics, coding for Urban Sustainability

Γεωχωρικές εφαρμογές

- All GEO-Concepts συνδέονται με διαφορετικά γεωχωρικά εργαλεία/εφαρμογές, διαμορφώνοντας διαφορετικές ασκήσεις και σχέδια μαθήματος ή projects για τους εκπαιδευτικούς.



The screenshot shows the GEO-ACADEMY website interface. At the top, there is a navigation bar with links: Home, Resources and Tools, Groups, Courses, Events, Contact, and Login. A search icon is also present. On the left, a sidebar contains filter categories with checkboxes and counts:

- English (36)
- French (13)
- German (12)
- Greek (6)
- Other(s) (16)
- Portuguese (13)
- Swedish (5)
- Skills (36)
 - Digital (36)
 - Green (17)
 - Spatial (34)

The main content area features three cards:

- GeoInquiries Collections**: Includes a thumbnail image and text: "Standards-based inquiry exercises designed to teach material based on maps found in widely used textbooks." with a [read more](#) link.
- Code with Mu**: Includes a thumbnail image and text: "Mu is a Python code editor for beginner programmers based on extensive feedback given by teachers and learners." with a [read more](#) link.
- ArcGIS Online Map Viewer**: Includes the ArcGIS Online logo and text: "Build interactive maps that explain your data and encourage users to explore."

Σύνδεση με το αναλυτικό πρόγραμμα

No specialized subjects in grades 1 to 4

Grade 1
Age 6+

Grade 2
Age 7+

Grade 3
Age 8+

Grade 4
Age 9+

@A

@B

@C

@D

GEOGRAPHY

@AA

@BB

@CC

@DD

PHYSICS

@EE

@FF

@GG

@HH

ENVIRONMENTAL
EDUCATION

@II

@JJ

@KK

@LL

DIGITAL
EDUCATION

@MM

@NN

@OO

@PP

MATHEMATICS

@QQ

@RR

@SS

@TT

+ (feel free to
insert more
subjects)

@UU

@VV

@WW

@XX

Grade 9
Age 14+

Grade 10
Age 15+

Grade 11
Age 16+

Grade 12
Age 17+

@AAA

@BBB

@CCC

@DDD

@EEE

@FFF

@GGG

@HHH

@III

@JJJ

@KKK

@LLL

@MMM

@NNN

@OOO

@PPP

@QQQ

@RRR

@SSS

@TTT

@

@WWW

@

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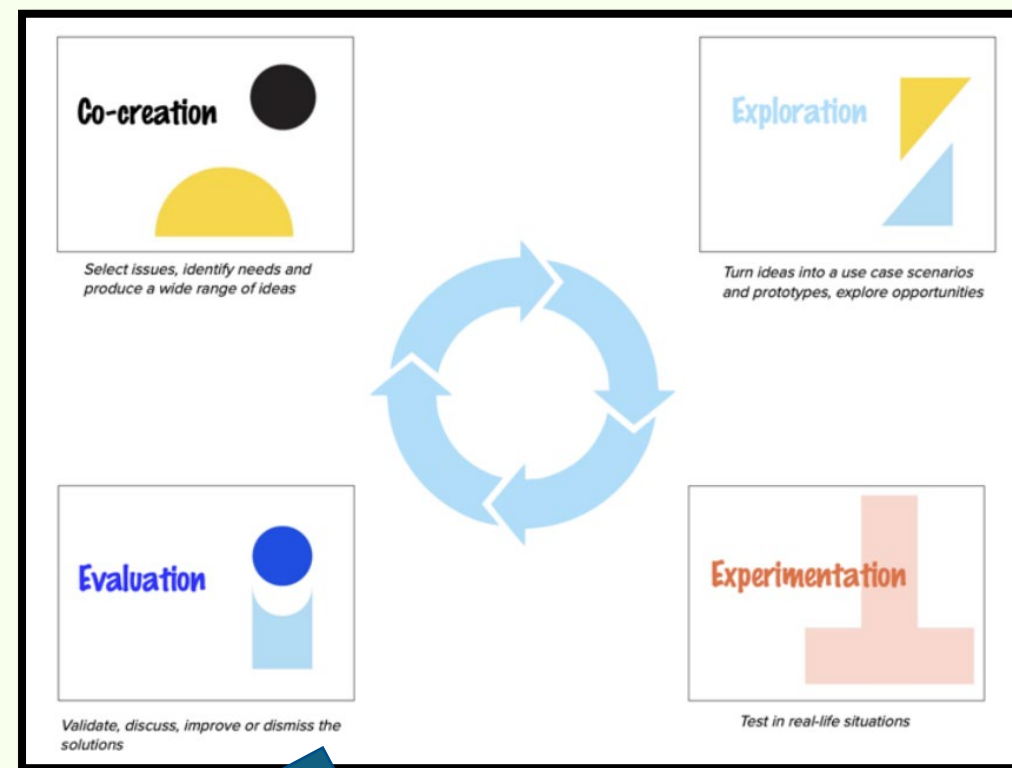
Παιδαγωγικό πλαίσιο

Μία ολιστική προσέγγιση του σχολείου



Source: Mathie, R. G. and Wals, A.E.J. (2022) Whole School Approaches to Sustainability: Exemplary Practices from around the world

Τα σχολεία σαν Ζωντανά Εργαστήρια



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GEO - Labs

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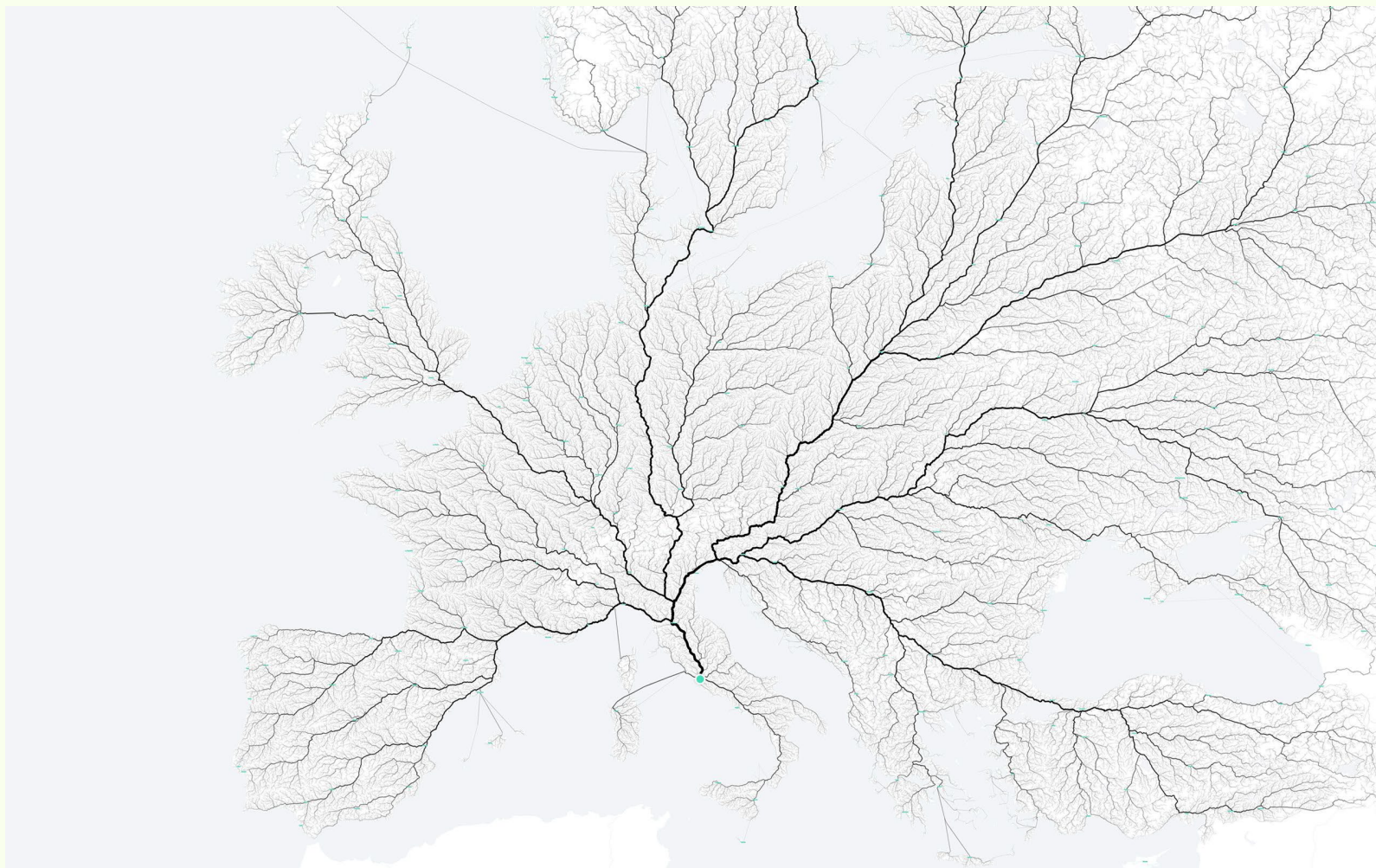




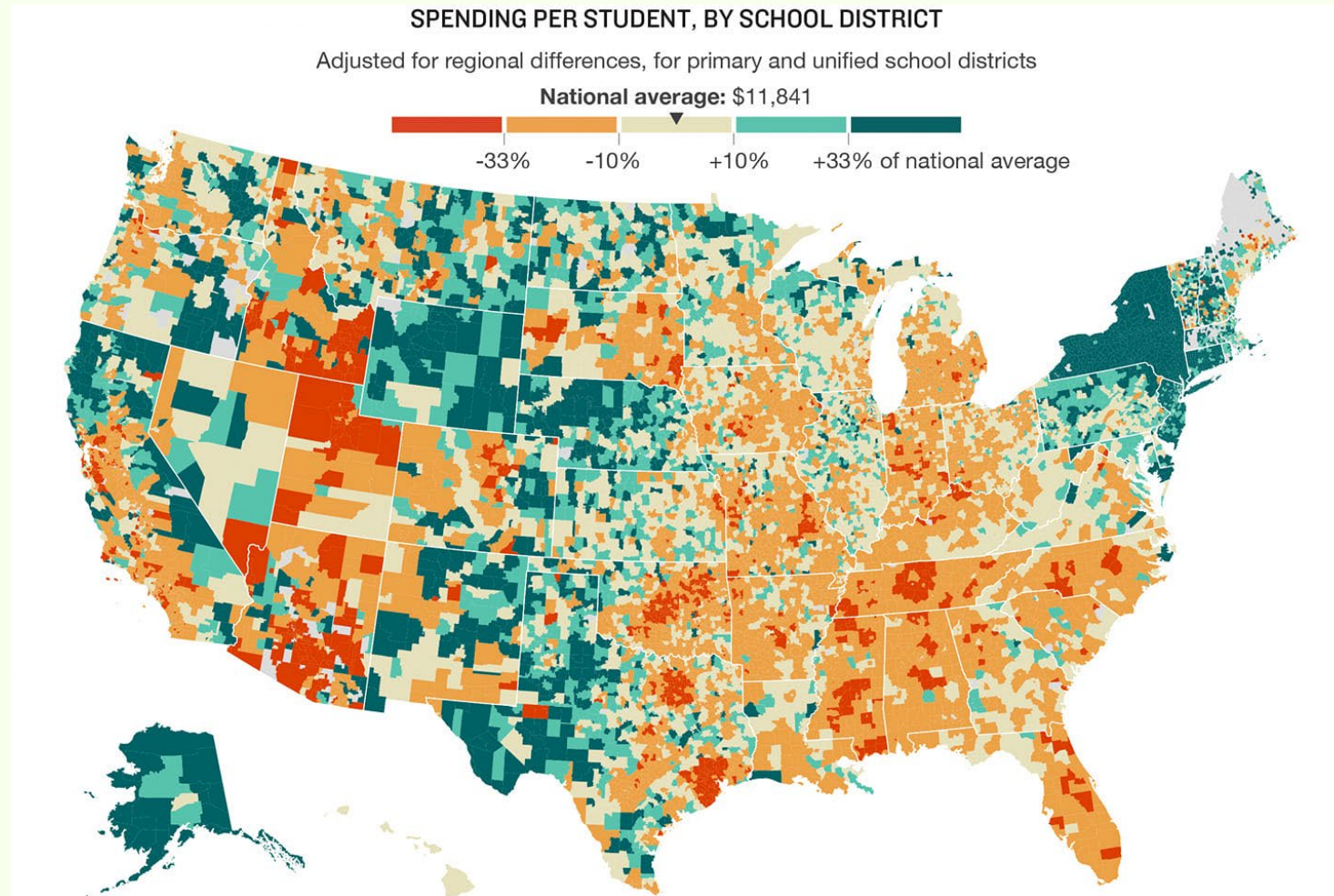
Γεωχωρικές εφαρμογές και ΕΒΑ



ΣΓΠ: Όλοι οι δρόμοι οδηγούν στη Ρώμη!



Θεματική Χαρτογραφία: Χρήματα για την εκπαίδευση



<https://www.facebook.com/amazingmap1/photos/a.853978418051160/2177135429068779/>

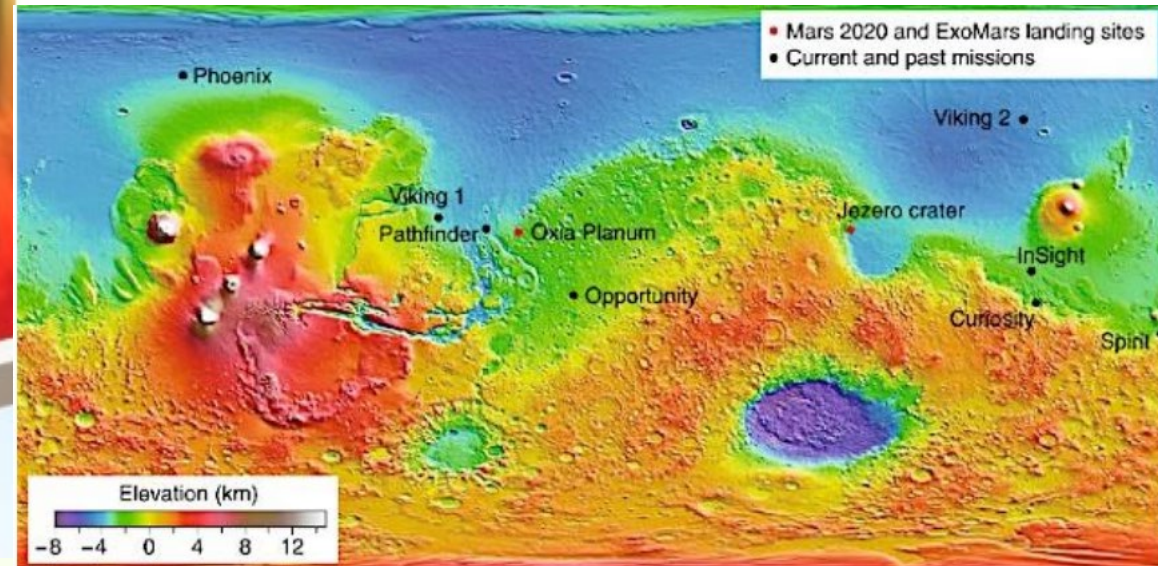
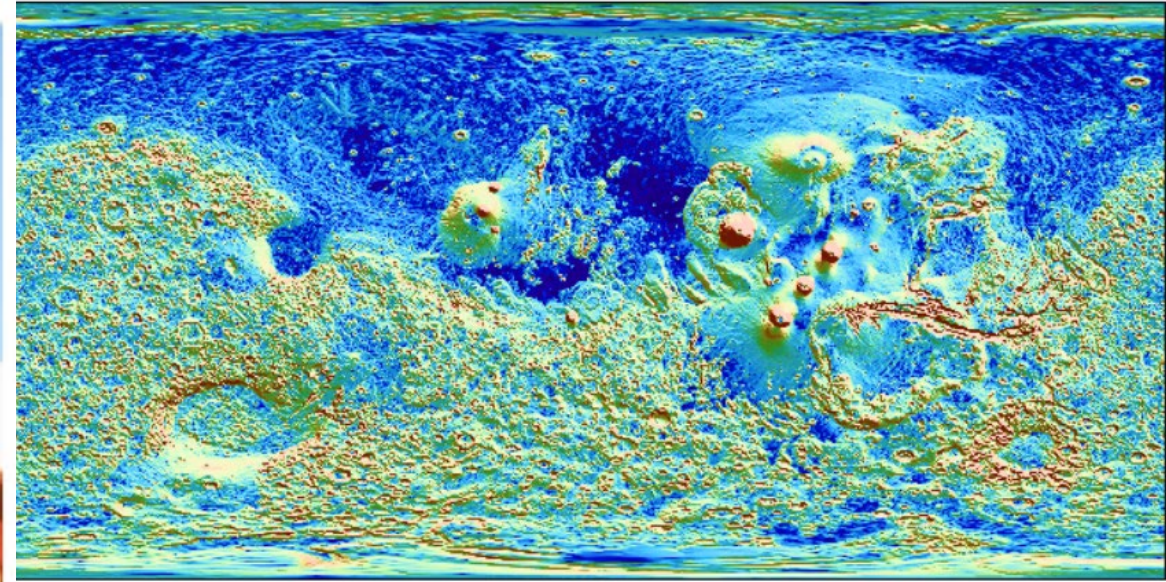
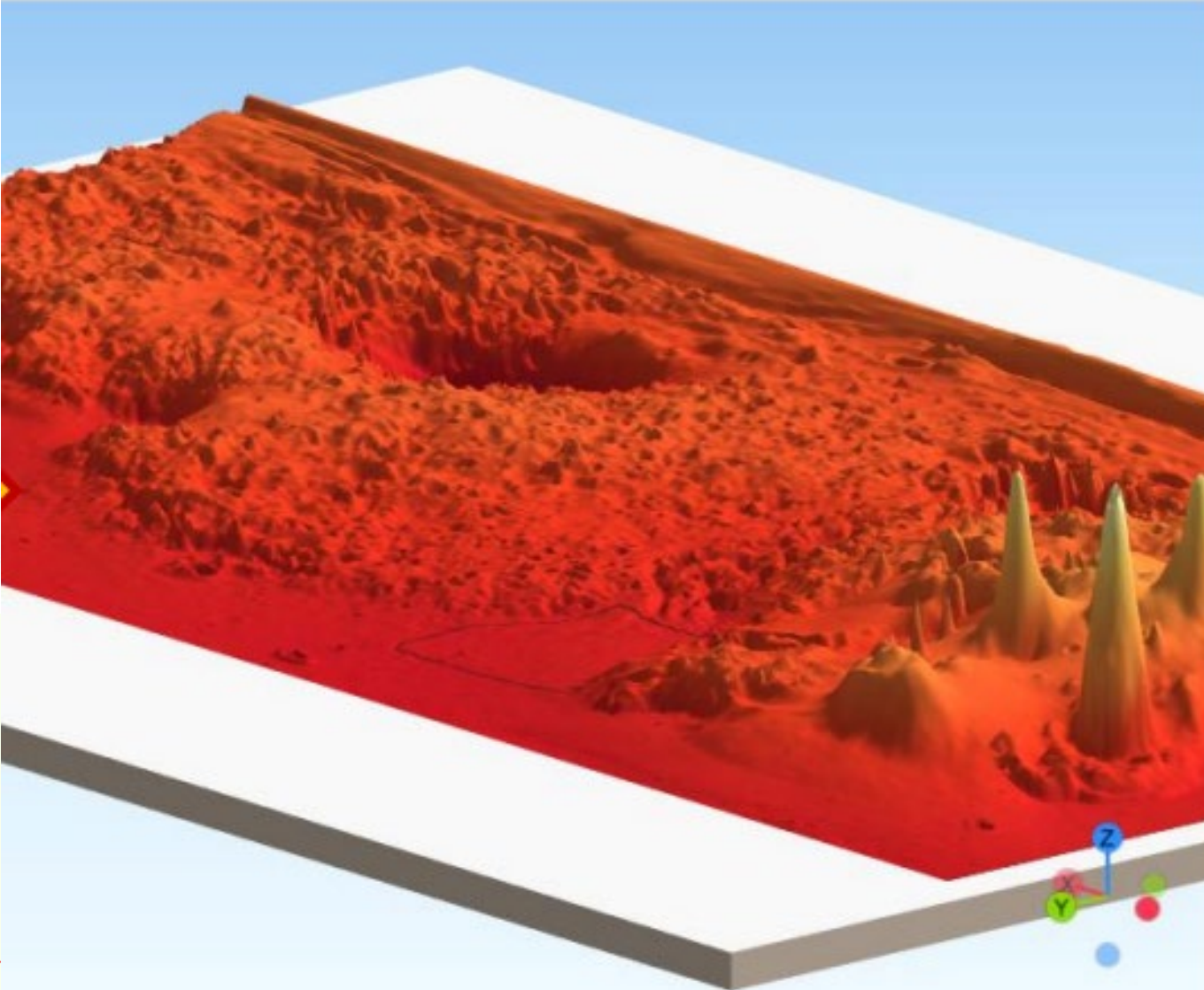


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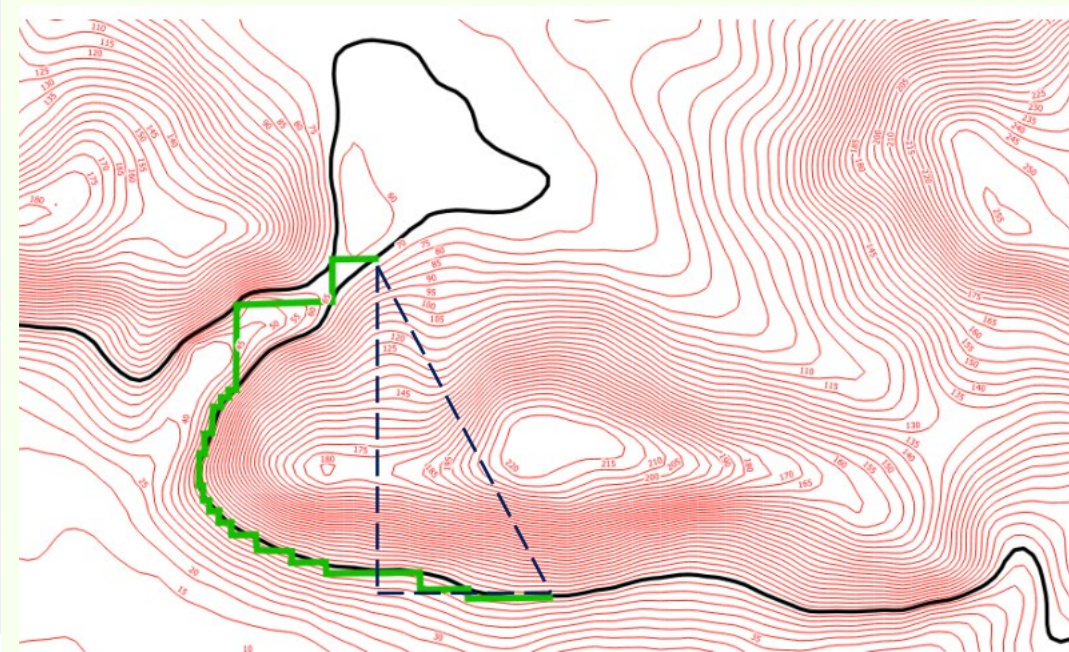
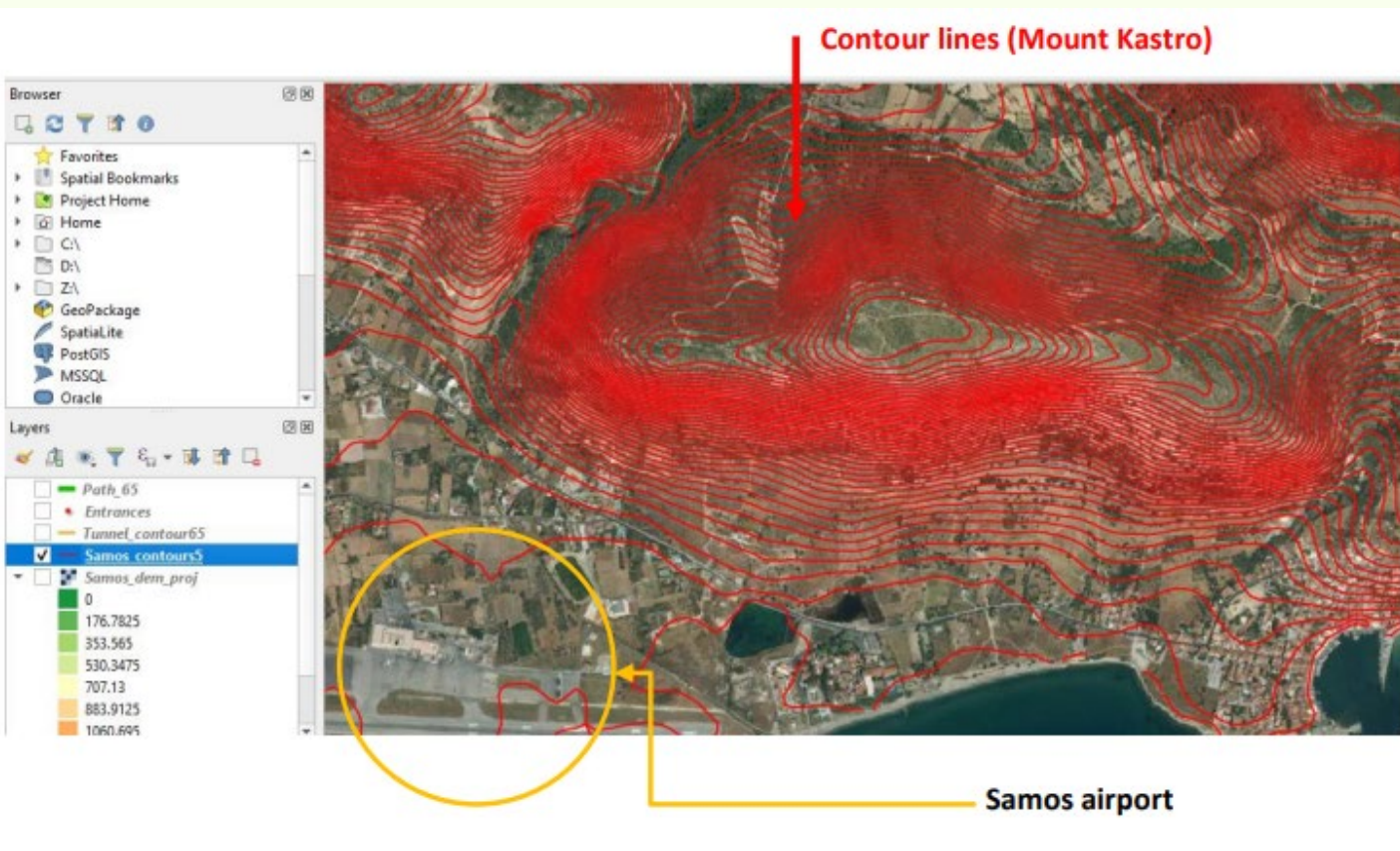
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ΣΓΠ: Πιθανά σημεία προσεδάφισης στον Άρη



