

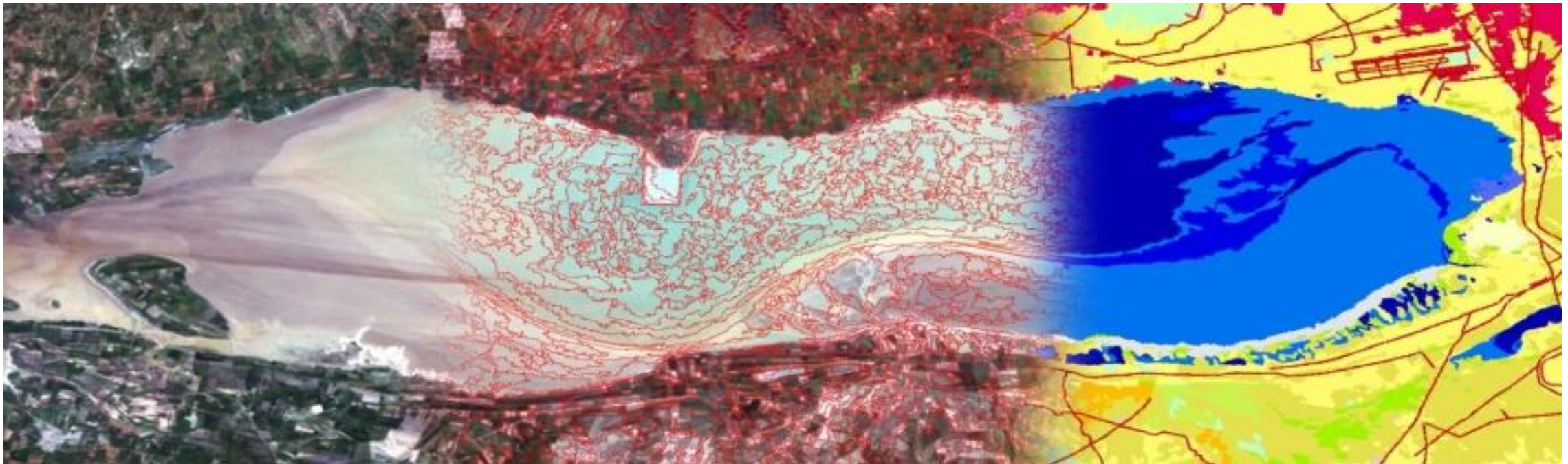


The Mediterranean Wetlands Observatory

Ramsar EO-Day

EO tools to monitor Mediterranean Wetlands: Lessons learned from the MWO

Anis GUELMAMI – Coordinator of the Mediterranean Wetlands Observatory (Tour du Valat)





The Mediterranean Wetland Observatory

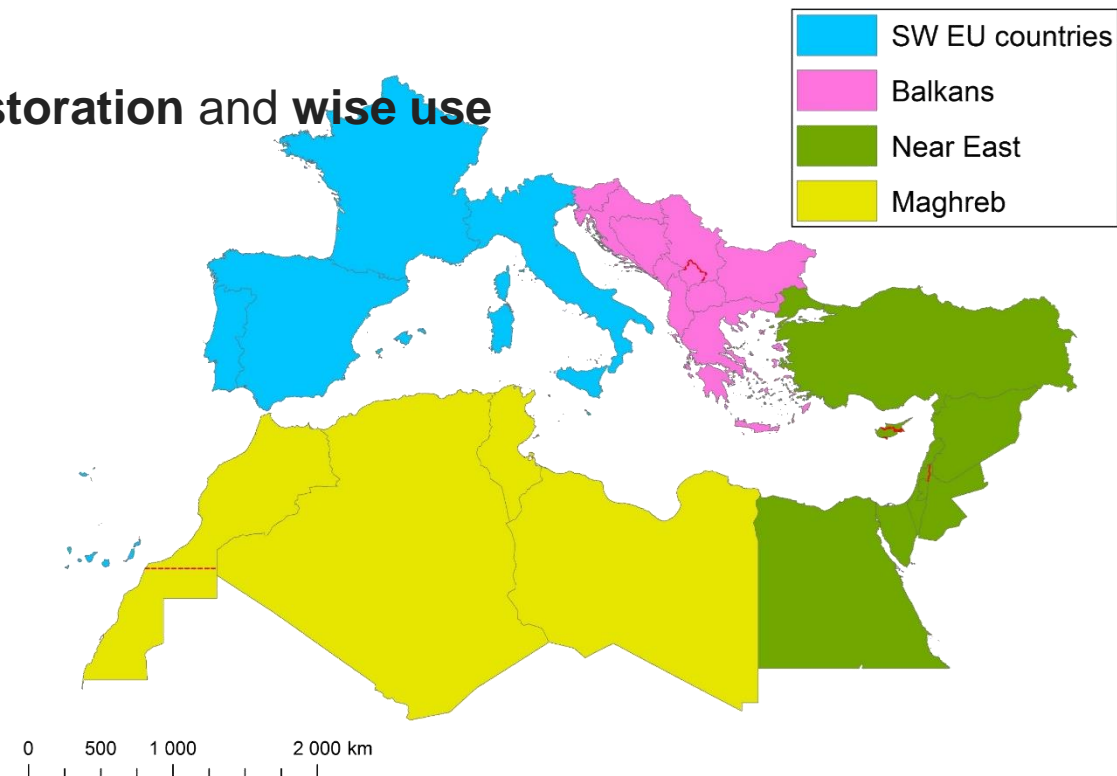
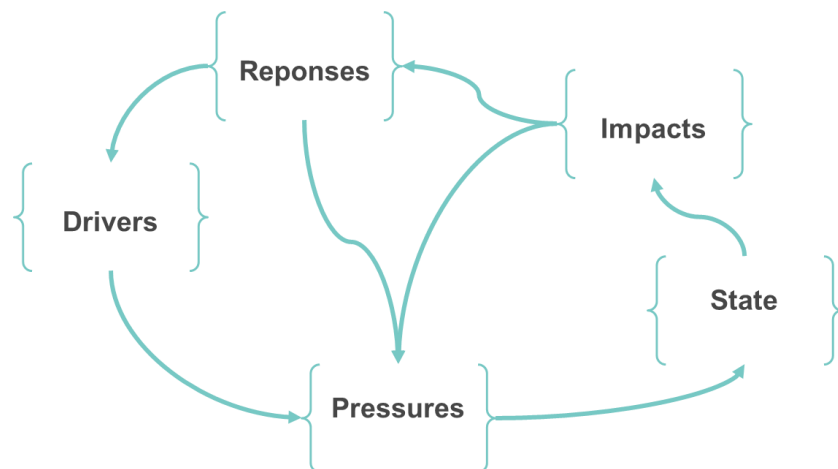
Consolidates the knowledge on wetlands at pan-Mediterranean level

- **28 MedWet countries**
- **Set of indicators feeding a DPSIR framework**

□ Analyze **status** and **trends** of Mediterranean Wetlands

□ Encourage political decisions favorable for their **protection, restoration** and **wise use**

□ Transfer **recommendations** and **key messages**





The Mediterranean Wetland Observatory

Consolidates the knowledge on wetlands at pan-Mediterranean level

- 28 MedWet countries
- Set of indicators feeding a DPSIR framework

Connected to

Regional agreements

Mediterranean Action Plan
Barcelona Convention

EEA

Union for the Mediterranean
Union pour la Méditerranée
الاتحاد من أجل المتوسط