ΣΓΠ: Το Ευπαλίνειο όρυγμα στη Σάμο



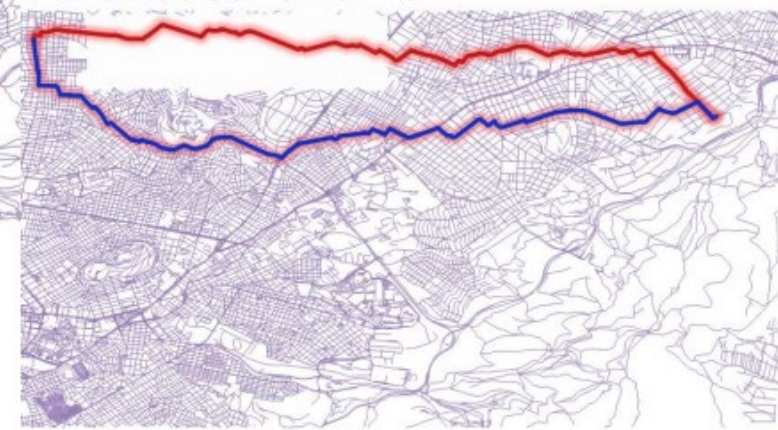
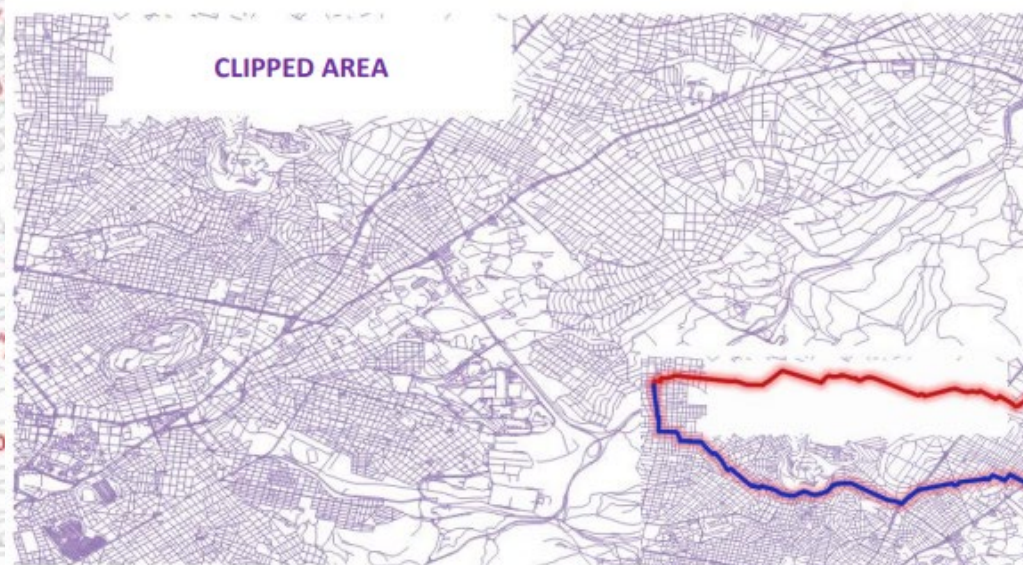
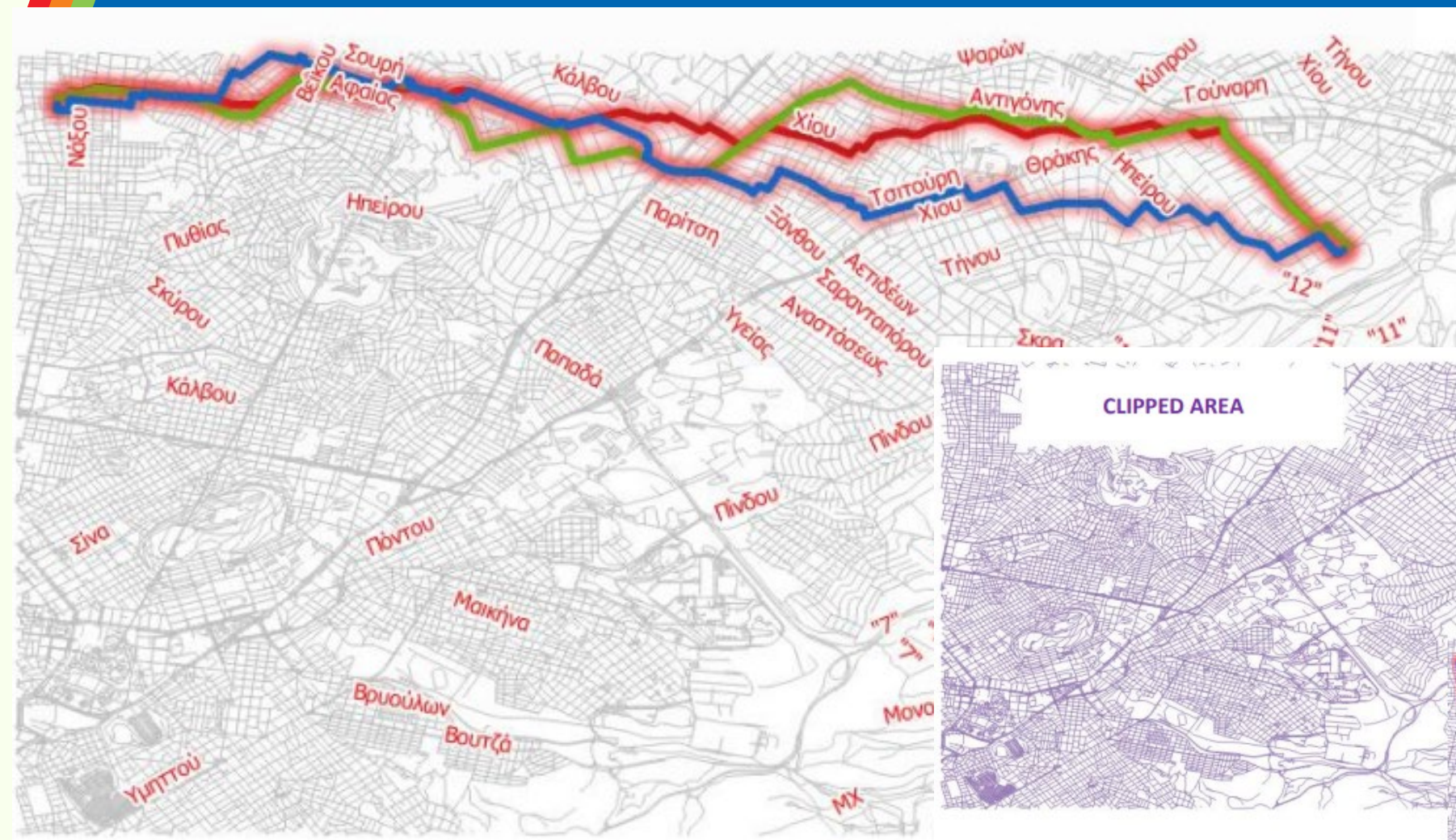
[https://www.gosteam.eu/wp-content/uploads/2022/11/The%20ancient%20tunnel%20of%20Eupalinos%20in%20Samos,%20Greece%20\(educational%20activity%20Ellinogermaniki%20Agogi\).pdf](https://www.gosteam.eu/wp-content/uploads/2022/11/The%20ancient%20tunnel%20of%20Eupalinos%20in%20Samos,%20Greece%20(educational%20activity%20Ellinogermaniki%20Agogi).pdf)



ΣΓΠ: Εύρεση βέλτιστης διαδρομής

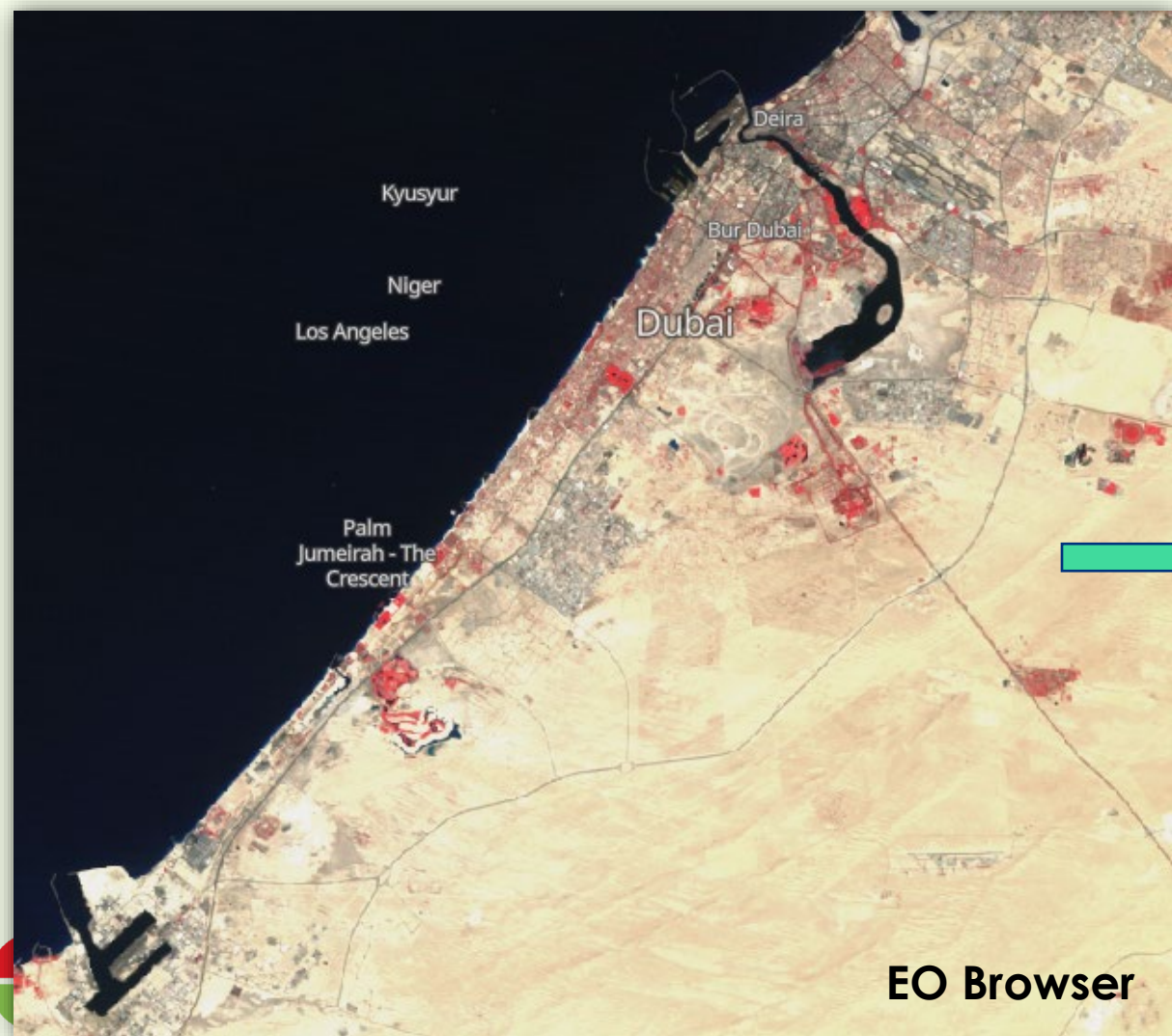
Συντομότερες vs
γρηγορότερες διαδρομές

Αποφυγή εμποδίων



Δορυφορικά: Η αστική εξάπλωση από το διάστημα

Dubai 2000: Landsat 4-5

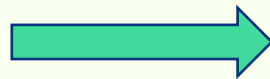
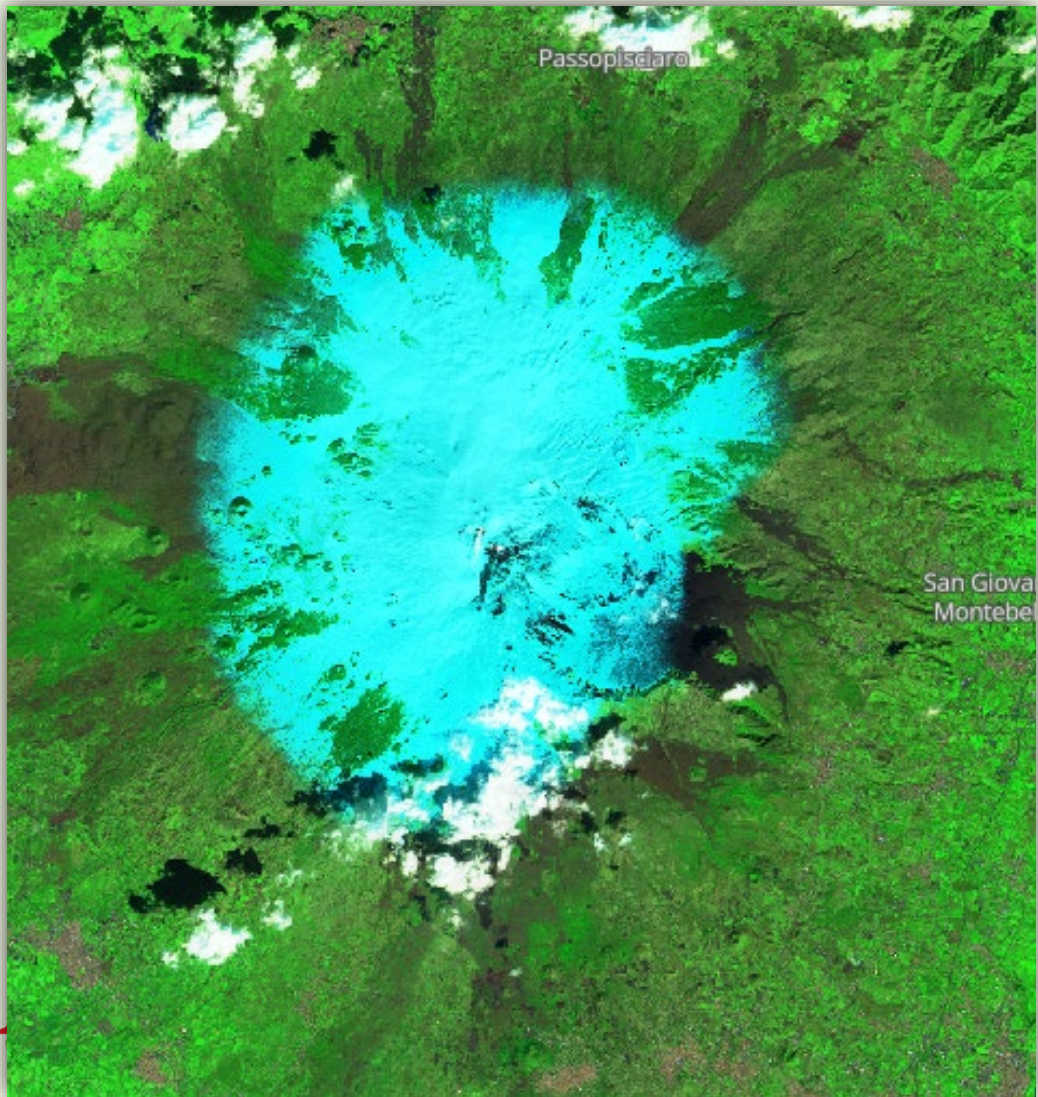


Dubai 2020: Sentinel 2

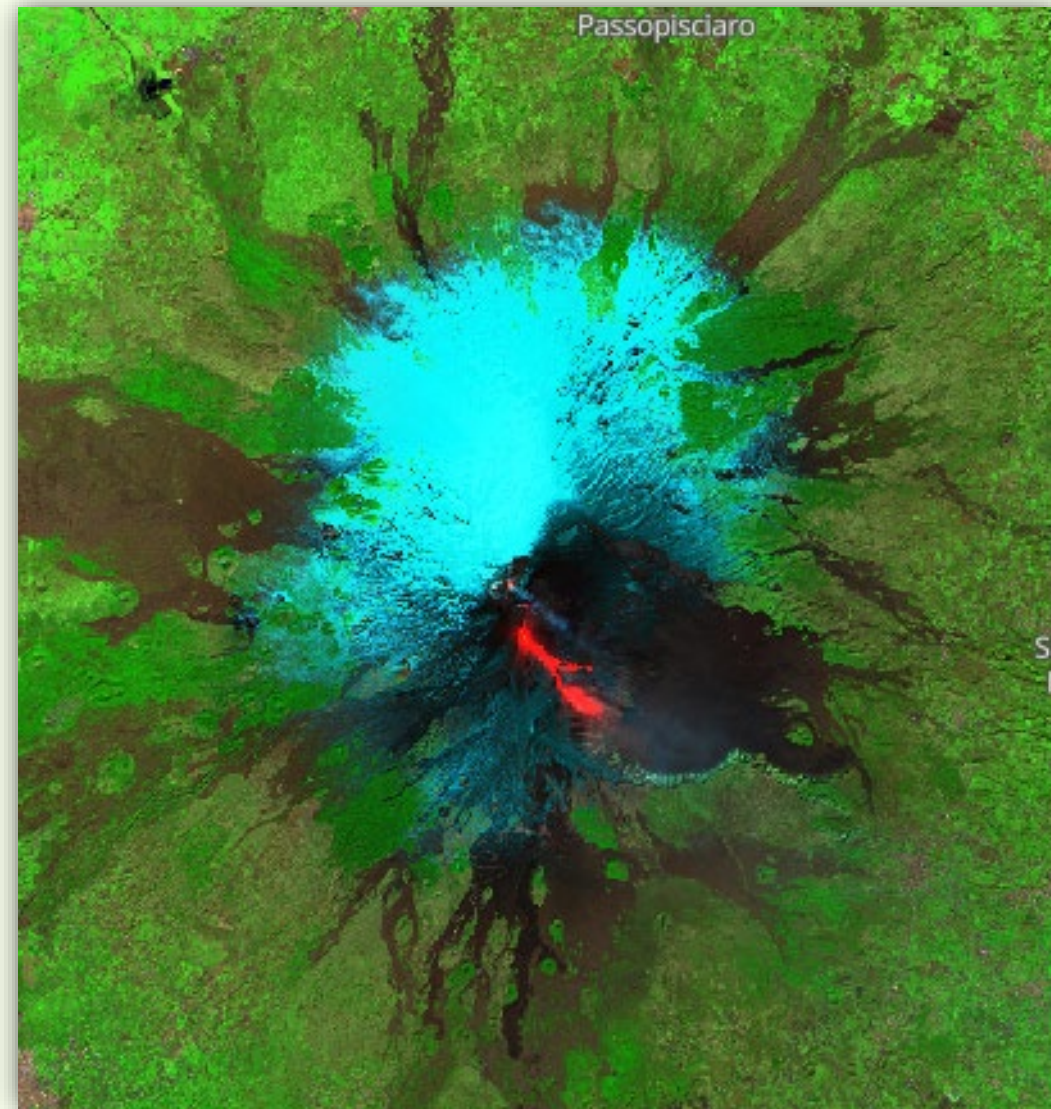


Δορυφορικά: Φυσικές καταστροφές - Ηφαίστεια

Etna 09/03/2017: Sentinel 2



Etna 19/03/2017: Sentinel 2



Προγραμματισμός?

Ψευδοκώδικας

Load the appropriate libraries

Initiate the Sea Level Rise limit (i.e. 12 meters (!!!))

Load the input image

Transform the .tiff file to array

For every row of the array

 For every column of the array

 If pixel value is different than 0 (Sea)

 If pixel value is below Sea Level Rise value

 Set the pixel value as 99999

Transform array to image again

Plot the results

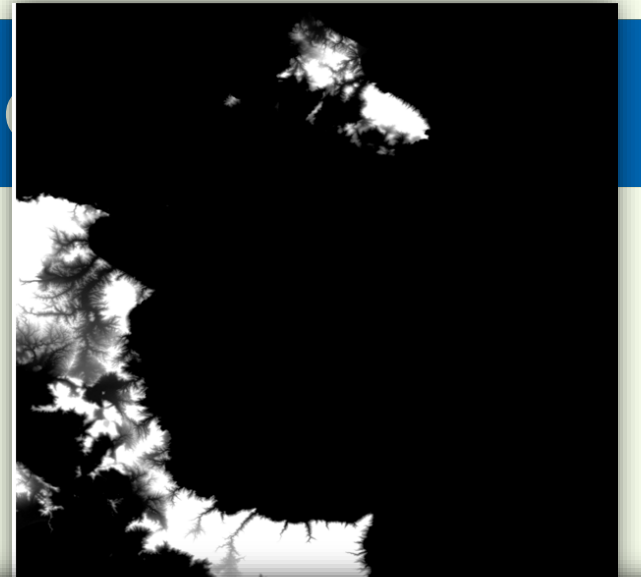
Κώδικας σε Python

```
from PIL import Image
import numpy as np
import matplotlib.pyplot as plt

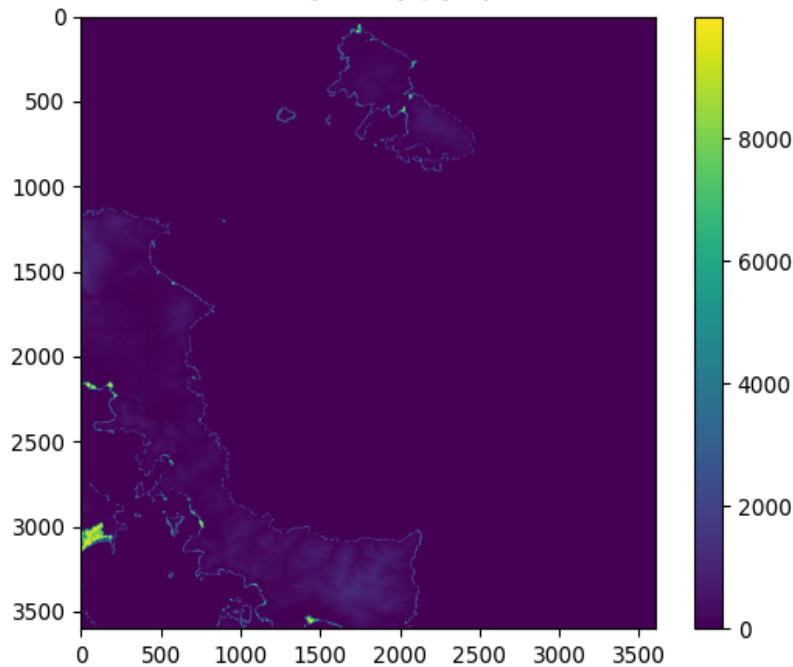
im = Image.open('C:\\Users\\User\\n38_e024_1arc_v3.tif')
im.show()
imarray = np.array(im)
rows,cols = imarray.shape
print("The array has: ",rows," rows and ",cols," columns")
sea_level_rise = 50
for i in range(0,rows):
    for j in range(0,cols):
        if imarray[i][j]!=0:
            if imarray[i][j] <= sea_level_rise:
                imarray[i][j] = 9999
plt.imshow(imarray)
plt.colorbar()
plt.show()
```


Προγραμματισμός - Sea Level Rise

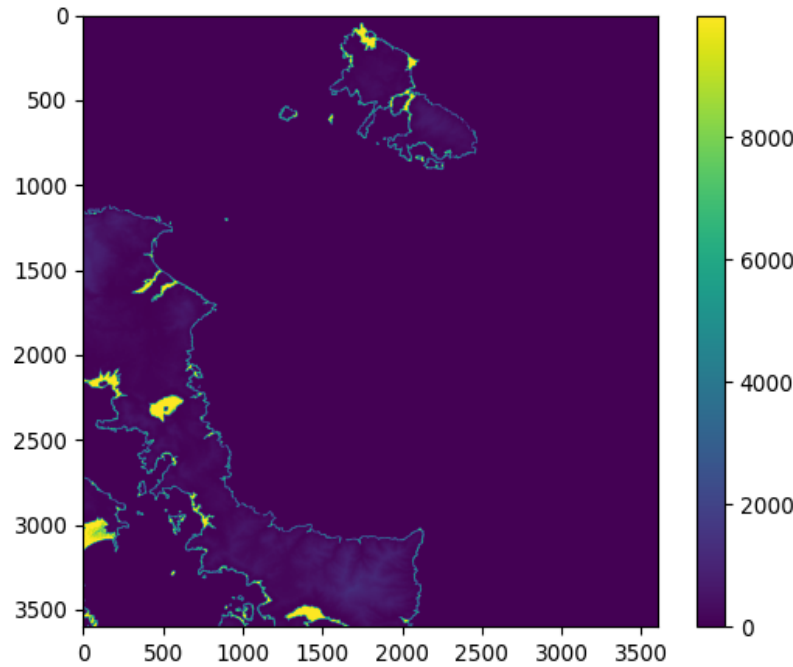
Ανάλυση σεναρίων



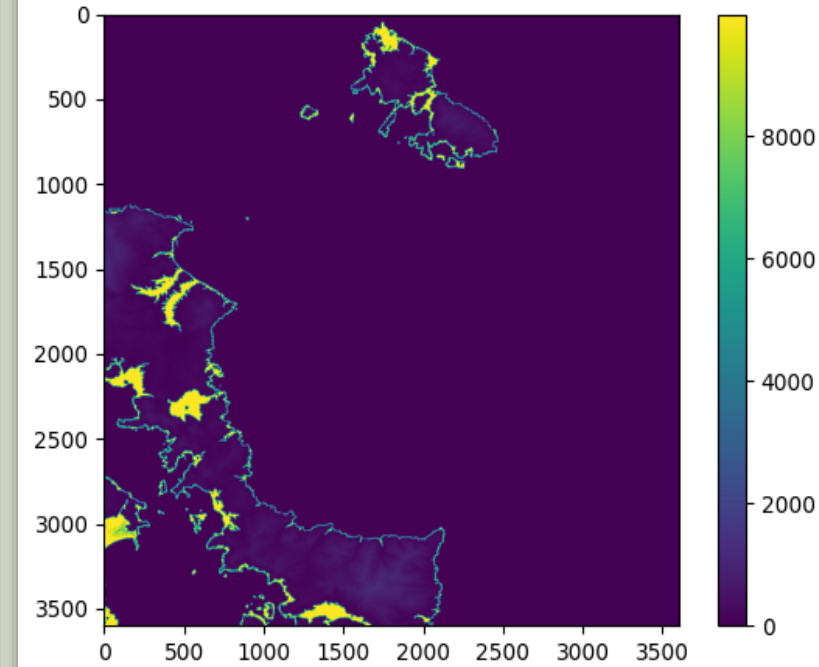
5 meters



25 meters



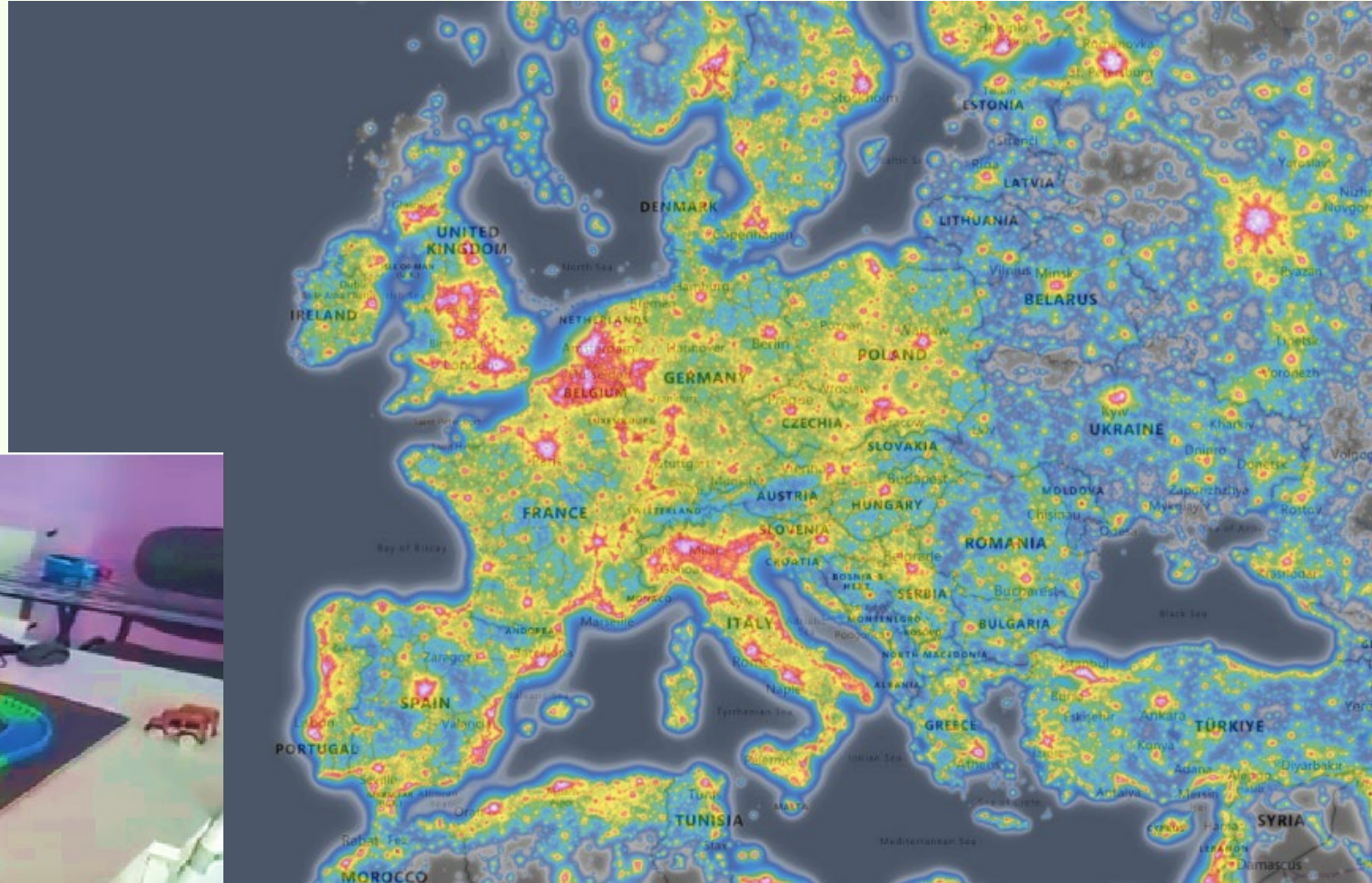
50 meters



Ρομποτική και Φωτορρύπανση

Create your own robotic solution that will study, measure and propose solutions to the problem of light pollution.

<https://clicpolit.eu/>



<https://www.youtube.com/watch?v=k0eA5fi2uiw>

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Θεωρία των ΣΓΠ



Συστήματα Γεωγραφικών Πληροφοριών

What is GIS?

GEOGRAPHIC INFORMATION SYSTEMS



Συστήματα Γεωγραφικών Πληροφοριών

Χωρικά δεδομένα / Γεωγραφικά δεδομένα (Spatial data) είναι δεδομένα που σχετίζονται με τον χώρο πιο συγκεκριμένα:

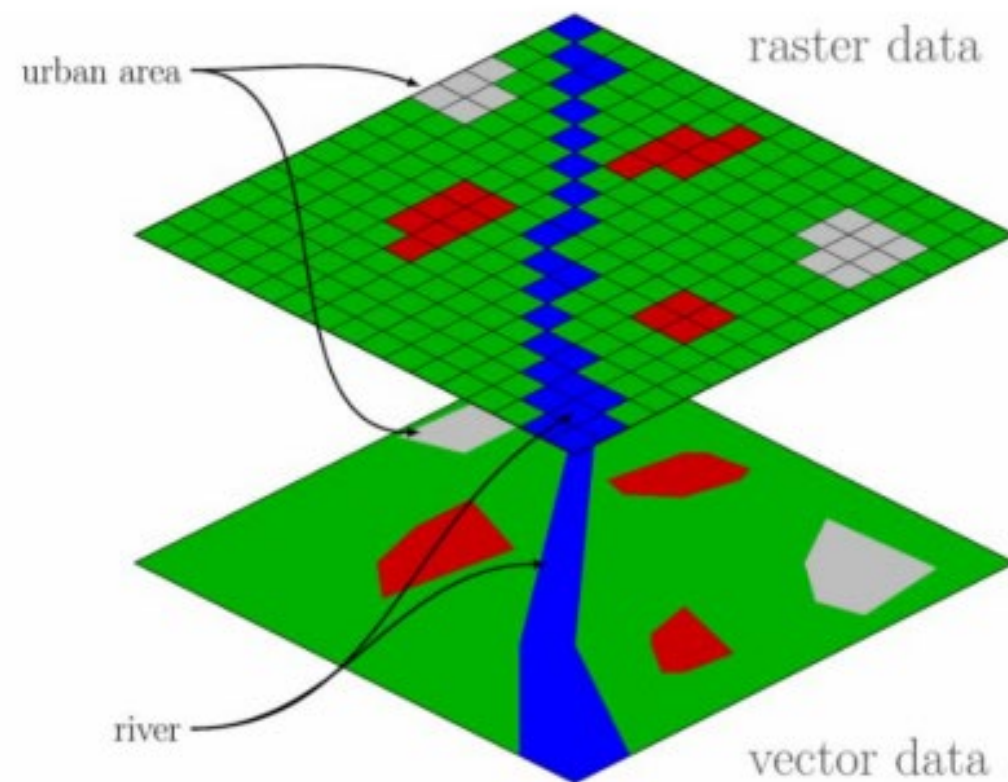
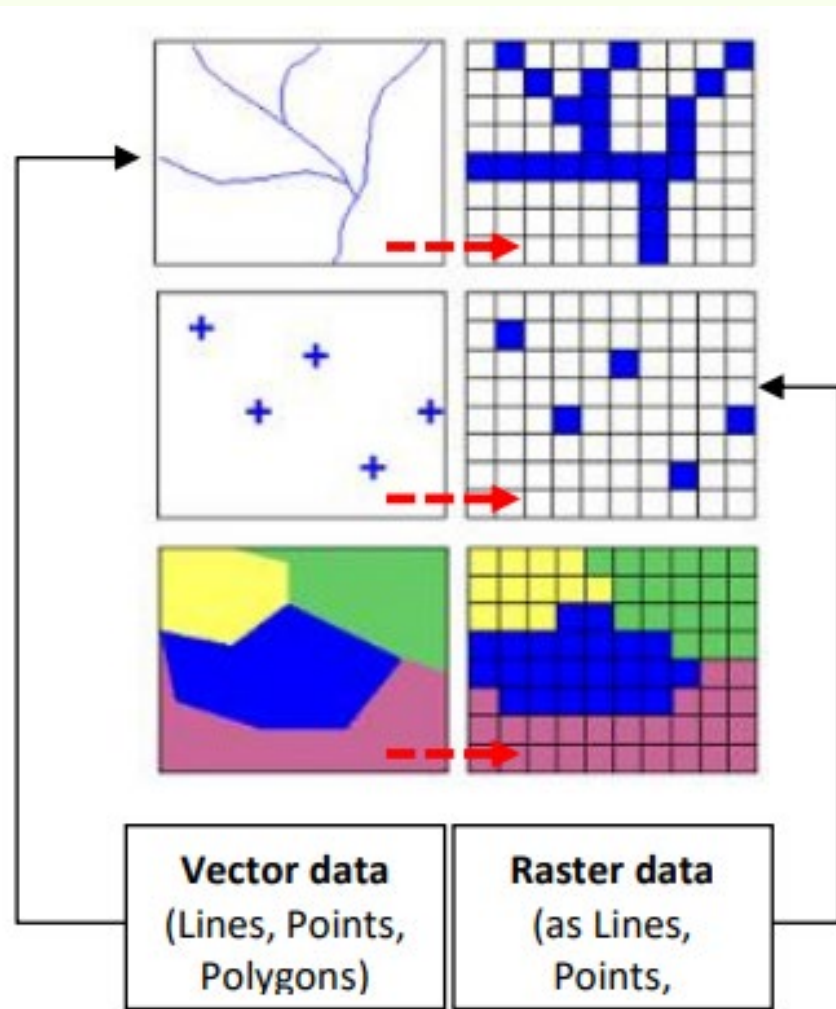
- δεδομένα τα οποία **περιγράφουν το χώρο** (χάρτες, φωτογραφίες, οδικά δίκτυα, σπίτια, λίμνες, διοικητικά όρια)
- δεδομένα που **αναφέρονται στο χώρο** (μετρήσεις χαρακτηριστικών π.χ. θερμοκρασία υγρασία, άνεμος, ατμοσφαιρική ρύπανση, εγγύτητα κ.α.)

Γεωγραφικές πληροφορίες είναι πληροφορίες που προέρχονται και βασίζονται σε γεωγραφικά δεδομένα.

Ένα Σύστημα Γεωγραφικών Πληροφοριών (ΣΓΠ) είναι ένα ψηφιακό Σύστημα για την εισαγωγή, διαχείριση, ανάλυση και παρουσίαση γεωγραφικών πληροφοριών.

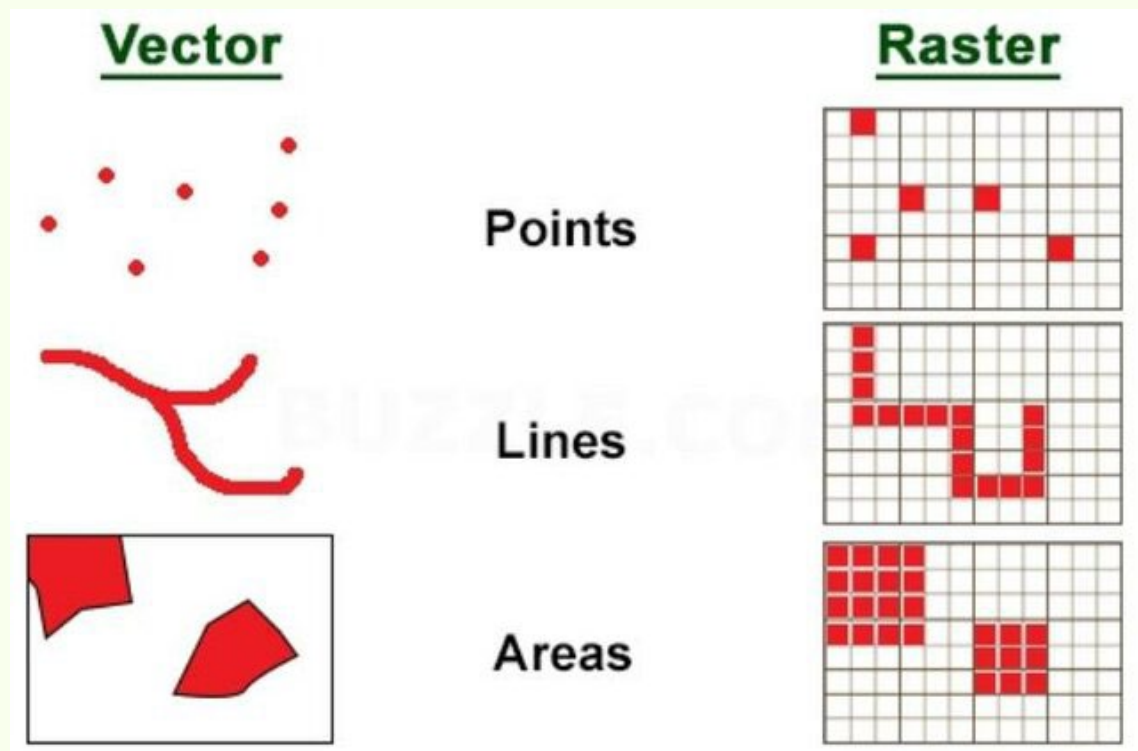
Τα ΣΓΠ παρέχουν ένα σύνολο εργαλείων κατάλληλων για την απεικόνιση (χαρτογράφηση), συλλογή, διαχείριση, ανάλυση και παρουσίαση γεωγραφικών δεδομένων/πληροφορίας.

Χωρική πληροφορία



An example

Χωρική πληροφορία



Stoeckle & Montgomery 2013; Polat & Alkan 2019

The raster view of the world	Happy Valley spatial entities	The vector view of the world
	 Points: hotels	
	 Lines: ski lifts	
	 Areas: forest	
	 Network: roads	
	 Surface: elevation	



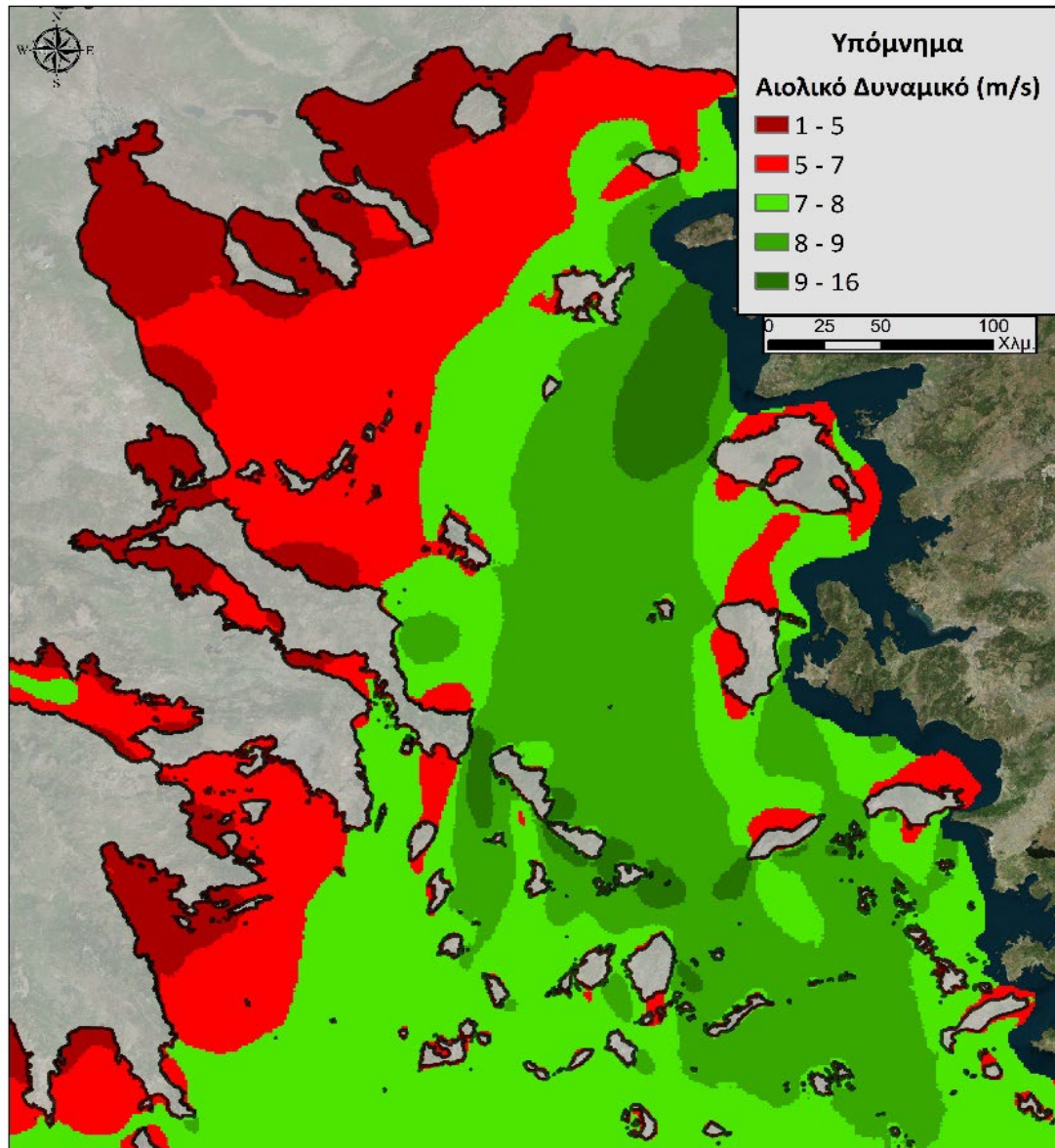
Παραδείγματα δραστηριοτήτων



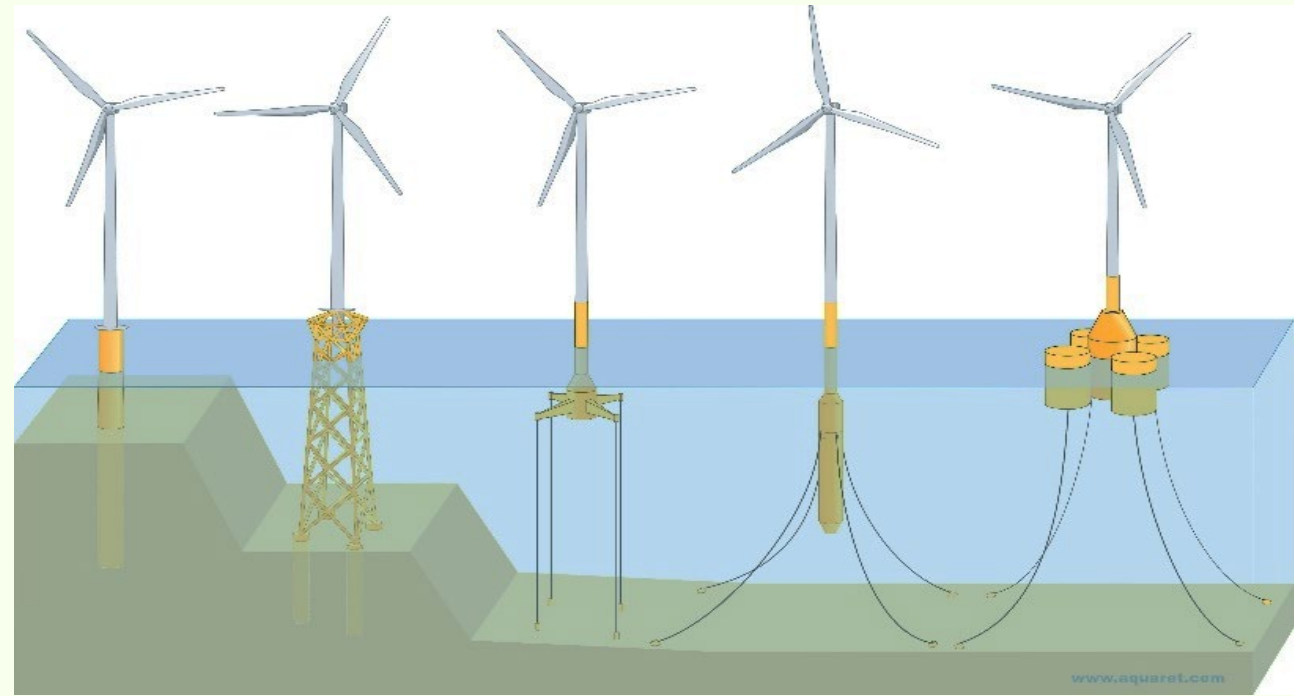
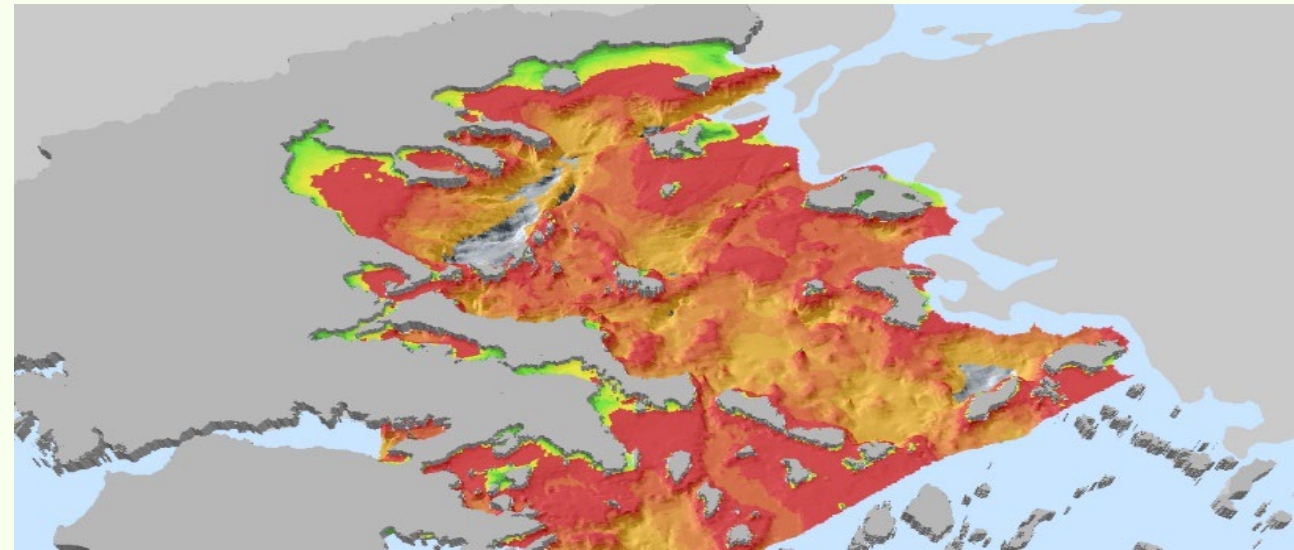
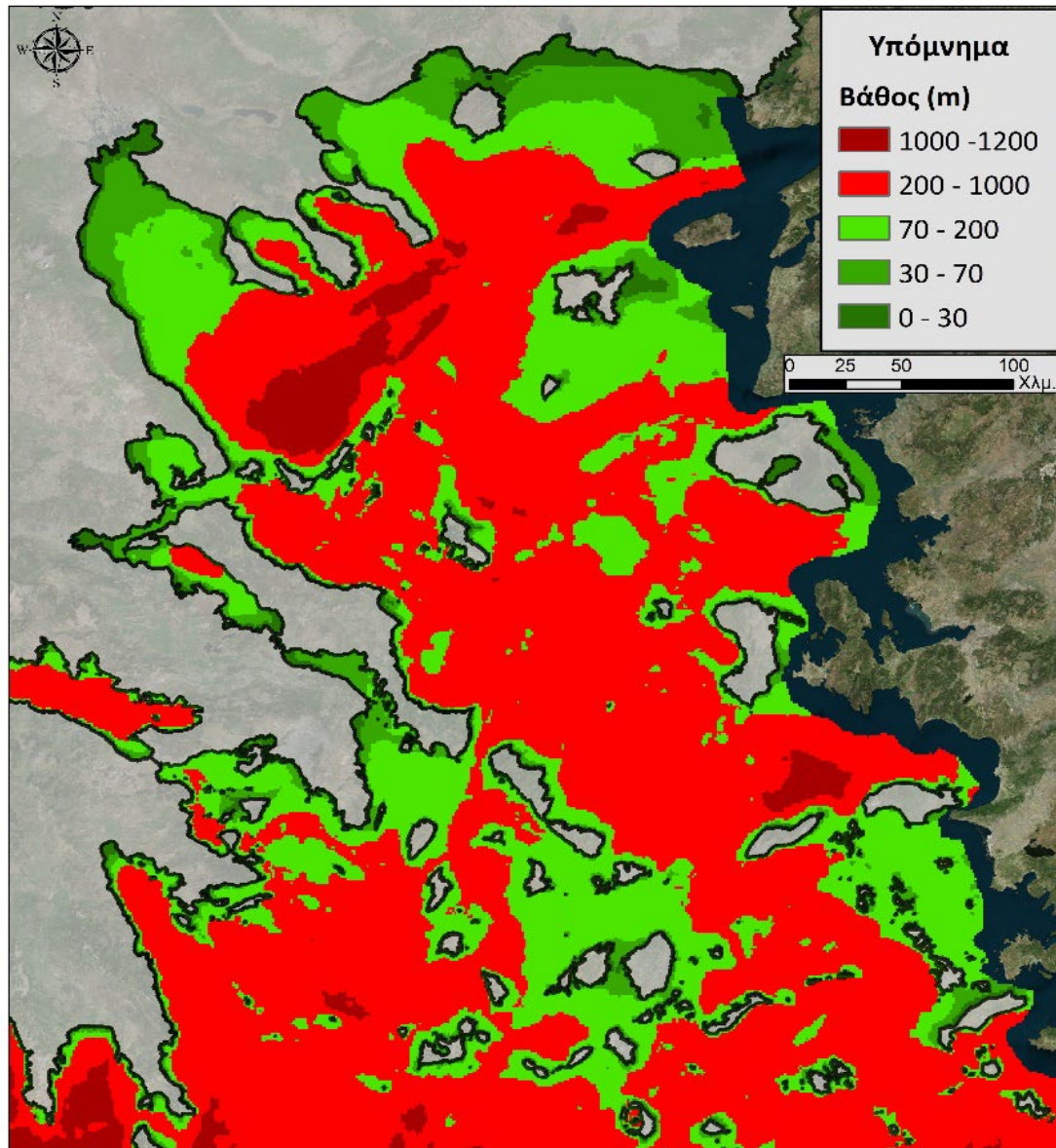
Πολυκριτηριακή ανάλυση για Δημοτικό



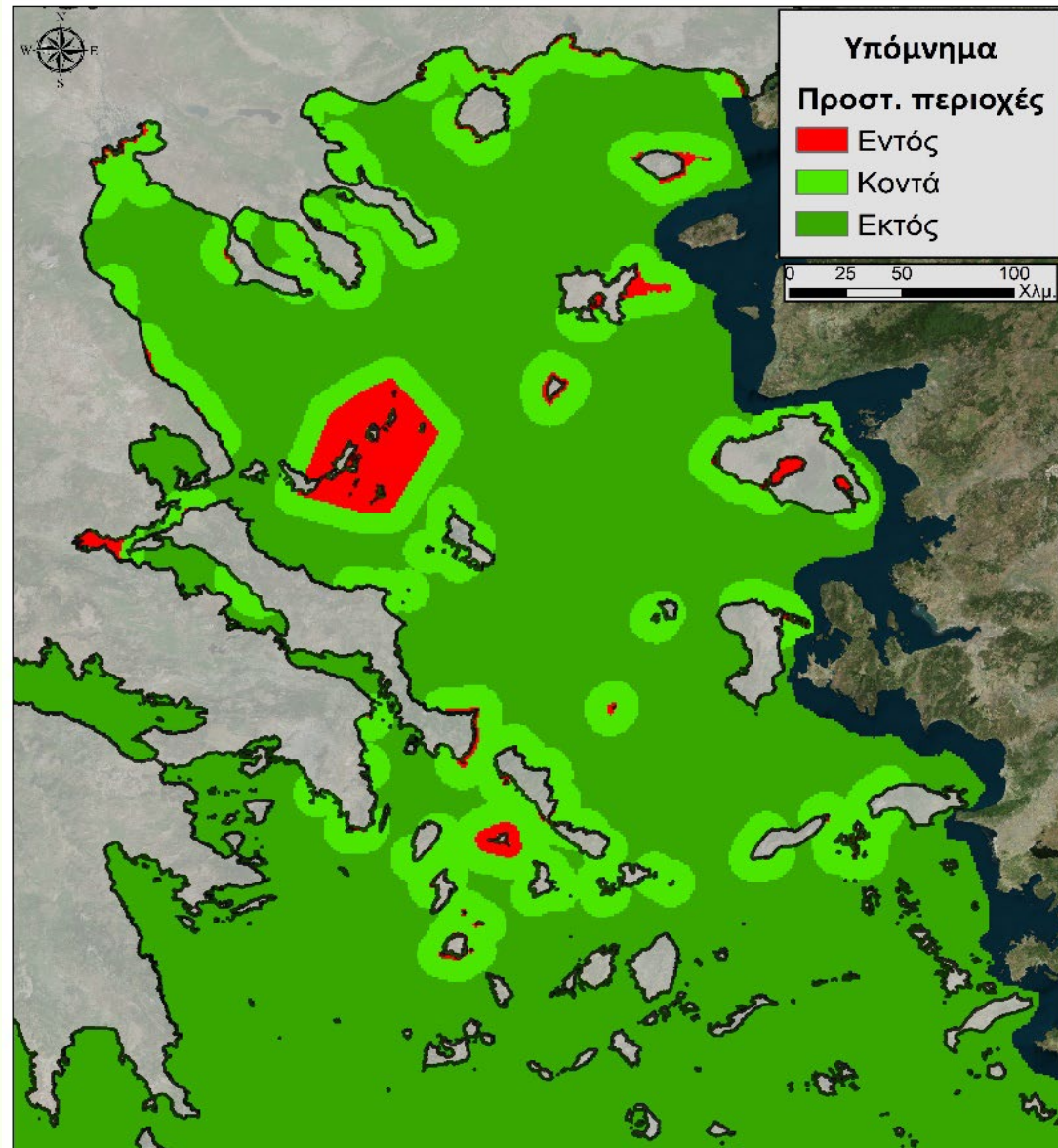
Criterion 1: Mean Wind Speed



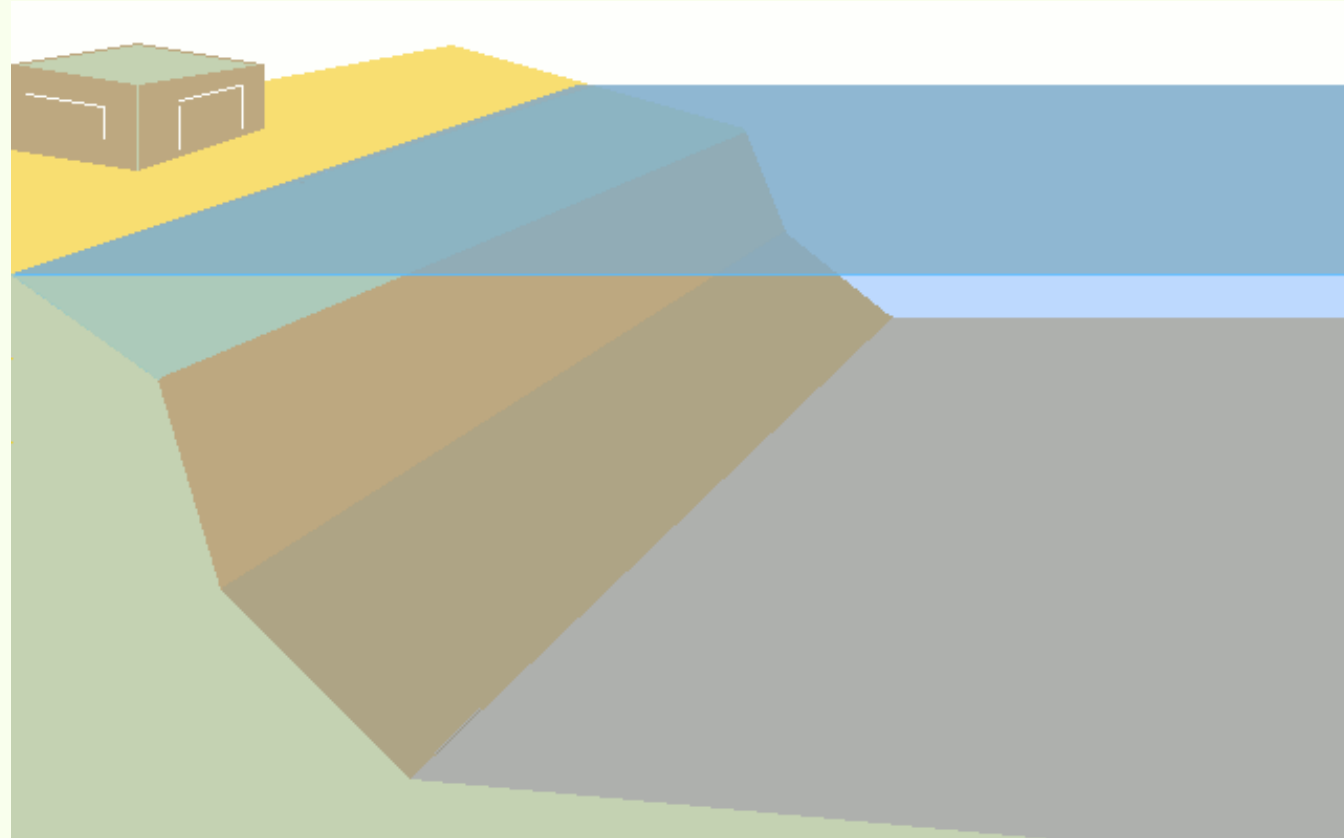
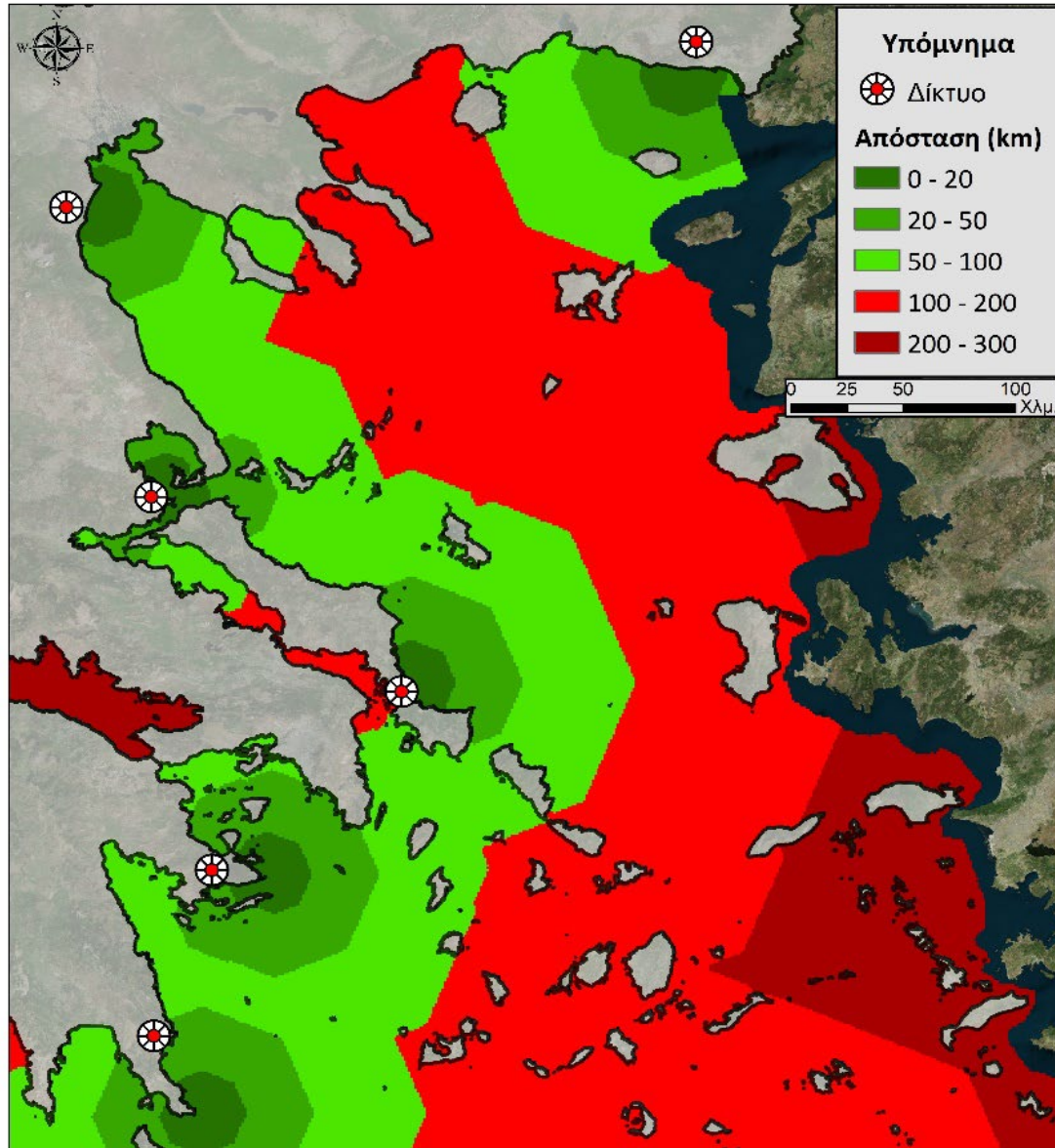
Criterion 2: Bathymetry (Depth)



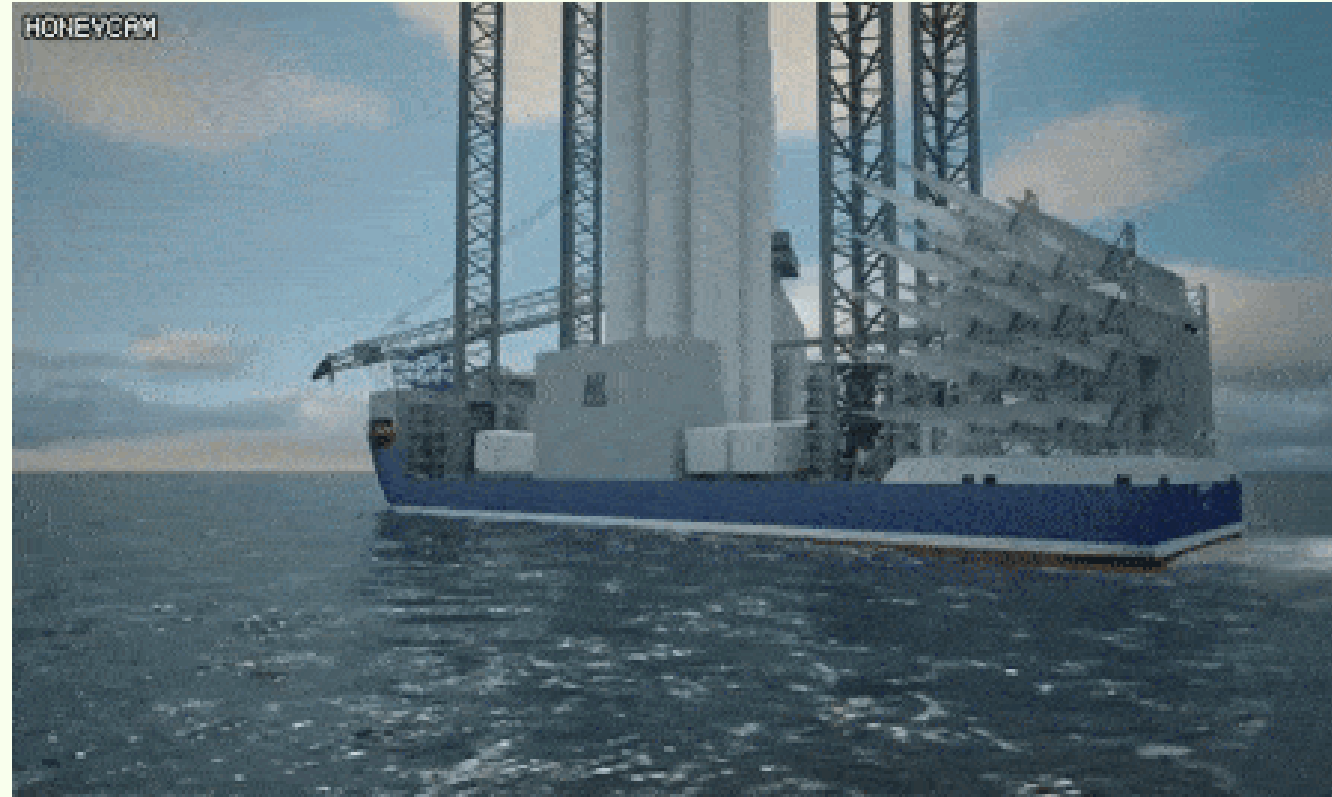
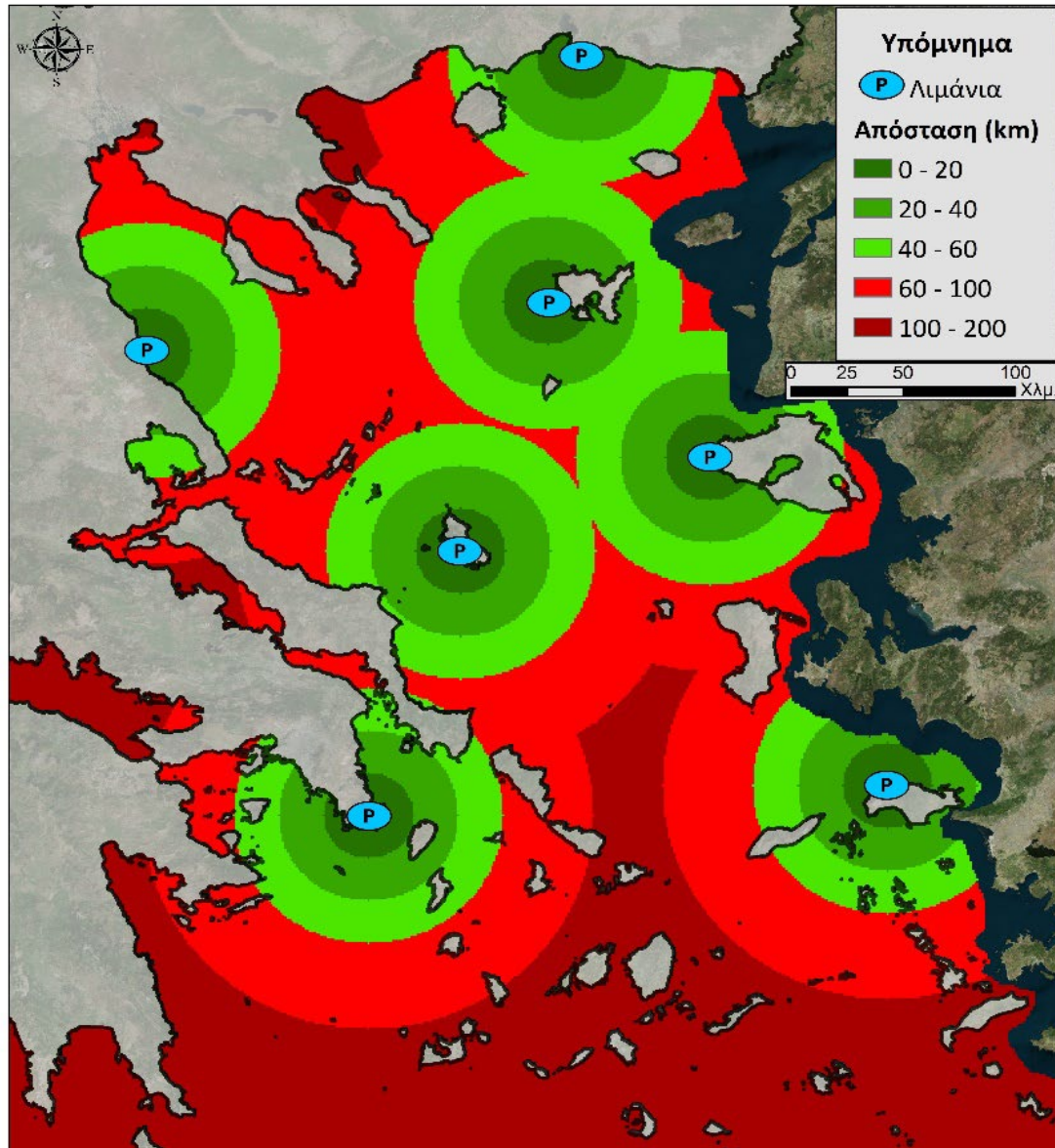
Criterion 3: Natura Areas



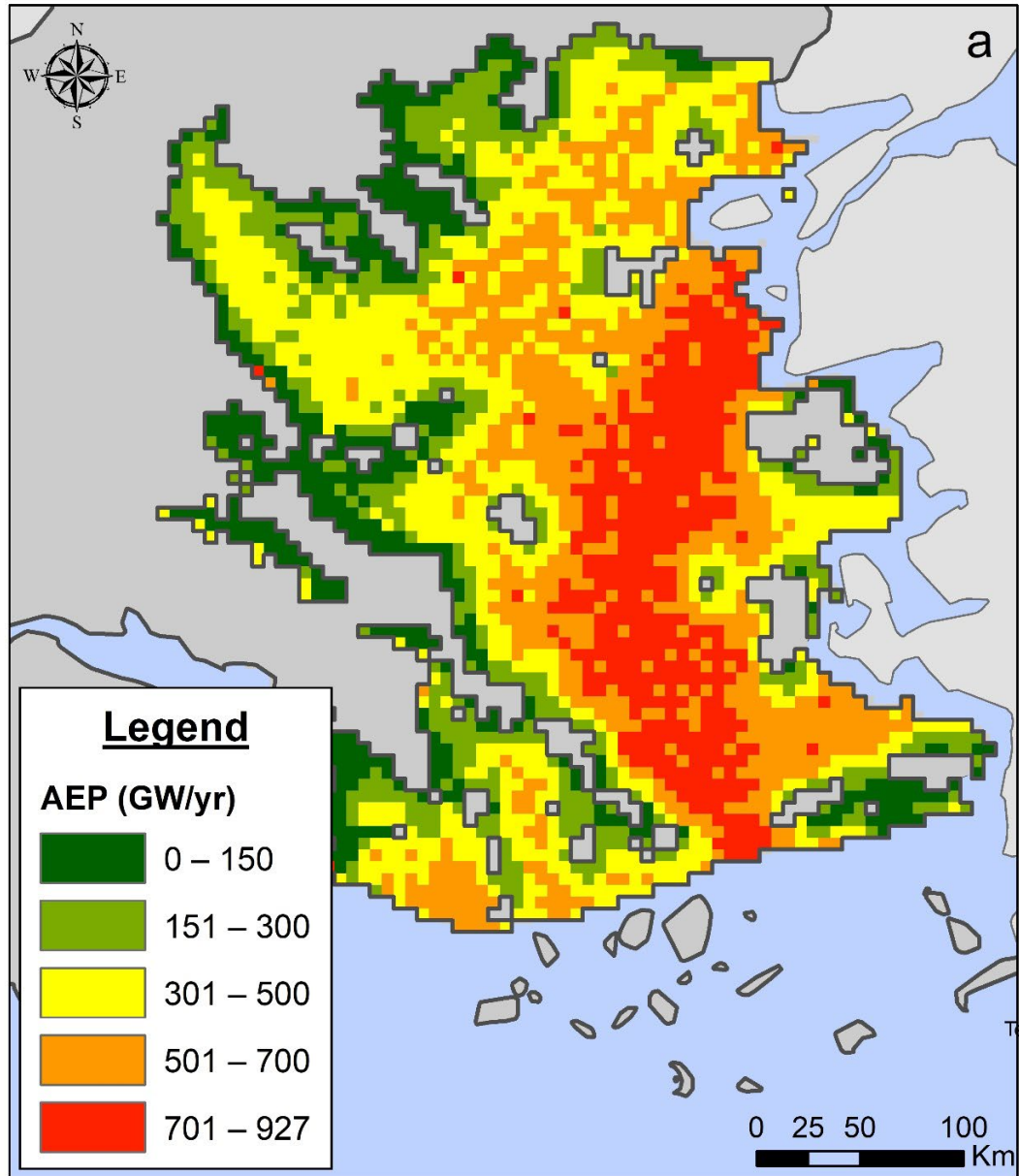
Criterion 4: Distance to onshore cable junctions

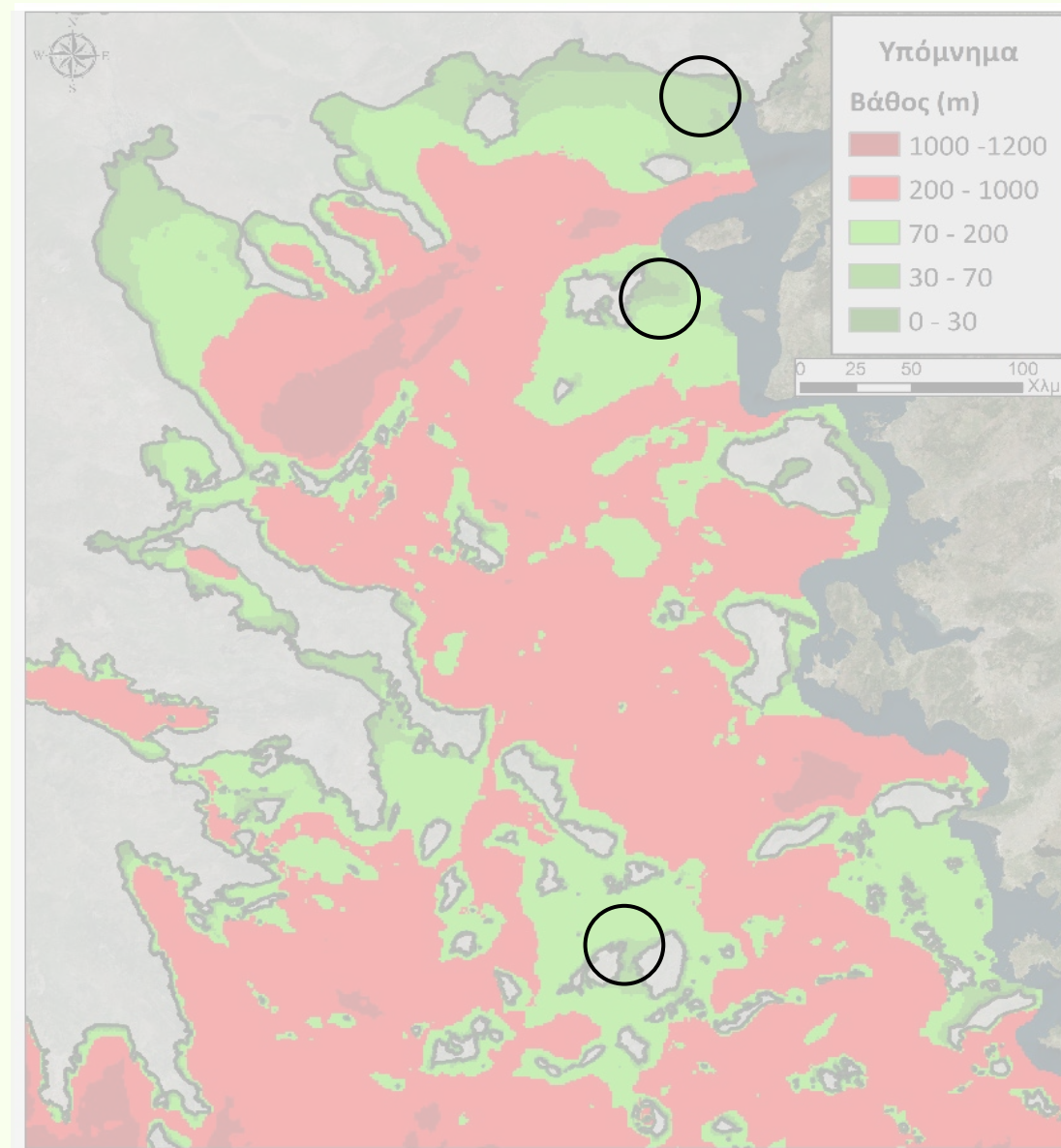
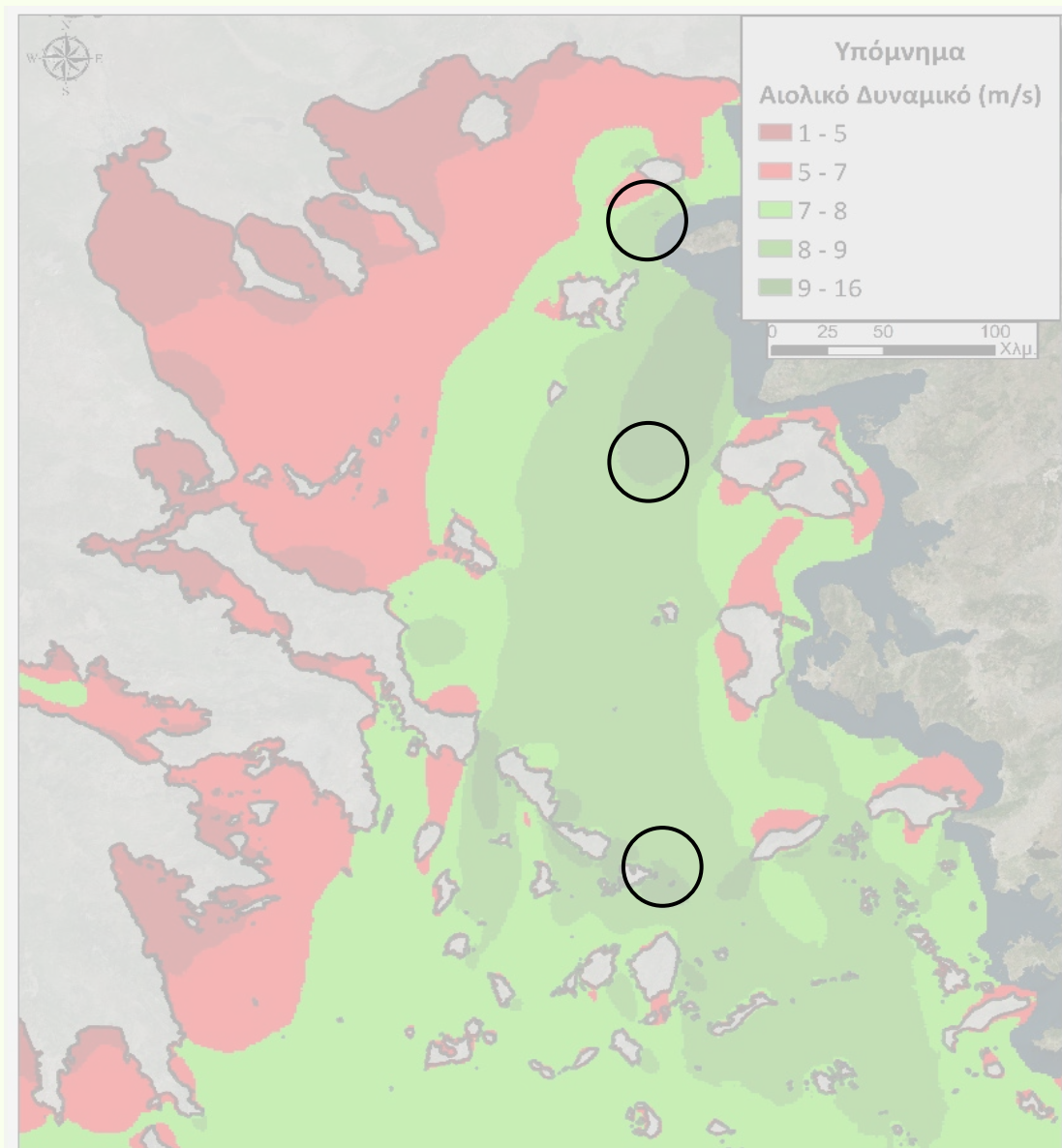


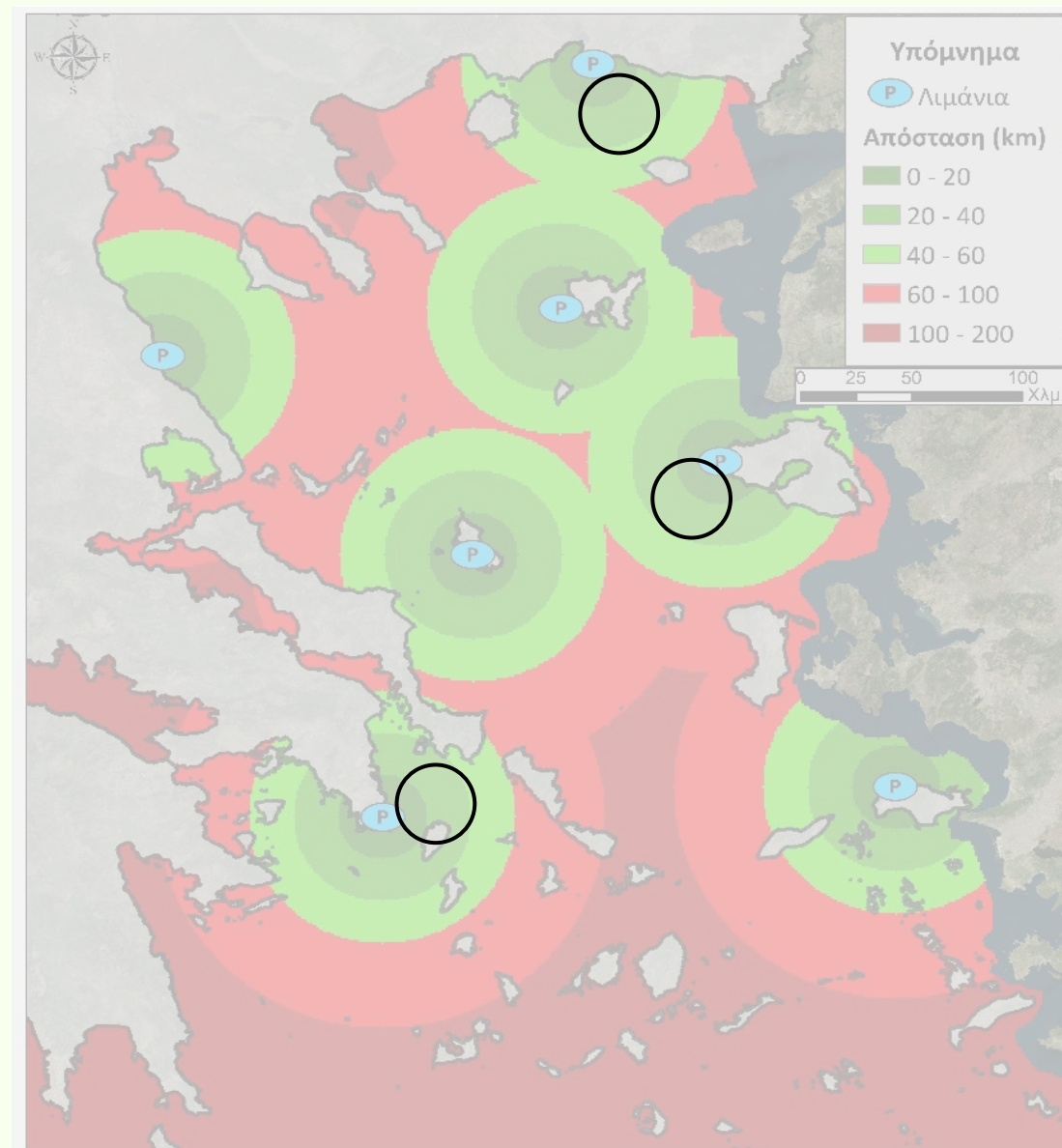
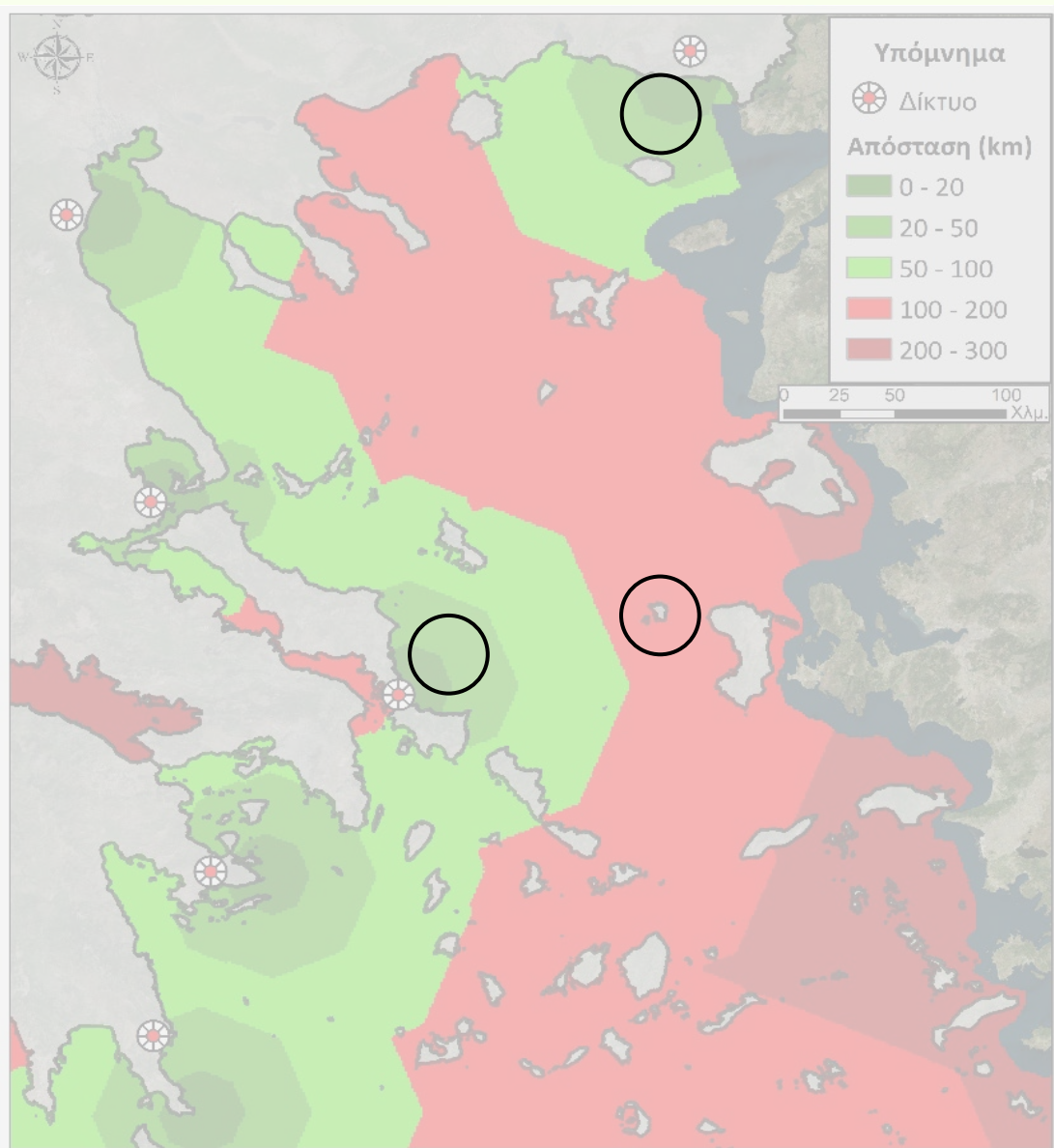
Criterion 5: Distance to ports

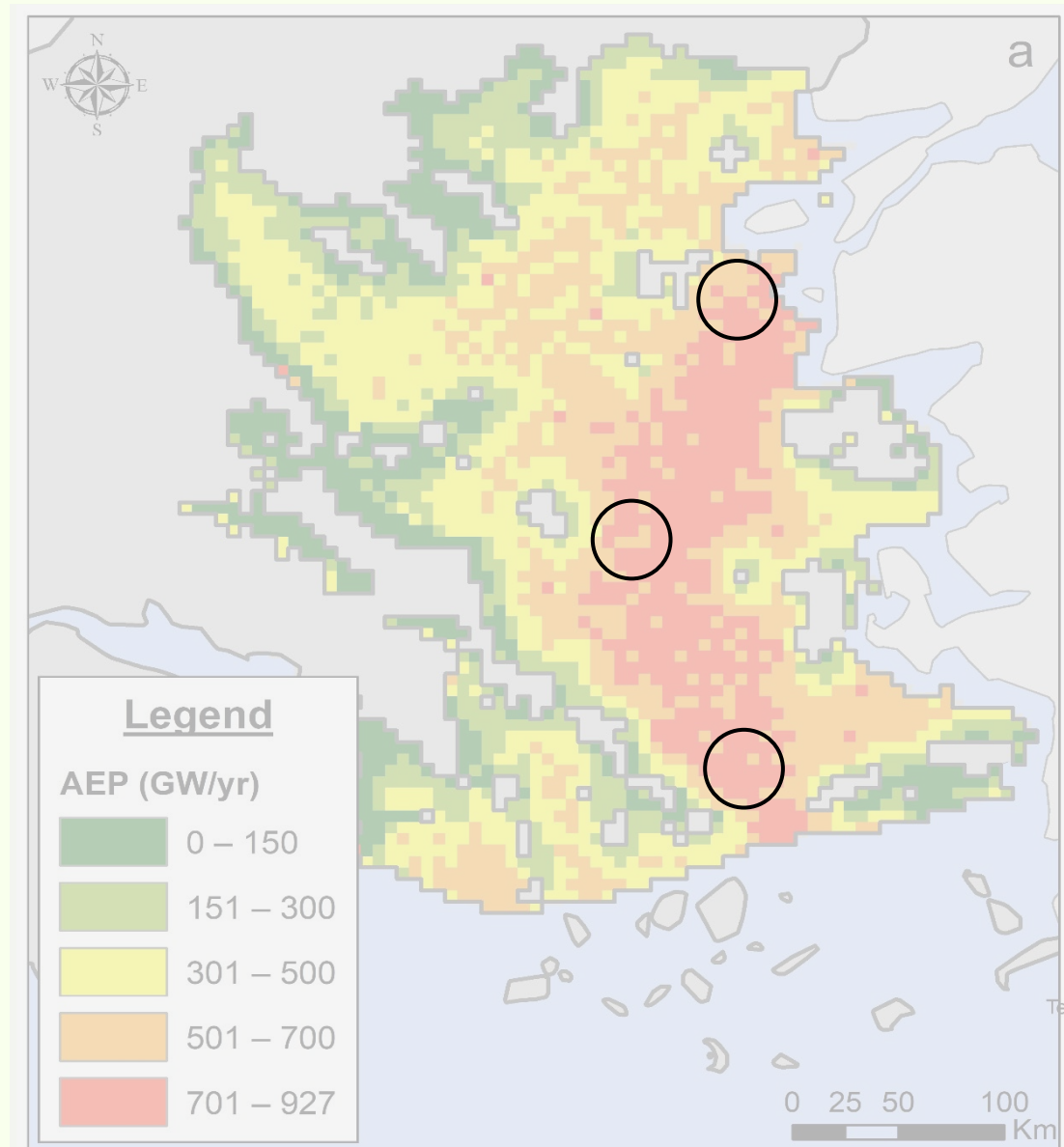
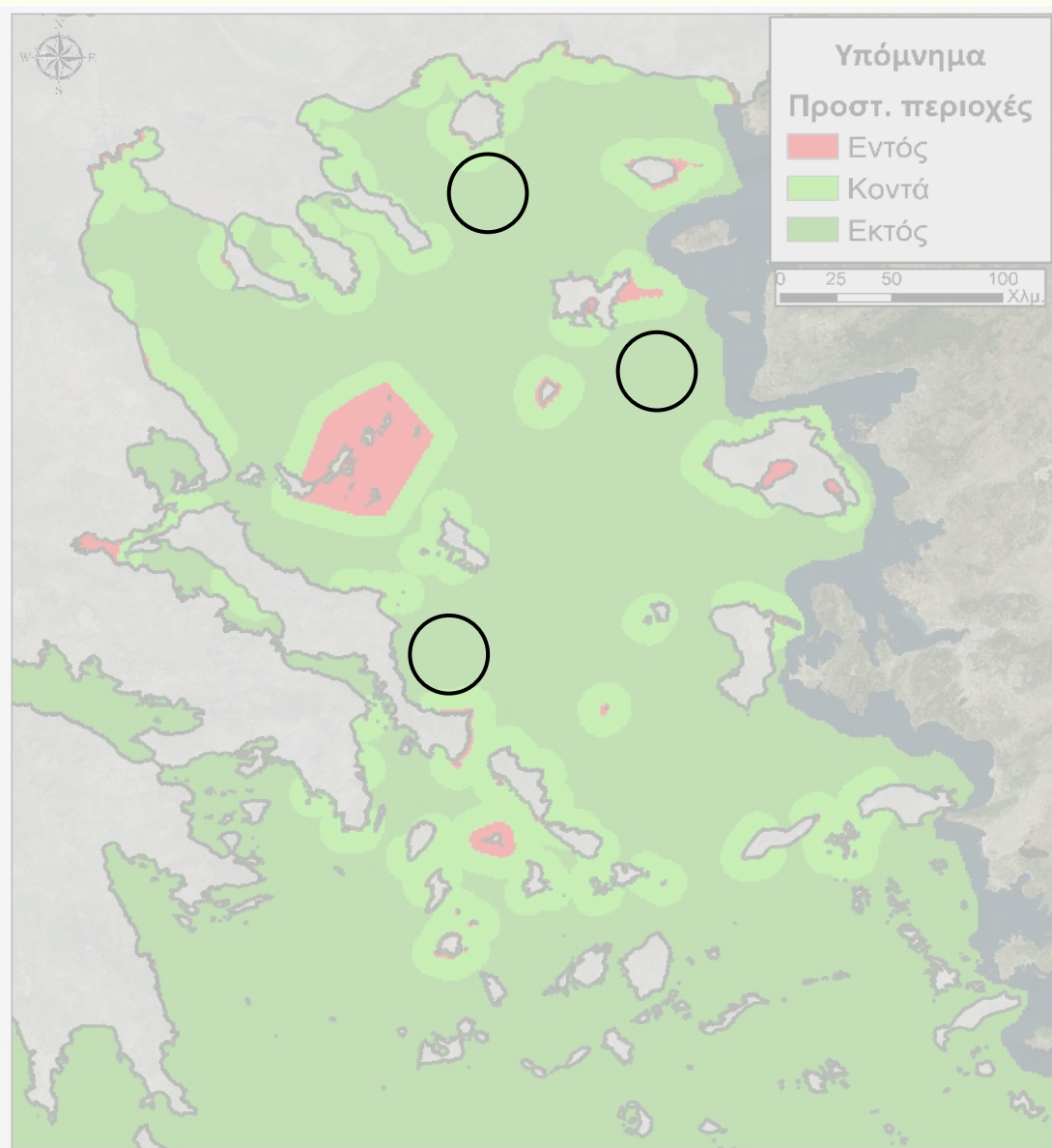


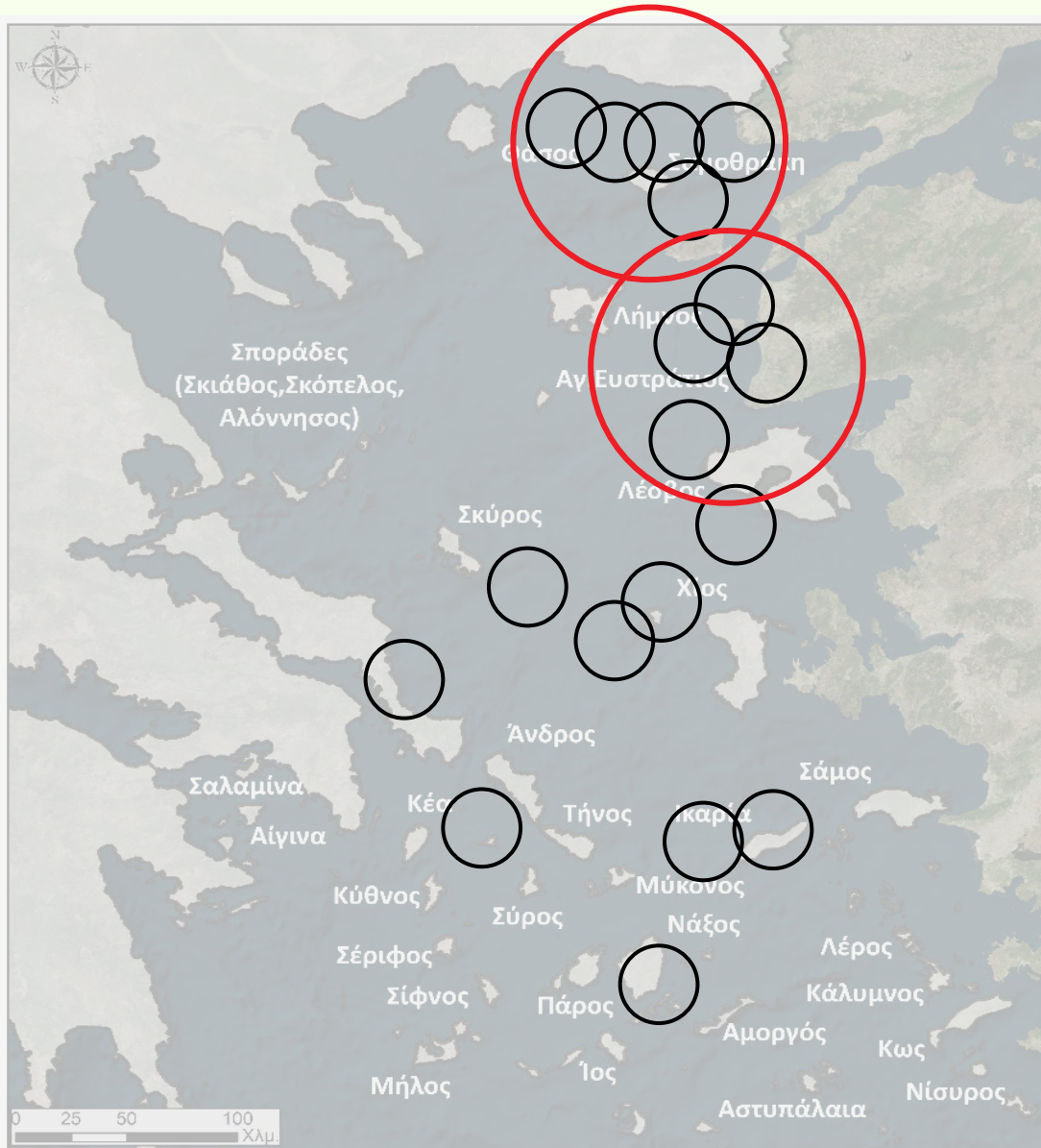
Criterion 6: Energy



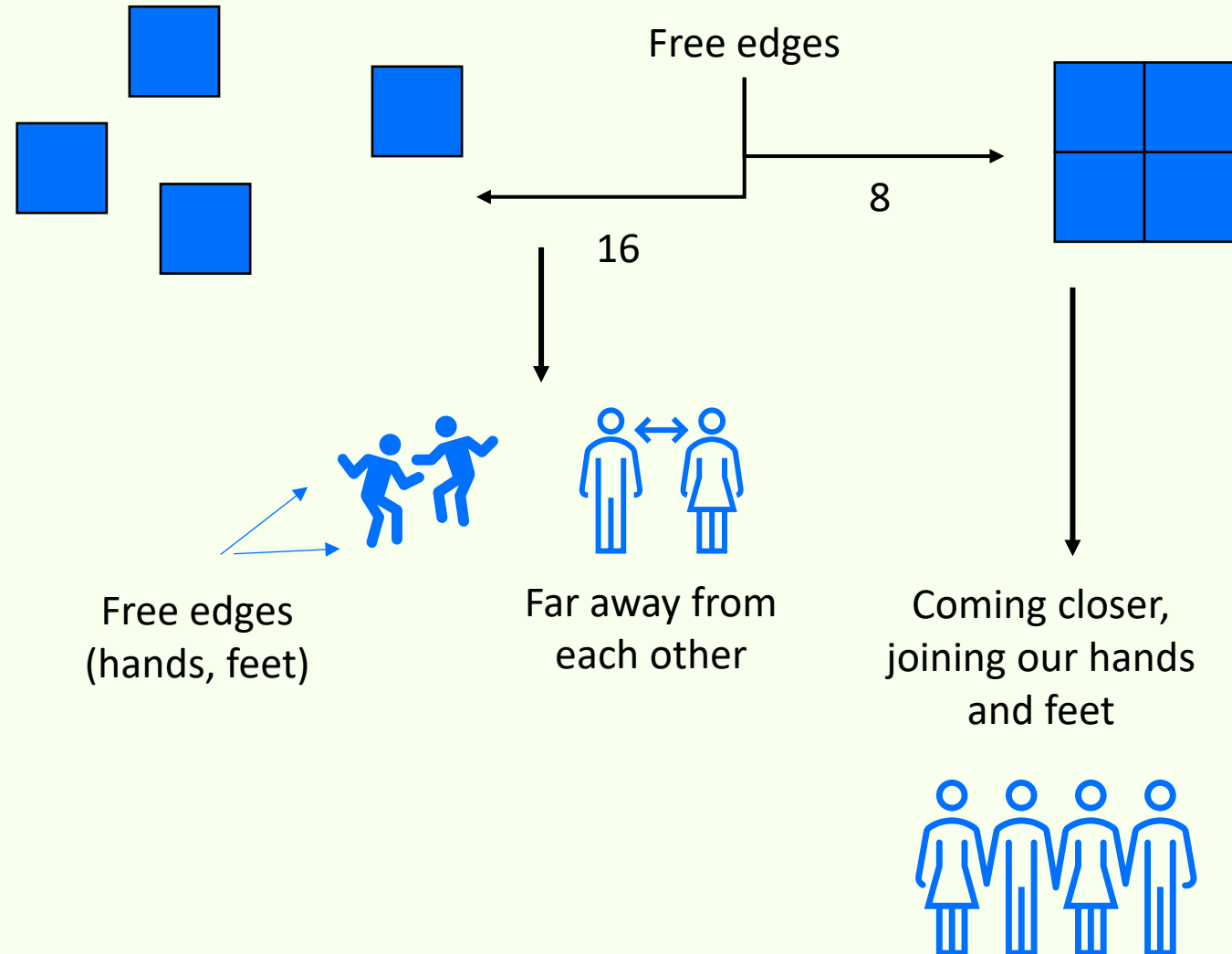








Explain how scientists solve complex spatial problems, i.e. compactness





Island / City	Number of houses
Evoia	60000
Andros	5000
Syros	6000
Paros	7000
Naxos	9000
Tinos	7000
Mykonos	14000
Koufonisia	500
Donousa	80
Samos	12000
Chios	18000
Lesvos	25000
Sporades	10000
Aegina	5000
Athens	1000000
Thessaloniki	150000

Offshore Wind Turbine Structures

NEW: FLOATING TECHNOLOGY

Monopile

Jacket

**Tension Leg
Platform**

Semi-submersible

Spar

← **Blades**

← **Nacelle**

← **Turbine Support
Tower**

← **Platform**

← **Hull**

← **Transition
Piece**

← **Foundation**

Shallow Water

10 – 40 meters

Cost: 1.000.000 €

**Transitional
Water**

40 – 80 meters

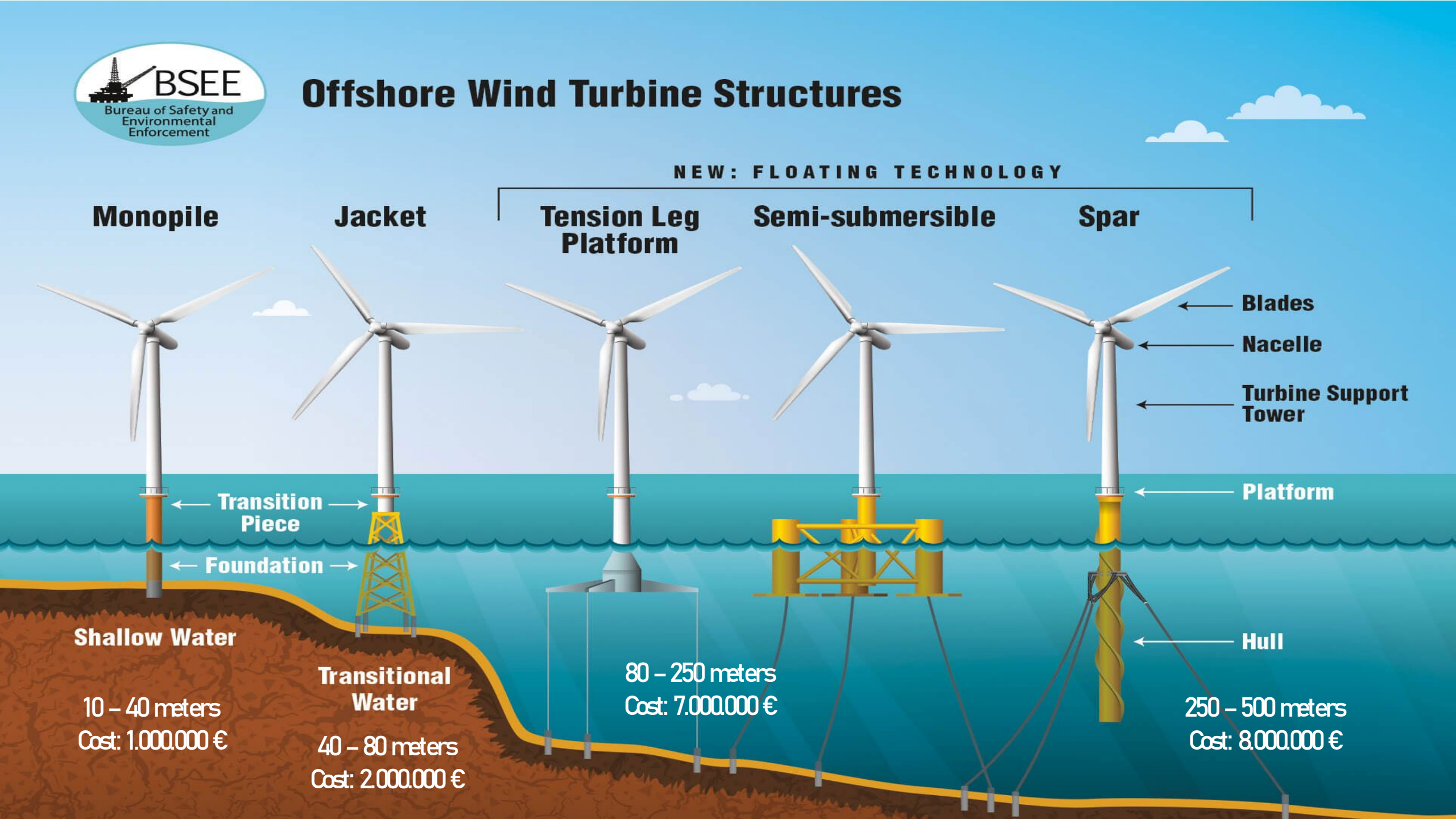
Cost: 2.000.000 €

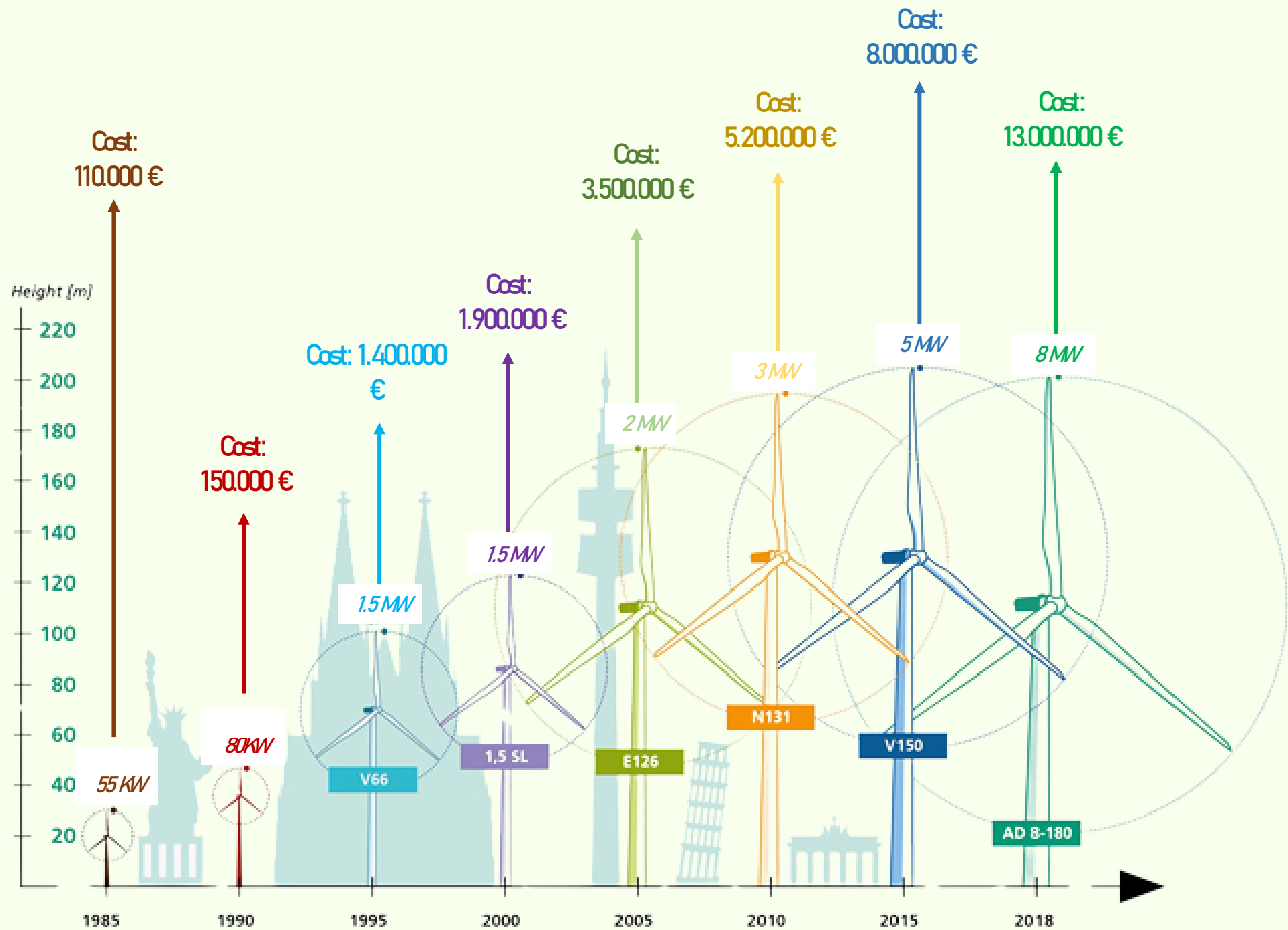
80 – 250 meters

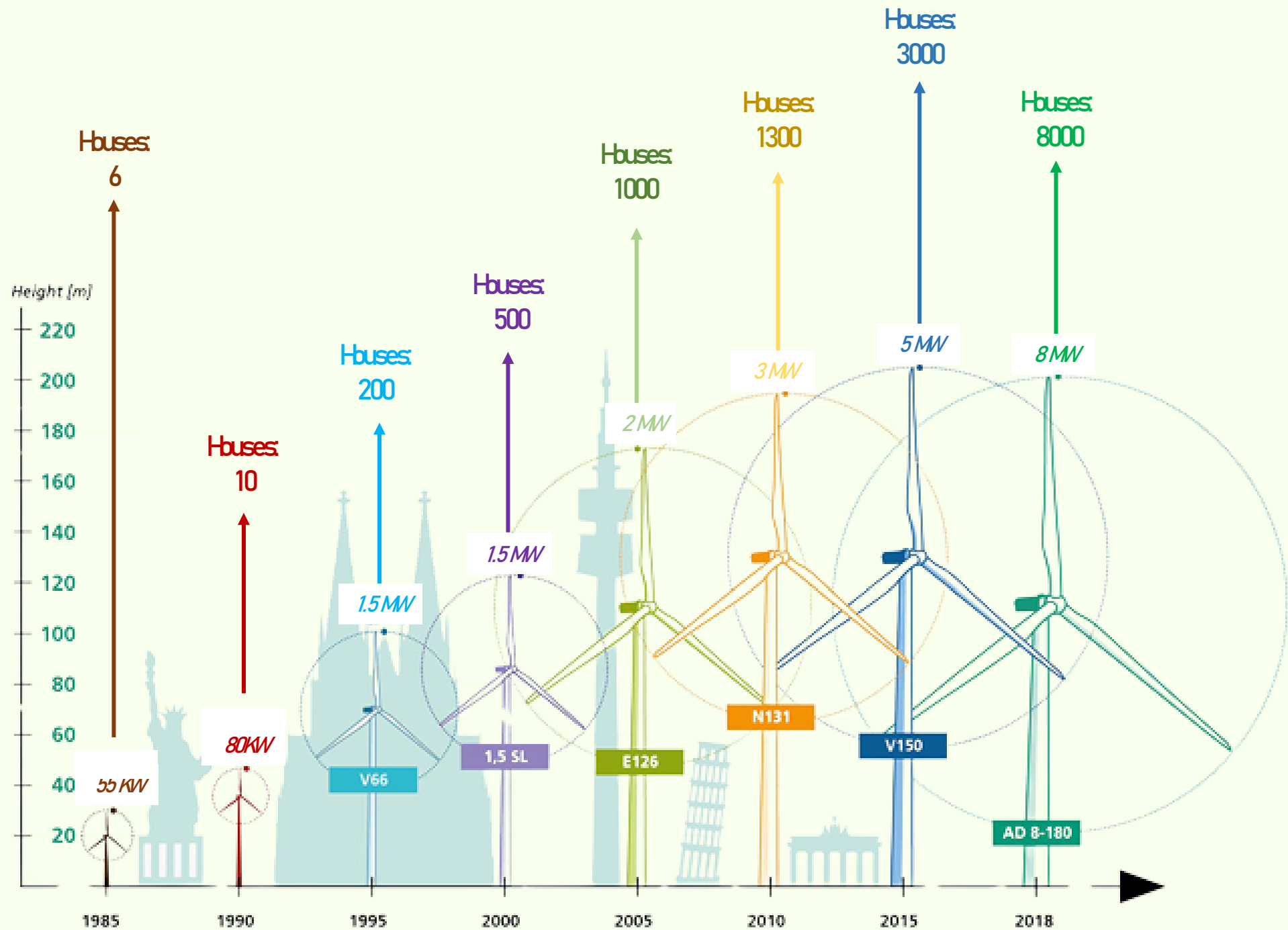
Cost: 7.000.000 €

250 – 500 meters

Cost: 8.000.000 €







Use Google Earth for the distance approximation!

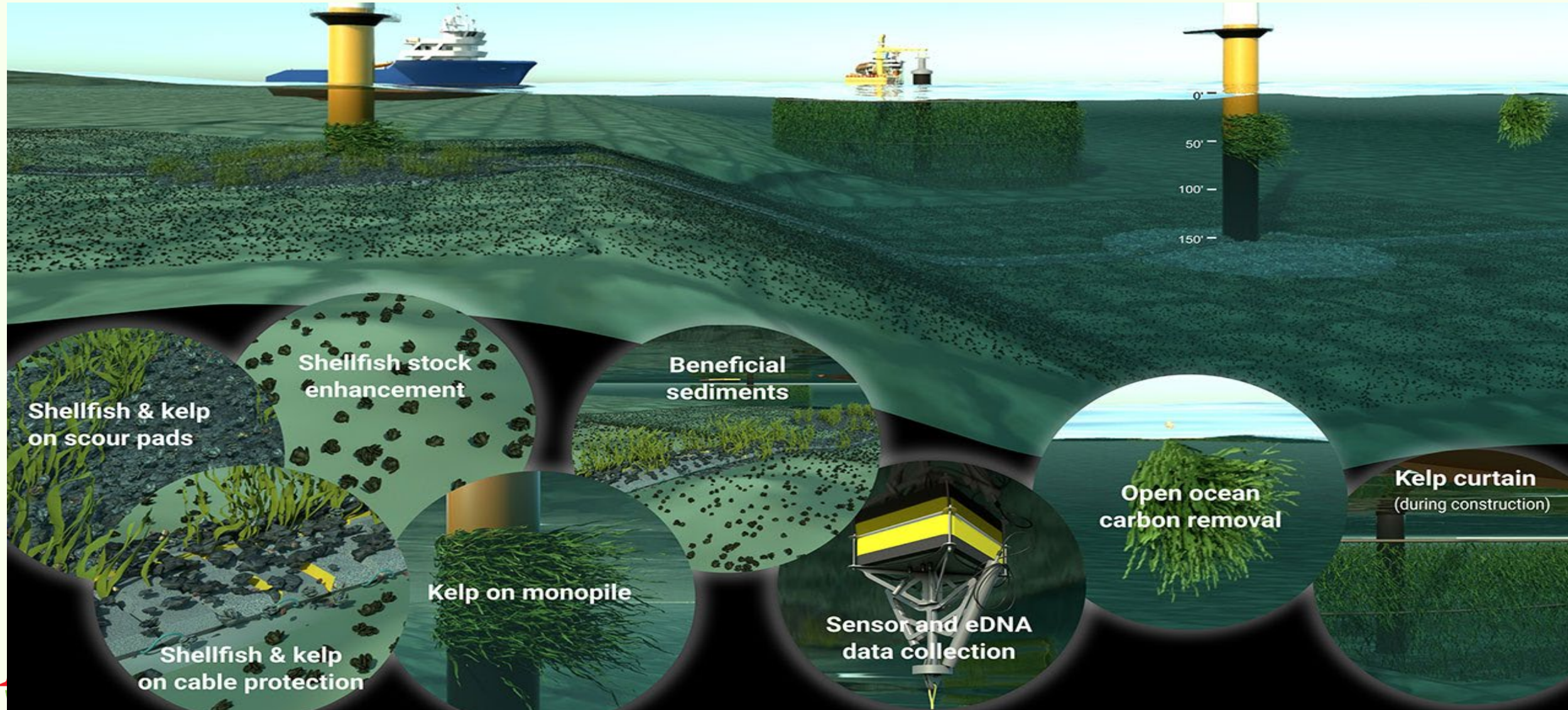


**Inter- and Intra-Connection Cables
between. The WT's and the WT's to the
shore**



Cost / 1 meter: 2.000 €

Stage 3: Integrating Nature-based Solutions





Reef Balls

Cost /Wind Turbine

400.000 €

Superpower:
Concentrating a few marine
species and enhancing
biodiversity



Layer Cakes

Cost /Wind Turbine

600.000 €

Superpower:
Concentrating several
marine species and
enhancing biodiversity



Cube Reefs

Cost /Wind Turbine

300.000 €

Superpower:
Concentrating a few small
marine species and
enhancing biodiversity



Reef Cells

Cost /Wind Turbine

1.000.000 €

Superpower:
Concentrating many different
marine species and
enhancing biodiversity



Fleximats



Cost /1 meter

100 €

Superpowers:

Cable protection, reduce magnetic fields, biodiversity increase



EOncrete



Cost / Structure

1.500€

Superpowers:

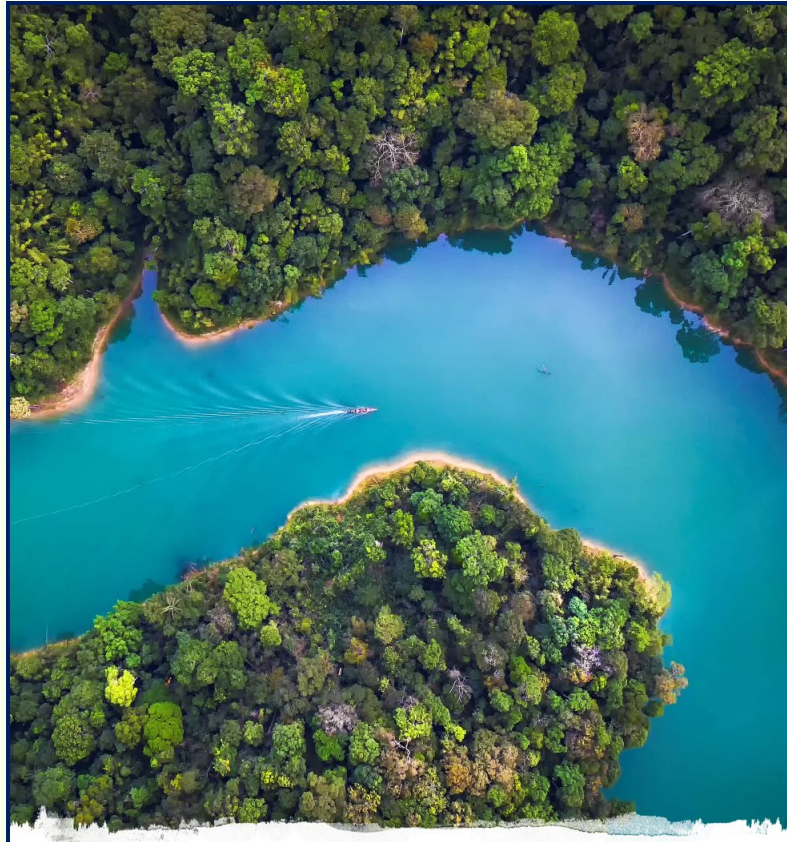
Enhanced ecosystem growth as oysters, worms, bryozoans and coral algae grow Absorption of carbon dioxide (CO₂)

Nature-based Solutions για το Γυμνάσιο



Integrating Nature – based Solutions (NbS) into your city

Project-based activity
7th – 9th Grade



Setting the scene

The problem

The context

Ποια NbS;



Forested green areas

Installation cost (EUR/m²)
1.32

Maintenance cost (EUR/m²)
2.49

Average Annual Cost by 2030 (EUR/m²)
0.47

Effectiveness against
Flood Risk: 1.9

Heat Island Effect
Reduction: 3

Environmental
Co-Benefits: 2.3



Urban parks, forests and other green spaces in cities.

They constitute green corridors that provide many benefits to mitigate the climatic risks. The most effective concepts involve the planting of trees and a large surface.

Biasin et al. (2023). <https://doi.org/10.3390/land12020280>
Photo Reference: Jitwimon Winitchaikul, Shutterstock, 1512042734



Urban Gardens

Installation cost (EUR/m²)
3.85

Maintenance cost (EUR/m²)
3.85

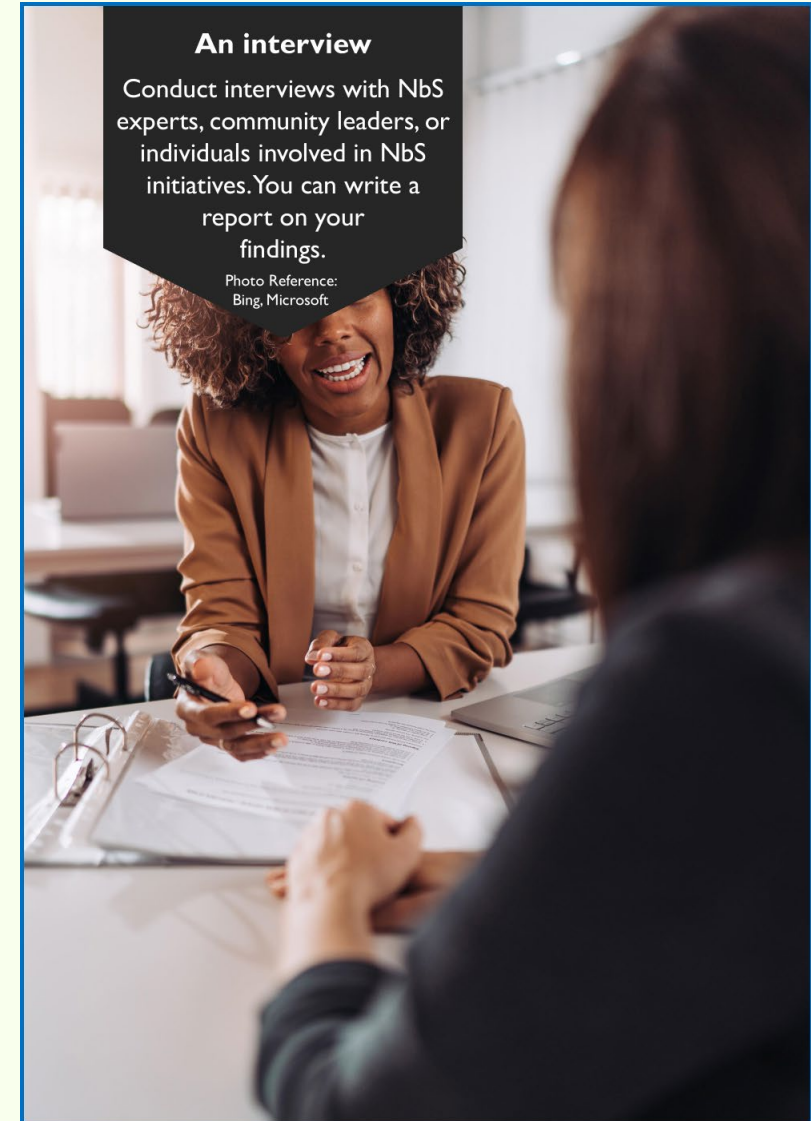
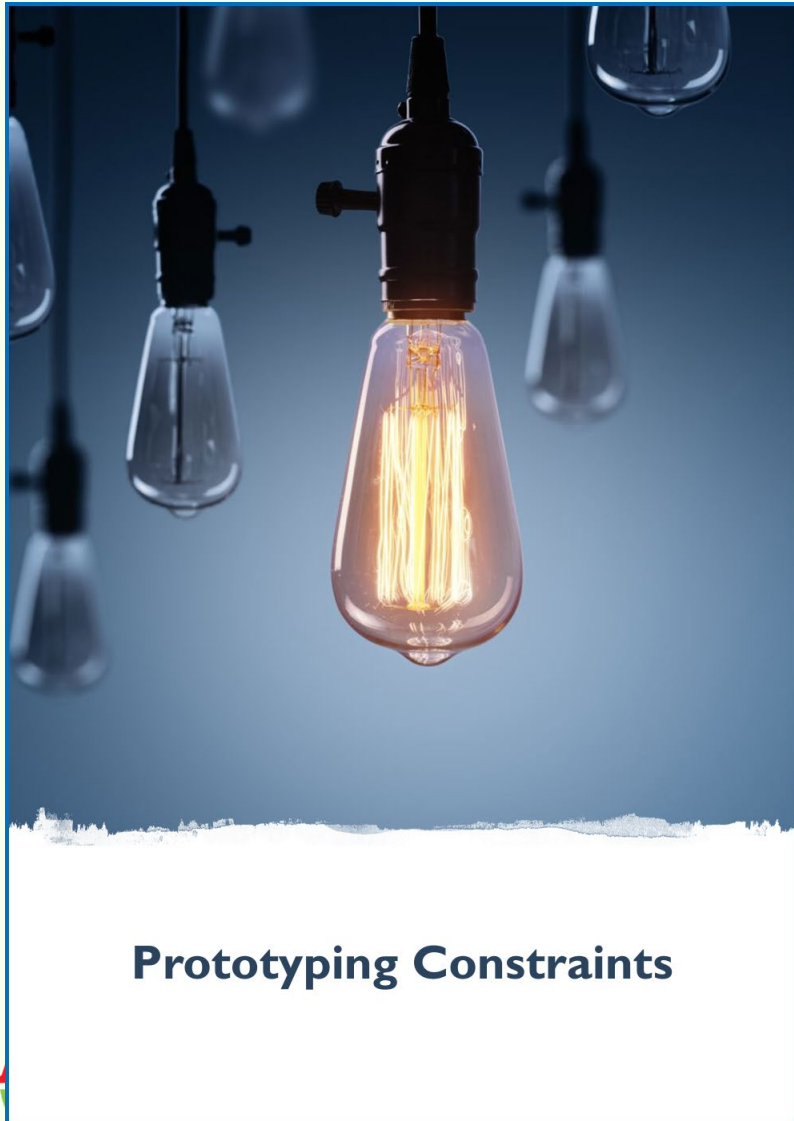
Average Annual Cost by 2030 (EUR/m²)
4.3

Effectiveness against
Flood Risk: 1.2

Heat Island Effect
Reduction: 2

Environmental
Co-Benefits: 1.6

Ποιο θα είναι το πρωτότυπό μας;



Με ποιους θα συνεργαστούμε;



Potential Societal Actors



A soil expert

Soil experts can help with Nature-based Solutions and Urban Soil Management and improvement of soil quality, Soil Conservation and Restoration, Microorganisms and Soil Life and Soil Composition and Health.

Photo Reference:
Bing, Microsoft



A local artist

An artist can help with Nature-based Solutions and how to use art to depict environmental issues and solutions creatively, raising awareness and inspiring action towards NbS and sustainability. An artist could also encourage collaborative art projects focused on nature, like mural painting, sculpture installations, or community gardens, fostering a deeper connection and appreciation for NBS.

Photo Reference:
Bing, Microsoft

Παρουσίαση του φαινομένου / προβλήματος

[Introduction](#)

[Purpose of Study](#)

[Layers - Heat Risk Index](#)

[Heat Risk Index](#)

[Index - Discussion](#)

[Comparison between 2021 and 20...](#)

[Time for Action!](#)

[Resources are available](#)



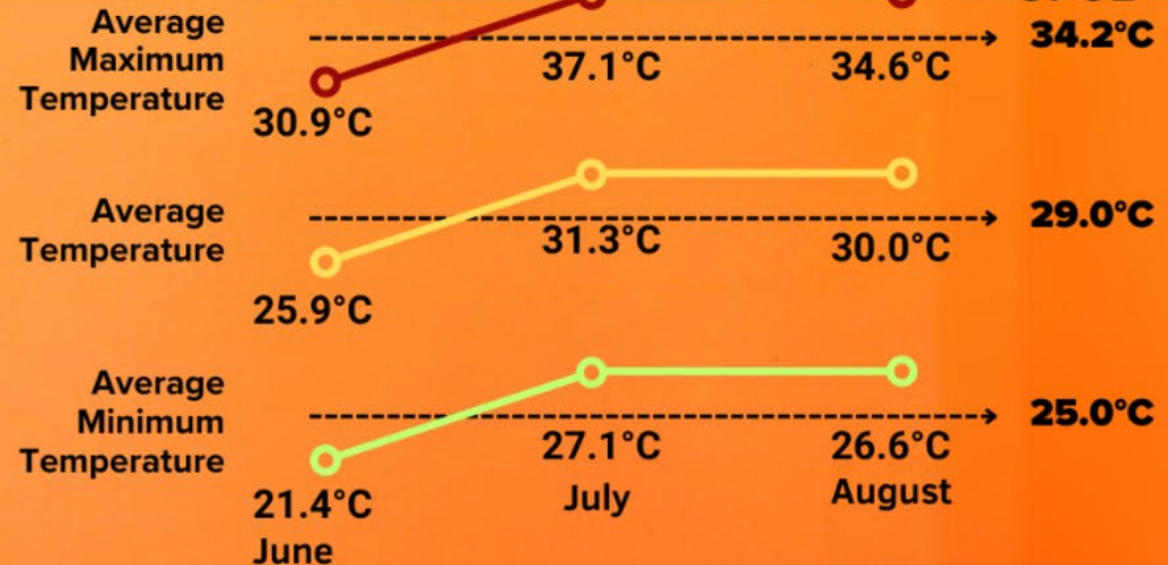
i

Temperatures

The 2023 heatwave in Athens, also known as "Cleon", was a historical milestone:

- the average maximum temperature reached 37,1°C, the highest recorded since 1863.
- the highest temperature reached 42,8° C.
- Had a duration of 15 days, breaking all records (Kathimerini, 2023).

The same source states that the highest minimum (night) temperature was 30.8°C, while the



Summer 2023



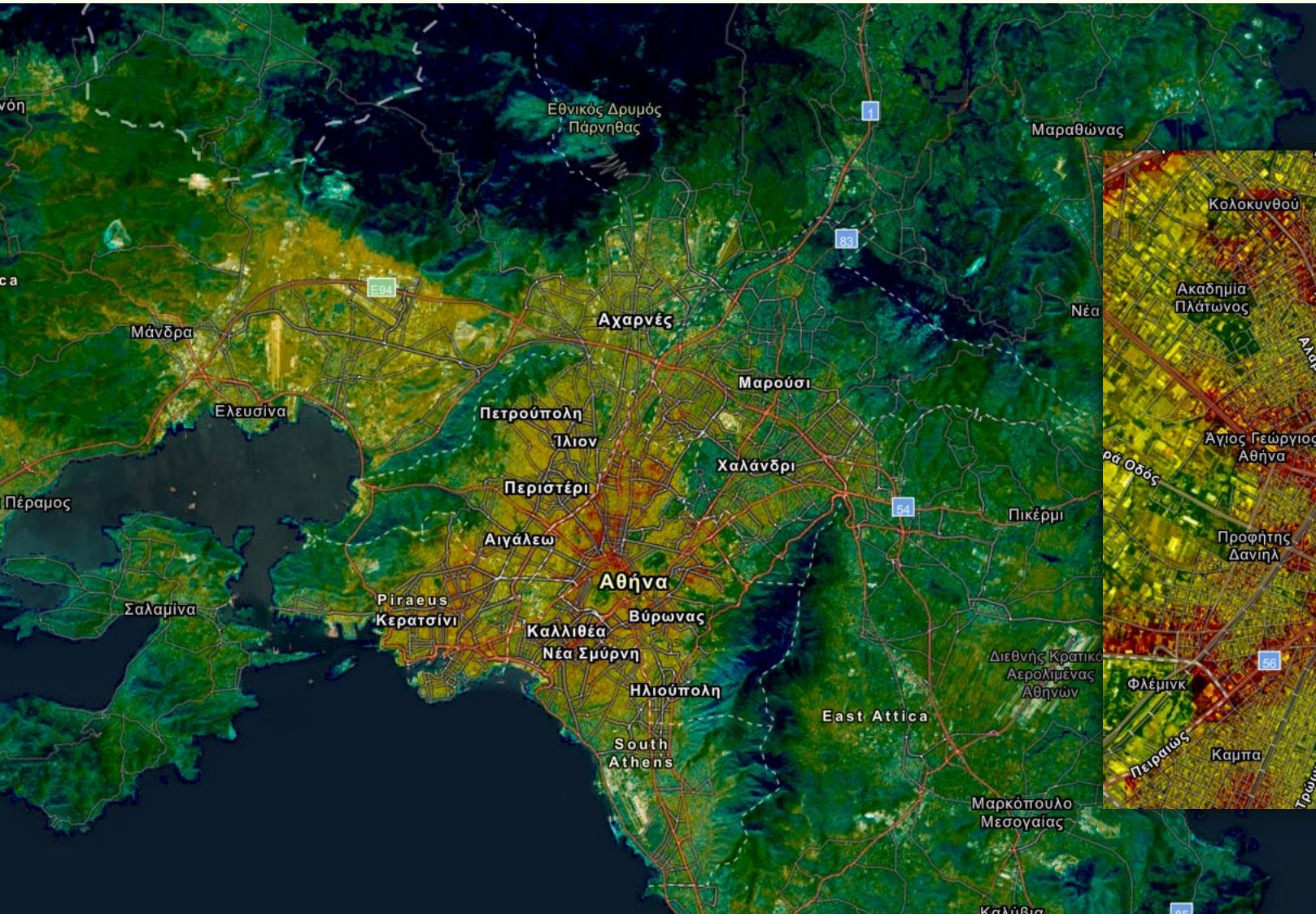
GEO-ACADEMY
GEO-Hub for teachers in Europe

<https://storymaps.arcgis.com/stories/9232e7d5a1c84408a61e0ac36c74296e>

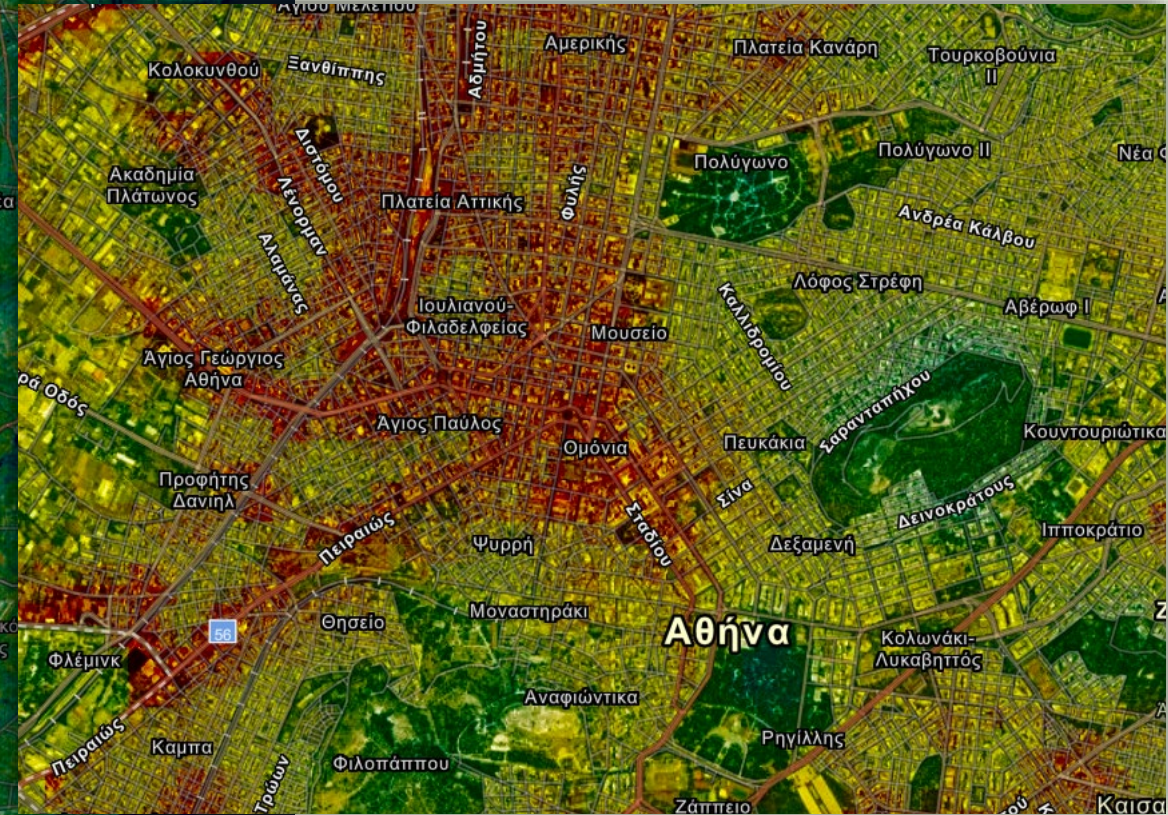
Co-funded by the
Erasmus+ Programme
of the European Union



Υπολογισμός δείκτη HRI - Αθήνα



<https://unipigis.maps.arcgis.com/apps/insant/basic/index.html?appid=f603205c71564161b120823cef7146bc>



Co-funded by the
Erasmus+ Programme
of the European Union



Υπολογισμός δείκτη HRI



ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ
UNIVERSITY OF PIRAEUS

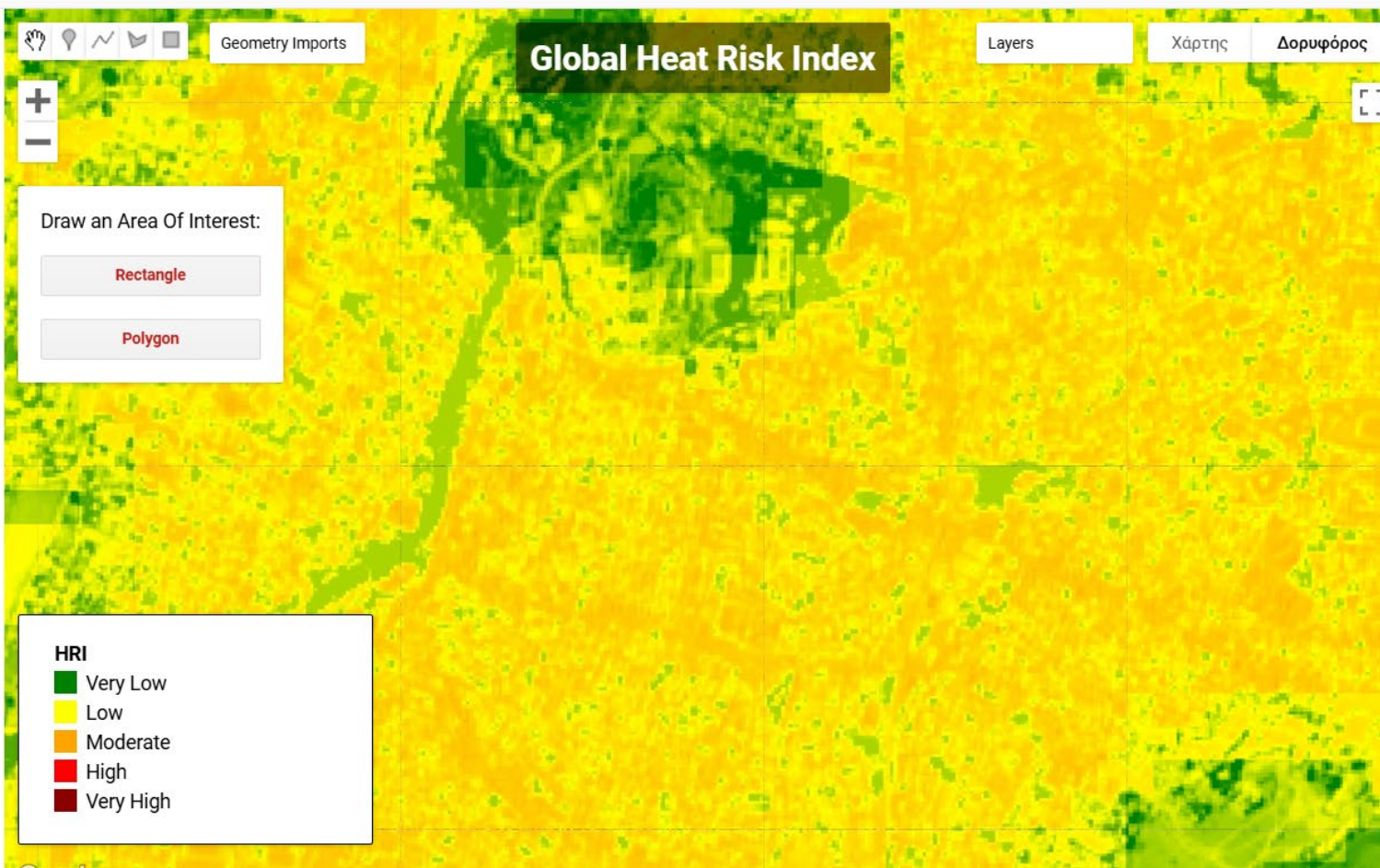
GIS Laboratory of Climate Crisis and
Information and Communication Technologies



Search places

Earth Engine Apps

Coordinates - Values of HRI



Explore the app

This application calculates the Heat Risk Index (HRI) for specific regions, providing valuable insights into the management of urban heat stress and supporting evidence based strategies for effective intervention planning.

Select Year:

2023

Compare with another year (optional):

Select a year

Calculate the Heat Risk Index

Activate Pixel Value Tool



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GEO-Hub for teachers in Europe

<https://unipi-gis.projects.earthengine.app/view/global-heat-risk-index>

Co-funded by the
Erasmus+ Programme
of the European Union



Επιλογή περιοχής μέσω του Google Earth Pro

Google Earth Pro

<https://www.google.com/earth/about/versions/#earth-pro>

Εκτύπωση χάρτης με κλίμακα

My Google Maps

<https://www.google.com/maps/d/u/0/>

Εκτύπωση χάρτη χωρίς κλίμακα

Οι μαθητές δουλεύουν πάνω στον χάρτη, κάνουν υπολογισμούς, επιλέγουν ποια NbS μπορούν να ενσωματωθούν κλπ.

Εργάζονται σε ομάδες (π.χ. συντονιστής, υπεύθυνος για τα NbS, υπεύθυνος επικοινωνίας με ειδικούς)



GEO-ACADEMY
GEO-Hub for teachers in Europe

Co-funded by the
Erasmus+ Programme
of the European Union



Διανυσματικά Δεδομένα (Κύπρος)

Ακτογραμμή Κύπρου

<https://mapcruzin.com/free-cyprus-country-city-place-gis-shapefiles.htm>

Τμήμα Κτηματολογίου και Χωρομετρίας

https://portal.dls.moi.gov.cy/arxeia_dedomenwn_category/enimerosi/archeia-dedomenon/geografika-dedomena-archeia-shape-files-noemvrios-2023/

Εδαφοκάλυψη

<https://cdr.eionet.europa.eu/cy/eea/clc/envw589zq/>

Ποιότητα αέρα

<https://www.airquality.gov.cy/>

Εθνική Πύλη Ανοιχτών Δεδομένων

https://www.data.gov.cy/el/search?s=&f%5B0%5D=content_type%3Adataset.dataset

Υπόβαθρα (ΙΠΠΟΔΑΜΟΣ)

<https://hippodamus.tph.moi.gov.cy/#/map>

Υγρότοποι Κύπρου

<https://www.cypruswetlands.org/general/search.php?lang=el&action=export>

Περιοχές αστικής ανάπτυξης

<https://human-settlement.emergency.copernicus.eu/>

Δεδομένα Open Street Maps (OSM)

<https://extract.bbbike.org/>

Ψηφιδωτά Δεδομένα (Κύπρος)

Ανέμου / Ενέργειας / Βαθυμετρίας

<https://globalwindatlas.info/en/>

Δεδομένα Ηλιακής Ακτινοβολίας / Ενέργειας από Φωτοβολταϊκά

<https://globalsolaratlas.info/map>

Global Human Settlement data

<https://human-settlement.emergency.copernicus.eu/>

Bathymetry Europe – EMODnet

<https://emodnet.ec.europa.eu/geoviewer/>

Υψόμετρα Κύπρου (Digital Elevation Model)

https://figshare.com/articles/dataset/A_Digital_Elevation_Model_for_Cyprus_based_on_the_ALOS_2_W3D30_Digital_Surface_Model/3159991



Εισαγωγή και επεξεργασία δεδομένων

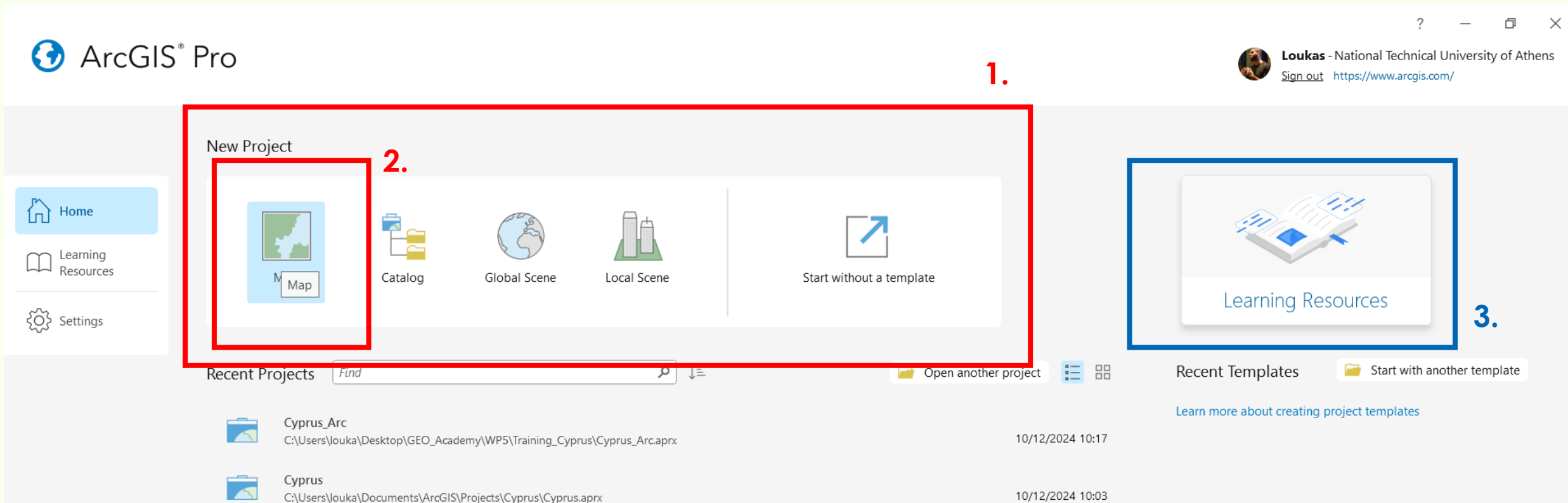




Όνομα	Επώνυμο	Όνομα χρήστη	Password
user1	user1	educyprus1	geocyprus1
user2	user2	educyprus2	geocyprus2
user3	user3	educyprus3	geocyprus3
user4	user4	educyprus4	geocyprus4
user5	user5	educyprus5	geocyprus5
user6	user6	educyprus6	geocyprus6
user7	user7	educyprus7	geocyprus7
user8	user8	educyprus8	geocyprus8
user9	user9	educyprus9	geocyprus9
user10	user10	educyprus10	geocyprus10
user11	user11	educyprus11	geocyprus11
user12	user12	educyprus12	geocyprus12
user13	user13	educyprus13	geocyprus13
user14	user14	educyprus14	geocyprus14
user15	user15	educyprus15	geocyprus15
user16	user16	educyprus16	geocyprus16
user17	user17	educyprus17	geocyprus17
user18	user18	educyprus18	geocyprus18
user19	user19	educyprus19	geocyprus19
user20	user20	educyprus20	geocyprus20



ArcGIS Pro - Εισαγωγή



1. **Επιλογές δημιουργίας project:** Χαρτοσύνθεση, Κατάλογος δεδομένων, 3D αποτύπωση
2. **Επιλέγουμε τον χάρτη – χαρτοσύνθεση (Map)**
3. **Διαθέσιμο εκπαιδευτικό υλικό** με παραδείγματα και αναλυτικές περιγραφές

ArcGIS Pro - Map

1. **Project:** Μπορούμε να σώσουμε το project στο οποίο θα δουλέψουμε

2. **Map:** Εισαγωγή δεδομένων (vector ή raster) και υποβάθρων

ArcGIS Pro – Δεδομένα Κύπρου

ArcGIS Pro interface showing a map of Cyprus with various data layers and analysis tools.

Top Bar: Project, Map, Insert, Analysis, View, Edit, Imagery, Share, Help. Command Search (Alt+Q). User: Loukas - National Technical University of Athens.

Toolbars: History, Python, Environments, Ready To Use Tools, Tools, Pairwise Buffer, Summarize Within, Spatial Join, Feature Analysis, Raster Analysis, Data Engineering, Suitability Modeler, Visibility Analysis, Exploratory 3D Analysis, Simulation, Network Analysis, Neighborhood Explorer, Geostatistical Wizard, Business Analysis, Raster Functions, Function Editor.

Contents Panel:

- Search
- Drawing Order
- Map
 - cyprus_coastline
 - cyprus_coastline_poly
 - Extract_area2
 - Value
 - 2 - 3.766
 - 3.767 - 4.412
 - 4.413 - 4.989
 - 4.99 - 5.737
 - 5.738 - 10.663
 - area_1_elevation_w_bathymetry.tif
 - Value
 - 1929
 - 2850
 - area_1_wind-speed_100m.tif
 - Value
 - 10.663
 - 1.99941
- World Topographic Map (Greece)

Map: Cyprus map showing Nicosia, Paphos, Limassol, and major roads (E903, A5, B6, A3). Scale: 1:1,234,822. Coordinates: 33.1599179°E 34.0403944°N.

Symbology - Extract_area2:

Primary symbology: Classify

Field: No fields

Normalization: No fields

Method: Natural Breaks (Jenks)

Classes: 5

Color scheme: [Color bar]

Classes:

Color	Upper value	Label
Dark Green	≤ 3.766097	2 - 3.766
Light Green	≤ 4.411619	3.767 - 4.412
Yellow	≤ 4.989191	4.413 - 4.989
Orange	≤ 5.736637	4.99 - 5.737
Red	≤ 10.662985	5.738 - 10.663

ArcGIS Pro – Μετατροπή γραμμών σε πολύγωνα

The screenshot displays the ArcGIS Pro interface with a map of Cyprus. The 'Analysis' tab is selected in the top ribbon, and the 'Tools' button is highlighted with a red box and the number '1'. A tooltip for the 'Geoprocessing' pane is visible, stating: 'Show the Geoprocessing pane. You can search for a specific tool, see a list of favorite and recently run tools, and explore all tools and toolboxes that are included in ArcGIS Pro.'

On the right side, the 'Geoprocessing' pane is open, showing a list of toolboxes. The 'Toolboxes' tab is selected, and the list includes various toolboxes such as 'AllSource Tools', 'Analysis Tools', 'Aviation Tools', 'Bathymetry Tools', 'Business Analyst Tools', 'Cartography Tools', 'Conversion Tools', 'Crime Analysis and Safety Tools', 'Data Interoperability Tools', 'Data Management Tools', 'Data Reviewer Tools', 'Defense Tools', 'Editing Tools', 'GeoAI Tools', 'GeoAnalytics Desktop Tools', 'Geocoding Tools', 'Geostatistical Analyst Tools', 'Image Analyst Tools', and 'Indoor Positioning Tools'. The 'Toolboxes' tab is highlighted with a red box and the number '2'.

At the bottom, two red text instructions are provided:

1. Στην main toolbar επιλέγουμε 'Analysis' - Tools
2. Δεξιά στην οθόνη εμφανίζονται τα Geopr. Tools. Επιλέγω 'Toolboxes'

ArcGIS Pro – Εύρεση εντολών/εργαλείων

The screenshot displays the ArcGIS Pro software interface. The top menu bar includes Project, Map, Insert, Analysis, View, Edit, Imagery, Share, and Help. The Analysis menu is currently open, showing various tool categories like Geoprocessing, Tools, Portal, Workflows, and Raster. A red box labeled '1.' highlights the 'Data Management Tools' category under the 'Features' sub-menu. Another red box labeled '2.' highlights the 'Find Tools' search bar in the 'Geoprocessing' pane on the right, which is used to search for the 'Feature To Polygon' tool. The main map area shows a topographic map of Cyprus with a red outline of the island. The left pane shows the 'Contents' list with layers like 'cyprus_coastline' and 'Extract_area2'. The bottom status bar shows the map scale as 1:1,234,822 and coordinates 35.0124404°E 35.2448862°N.

1. Επιλέγουμε Data Management Tools > Features > Feature to Polygon

2. Εναλλακτικά, γράφουμε στο Find tools 'Feature to Polygon'

ArcGIS Pro – Λογική εντολών

The screenshot shows the ArcGIS Pro interface with the following components:

- Top Menu Bar:** Project, Map, Insert, Analysis, View, Edit, Imagery, Share, Help.
- Toolbars:** History, ModelBuilder, Python, Environments, Ready To Use Tools, Tools, Pairwise Buffer, Summarize Within, Spatial Join, Feature Analysis, Raster Analysis, Data Engineering, Suitability Modeler, Visibility Analysis, Exploratory 3D Analysis, Simulation, Network Analysis, Neighborhood Explorer, Geostatistical Wizard, Business Analysis, Data Interop, Raster Functions, Function Editor.
- Contents Panel:** Search bar, Drawing Order, Map, cyprus_coastline, cyprus_coastline_poly, Extract_area2 (selected), Value ranges for elevation and wind speed.
- Map View:** A map of Cyprus with a red outline representing the coastline. Labels include Nicosia, Paphos, Limassol, and CYP RUS.
- Geoprocessing Panel:** Feature To Polygon tool. Parameters: Input Features (cyprus_coastline), Output Feature Class (cyprus_coastline_poly.shp), Preserve attributes (checked).

1. Input > Ακτογραμμή Κύπρου (γραμμή) και Output επιλέγω το εικονίδιο με τον φάκελο και αποθηκεύω το αρχείο μου σε φάκελο.

ArcGIS Pro – Αποτέλεσμα / Συμβολισμός

The screenshot displays the ArcGIS Pro interface. The main map area shows a coastline of Cyprus with a light purple fill and a dark red outline. The 'Contents' pane on the left lists several layers, with 'cyprus_coastline_poly' selected and highlighted by a red box and the number '1.'. The 'Symbology' pane on the right, also highlighted by a red box and the number '2.', shows the 'Primary symbology' for the selected layer. It is set to 'Single Symbol' with a light purple color swatch. The 'Label' and 'Description' fields are empty. The 'Command Search' bar at the top right shows 'Loukas - National Technical University of Athens'. The status bar at the bottom indicates the scale is 1:1,234,822 and the coordinates are 35.4632444°E 34.7776467°N.

1. Αλλαγή συμβολισμού/χρώματος πατώντας πάνω στο πολύγωνο

2. Αλλαγή συμβολισμού πατώντας στο όνομα του αρχείου

ArcGIS Pro – Buffer (Ζώνη επιρροής)

1. Analysis > Tools > Find Tools (δεξιά) > Buffer

2. Δεδομένα εισόδου (coast_poly) > Distance 20 km (linear unit), Side type: Exclude the input > Αποθηκεύω το αρχείο μου

The screenshot shows the ArcGIS Pro interface with the Buffer tool configured. The map displays the coastline of Cyprus with a 20km buffer zone. The Geoprocessing pane on the right shows the Buffer tool settings: Input Features: cyprus_coastline_poly, Output Feature Class: cyprus_coastline_buffer.shp, Distance: 20 Kilometers, Side Type: Exclude the input polygon from buffer, Method: Planar, Dissolve Type: No Dissolve. The Contents pane on the left shows the map layers: cyprus_coastline, cyprus_coastline_buffer, cyprus_coastline_poly, Extract_area2, area_1_elevation_w_bathymetry.tif, and area_1_wind-speed_100m.tif.

ArcGIS Pro – Clip raster

The screenshot displays the ArcGIS Pro software interface. The 'Analysis' tab is selected in the top ribbon, and the 'Tools' button is highlighted with a red box and the number '1.'. The 'Geoprocessing' pane on the right is open, showing the 'Extract by Mask' tool. The tool's parameters are configured as follows:

- Input raster:** area_1_elevation_w_bathymetry.tif
- Input raster or feature mask data:** cyprus_coastline_poly
- Output raster:** Elevation_Clip
- Extraction Area:** Inside
- Analysis Extent:** X and Y Extent (Top: 35.6967152, Left: 32.269213, Right: 34.5915364, Bottom: 34.562252)

The 'Contents' pane on the left shows the map layers, including 'cyprus_coastline_buffer' and 'area_1_elevation_w_bathymetry.tif'. The map area displays a grayscale elevation raster of Cyprus with a black coastline buffer overlay. The status bar at the bottom indicates the map's extent and coordinate system (GCS WGS 1984).

1. Analysis > Tools > Find Tools (δεξιά) > Extract by Mask

2. Input: Elevation raster, Input mask: coast_poly, Output, Extraction: Inside

ArcGIS Pro – Clip raster result

Cyprus_Arc

Command Search (Alt+Q)

Loukas - National Technical University of Athens

Project Map Insert Analysis View Edit Imagery Share Help Raster Layer Data

History ModelBuilder Python Ready To Use Tools Tools Pairwise Buffer Summarize Within Spatial Join Feature Analysis Raster Analysis Data Engineering Exploratory 3D Analysis Neighborhood Explorer Data Interop Raster Functions Function Editor

Geoprocessing Tools Portal Workflows

Contents

Search

Drawing Order

- Map
 - cyprus_coastline
 - cyprus_coastline_buffer
 - cyprus_coastline_poly
 - Elevation_clip**
- area_1_elevation_w_bathymetry.tif
- area_1_wind-speed_100m.tif

Value

- 2 - 3.766
- 3.767 - 4.412
- 4.413 - 4.989
- 4.99 - 5.737
- 5.738 - 10.663

1.

2.

1. Πατάω στο όνομα του αρχείου (raster)

2. Primary symbology: Classify, επιλέγω χρωματική παλέτα

Symbology - Elevation_clip

Primary symbology

Classify

Field No fields

Normalization No fields

Method Natural Breaks (Jenks)

Classes 5

Color scheme

Classes Mask Histogram

More + 0.0 - 0.0

Color	Upper value	Label
2 - 3.766	≤ 3.766097	2 - 3.766
3.767 - 4.412	≤ 4.411619	3.767 - 4.412
4.413 - 4.989	≤ 4.989191	4.413 - 4.989
4.99 - 5.737	≤ 5.736637	4.99 - 5.737
5.738 - 10.663	≤ 10.662985	5.738 - 10.663

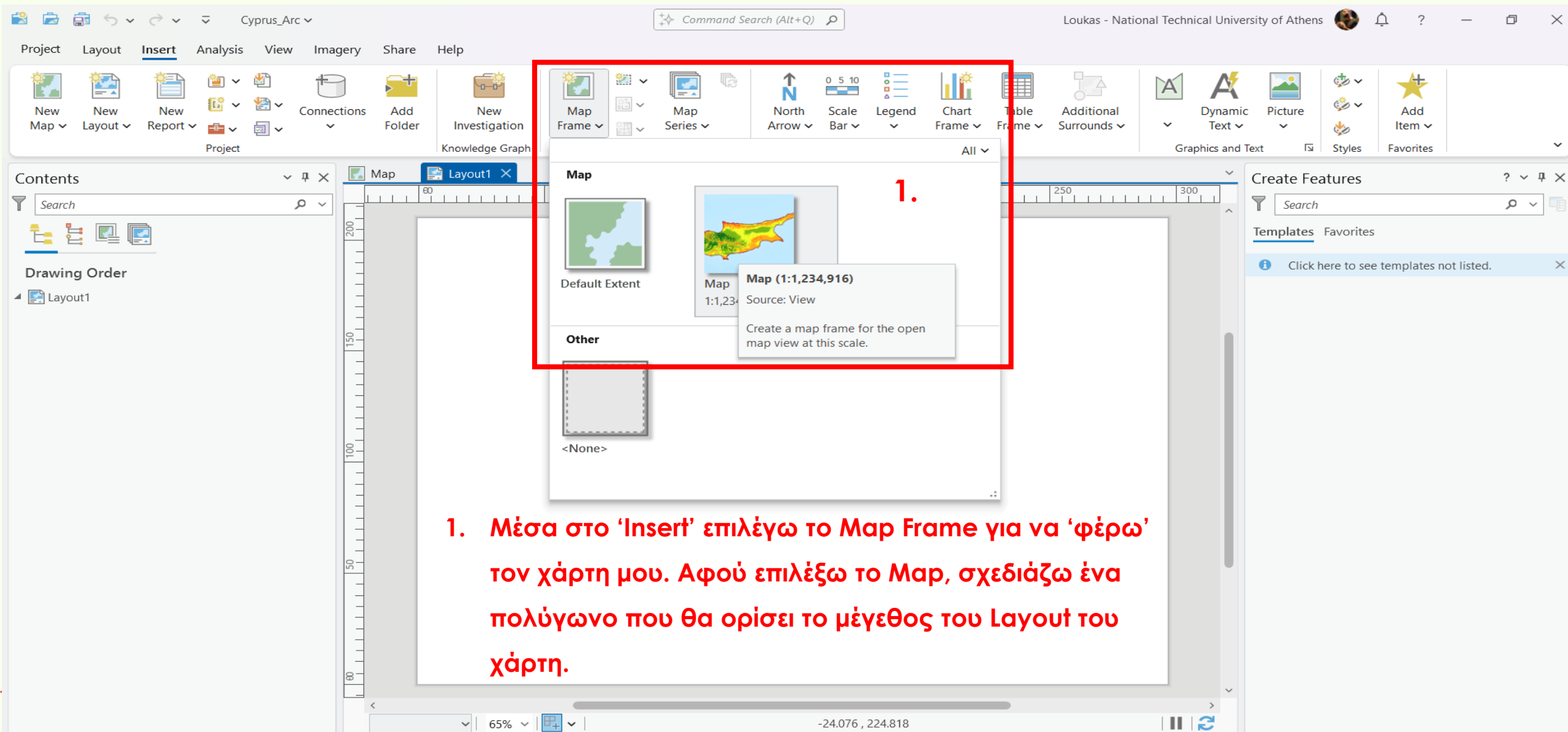
1:1,234,822 35.5571619°E 36.0502287°N Selected Features: 0 Catalog Symbology

ArcGIS Pro – Εξαγωγή χάρτη

The screenshot shows the ArcGIS Pro interface with the 'Insert' menu highlighted in the top ribbon. The 'Print' dialog box is open, displaying various page size templates. The 'ISO - Portrait' section is selected, showing options for A5, A4, A3, A2, A1, and A0. The 'ANSI - Portrait' section shows options for Letter, Legal, Tabloid, ANSI C, ANSI D, and ANSI E. The 'ANSI - Landscape' section also shows options for Letter, Legal, Tabloid, ANSI C, ANSI D, and ANSI E. The 'Architectural - Portrait' section is partially visible at the bottom. The 'Create Features' panel on the right shows the 'cyprus_coastline' layer selected.

1. Επιλέγω το 'Insert' στην κύρια εργαλειοθήκη για να εισάγω νέο layout για χάρτη. Ορίζω το μέγεθος του χάρτη, π.χ. A4

ArcGIS Pro – Εξαγωγή χάρτη (Σχεδίαση)



1. Μέσα στο 'Insert' επιλέγω το Map Frame για να 'φέρω' τον χάρτη μου. Αφού επιλέξω το Map, σχεδιάζω ένα πολύγωνο που θα ορίσει το μέγεθος του Layout του χάρτη.

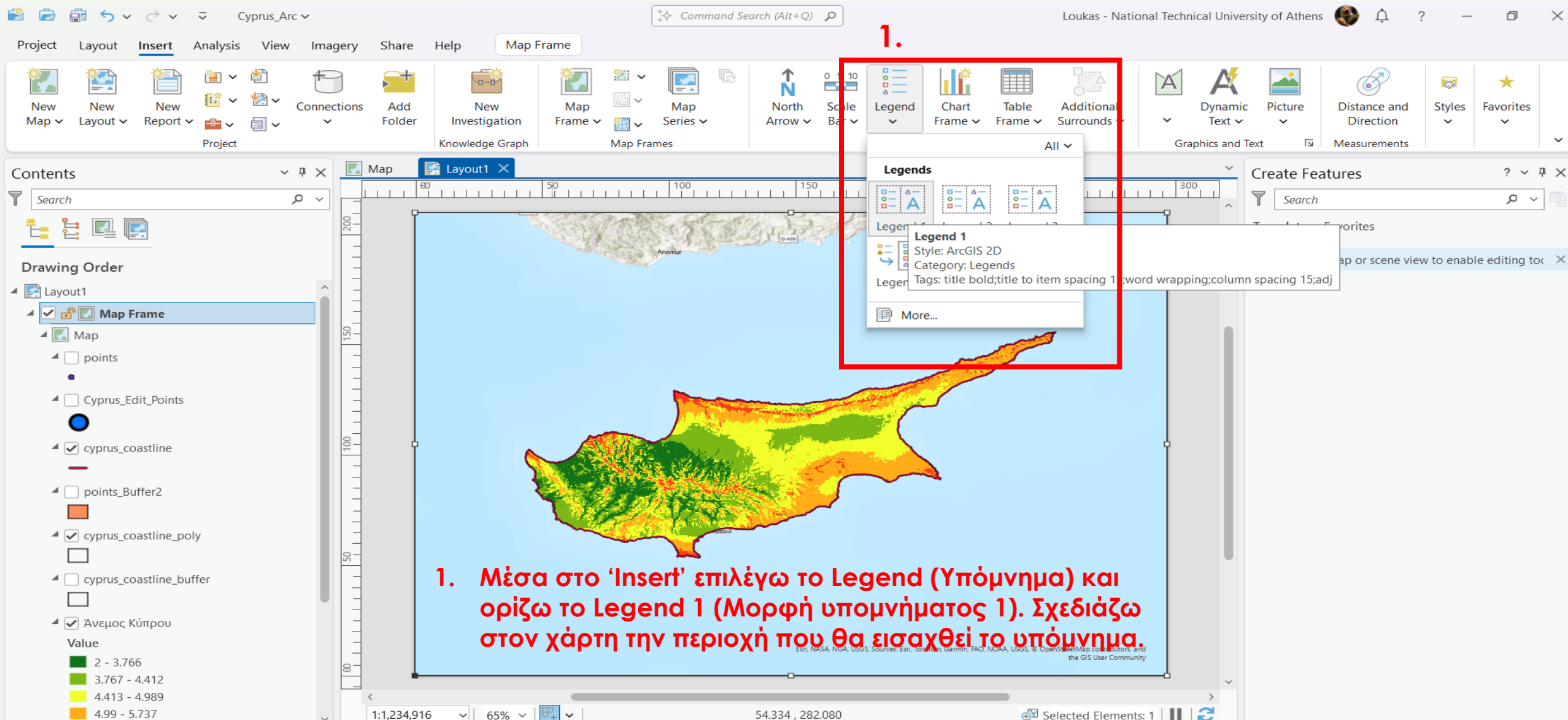
ArcGIS Pro – Εξαγωγή χάρτη (Επεξεργασία)

The screenshot displays the ArcGIS Pro software interface. The top menu bar includes Project, Layout, Insert, Analysis, View, Imagery, Share, and Help. The 'Layout' tab is selected, indicated by a red box and the number '1'. The ribbon contains various tool groups: Clipboard (Paste, Copy), Navigate (Navigate, Select), Elements (Select All, Clear Selection, Delete), Page Setup (Duplicate Layout, Orientation, Page from Printer), Show (Rulers, Guides, Margins), Map (Activate, Zoom To, Map View), and Review (Check Spelling). A red box and the number '2' highlight the 'Activate' button in the Map group. A tooltip for 'Activate Map Frame (Q)' is visible, stating 'Activate the map frame to navigate and interact with the map. Press F1 for more help.' The main map area shows a map of Cyprus with a legend, scale bar, and north arrow. The legend includes 'cyprus_coastline', 'cyprus_coastline_poly', and 'Ανεμος Κύπρου' with a color-coded value scale. The map is surrounded by a scale bar and a north arrow. The bottom status bar shows the scale '1:1,234,916', a zoom level of '49%', and coordinates '-175.953, 288.787'. On the left, the 'Contents' pane shows the 'Drawing Order' for 'Layout1', including 'Scale Bar', 'North Arrow', 'Legend', and 'Map Frame'. The 'Map Frame' section lists 'points', 'Cyprus_Edit_Points', and 'cyprus_coastline'. On the right, the 'Create Features' pane is visible with a search bar and a message to 'Click a map or scene view to enable editing tools'.

1. Για να αλλάξω το μέγεθος/θέση της εικόνας, επιλέγω 'Layout' στην κύρια εργαλειοθήκη.

2. Πατάω στο 'Activate' και μετακινώ τον χάρτη ή αλλάζω το Zoom με τα βέλη

ArcGIS Pro – Εξαγωγή χάρτη (Υπόμνημα)



1.

1. Μέσα στο 'Insert' επιλέγω το Legend (Υπόμνημα) και ορίζω το Legend 1 (Μορφή υπομνήματος 1). Σχεδιάζω στον χάρτη την περιοχή που θα εισαχθεί το υπόμνημα.

ArcGIS Pro – Εξαγωγή χάρτη (Λοιπά στοιχεία)

The screenshot displays the ArcGIS Pro interface. The top ribbon includes tabs for Project, Layout, Insert, Analysis, View, Imagery, Share, and Help. The 'Insert' tab is active, showing various tool groups. A red box labeled '1.' highlights the 'Map Surrounds' group, which contains the 'North Arrow', 'Scale Bar', and 'Legend' tools. The 'Contents' pane on the left shows the 'Drawing Order' for 'Layout1', with 'Legend' selected. The 'Map' frame shows a map of Cyprus with a legend. A red box labeled '2.' highlights the legend in the map frame. The legend lists several layers: 'cyprus_coastline', 'cyprus_coastline_poly', 'Άνεμος Κύπρου', and 'area_1_wind-speed_100m.tif'. The 'Map' frame also shows a scale bar and a north arrow.

1. Επαναλαμβάνω το ίδιο για το North Arrow (Ενδειξη Βορρά) και το Scale Bar (γραφική κλίμακα).

2. Αφού εισάγω τα πάντα, πατώντας πάνω τους μπορώ να αλλάξω τη θέση και το μέγεθος.

ArcGIS Pro – Εξαγωγή χάρτη (Αποθήκευση)

The screenshot displays the ArcGIS Pro interface with a map of Cyprus. The 'Share' tab is selected in the top ribbon, and the 'Export Layout' dropdown menu is open, showing 'Web JPEG' as the selected option. The 'Export Layout' dialog box is also open, showing the 'Properties' tab with the 'File Type' set to 'JPEG' and the 'Name' field containing 'C:\Users\louka\Desktop\Layout1.jpg'. The 'Map Frame' is selected in the 'Contents' pane.

1. Επιλέγω στην κύρια εργαλειοθήκη το 'Share'

2. Επιλέγω μέσα στο 'Share' το 'Export Layout' > Web JPEG

3. Σώζω το αρχείο μου στον φάκελο που επιθυμώ (Export)

ArcGIS Pro – Φαρμακεία στη Λευκωσία

en de fr ru - intro - about

Format ?

Shapefile (Esri) ▼

Name of area to extract ? or search

Your email address ?

loukaskatikas@gmail.com

☐ show lng/lat

Now move the map to your desired location.
Then click [here](#) to create the bounding box. ?

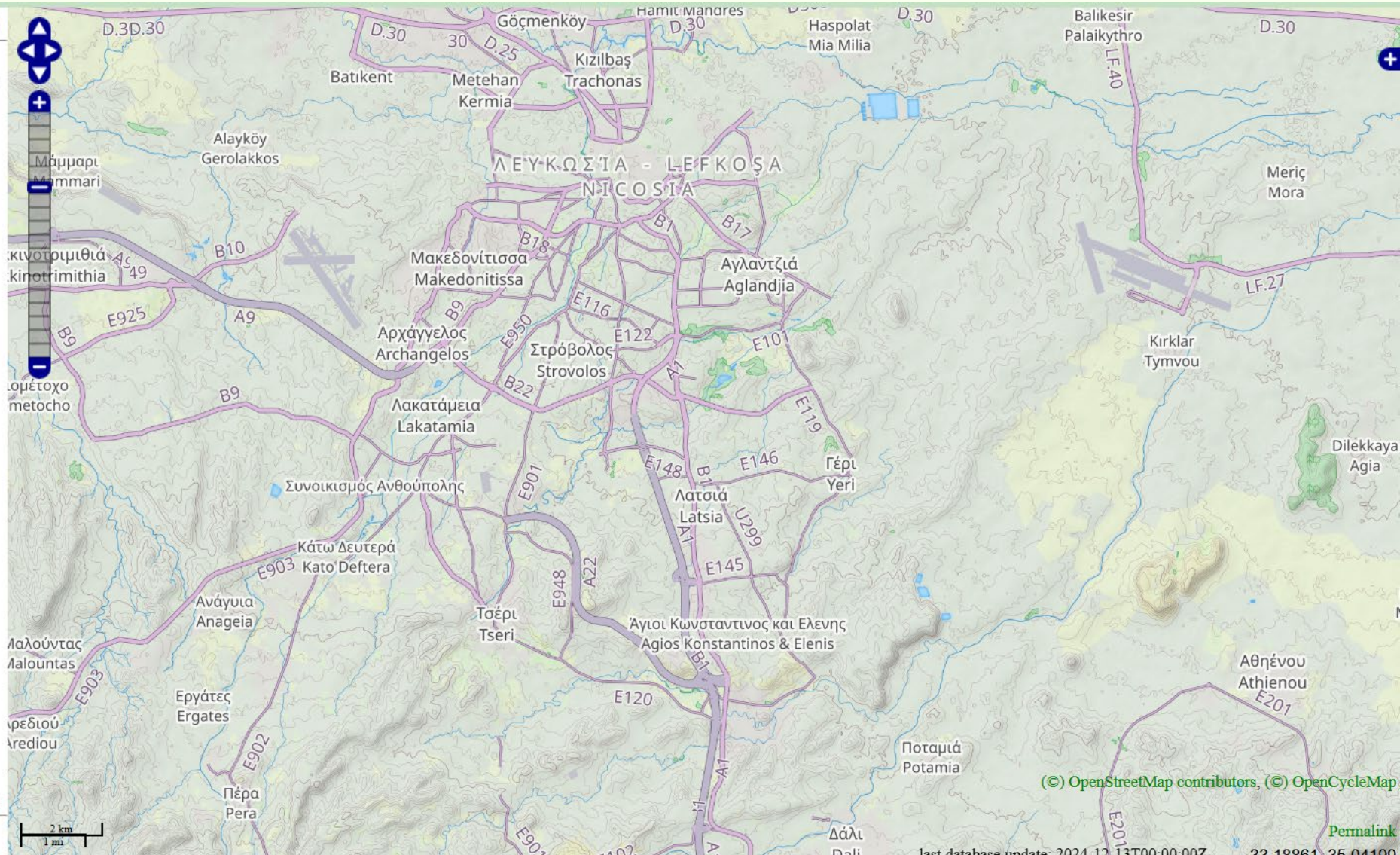
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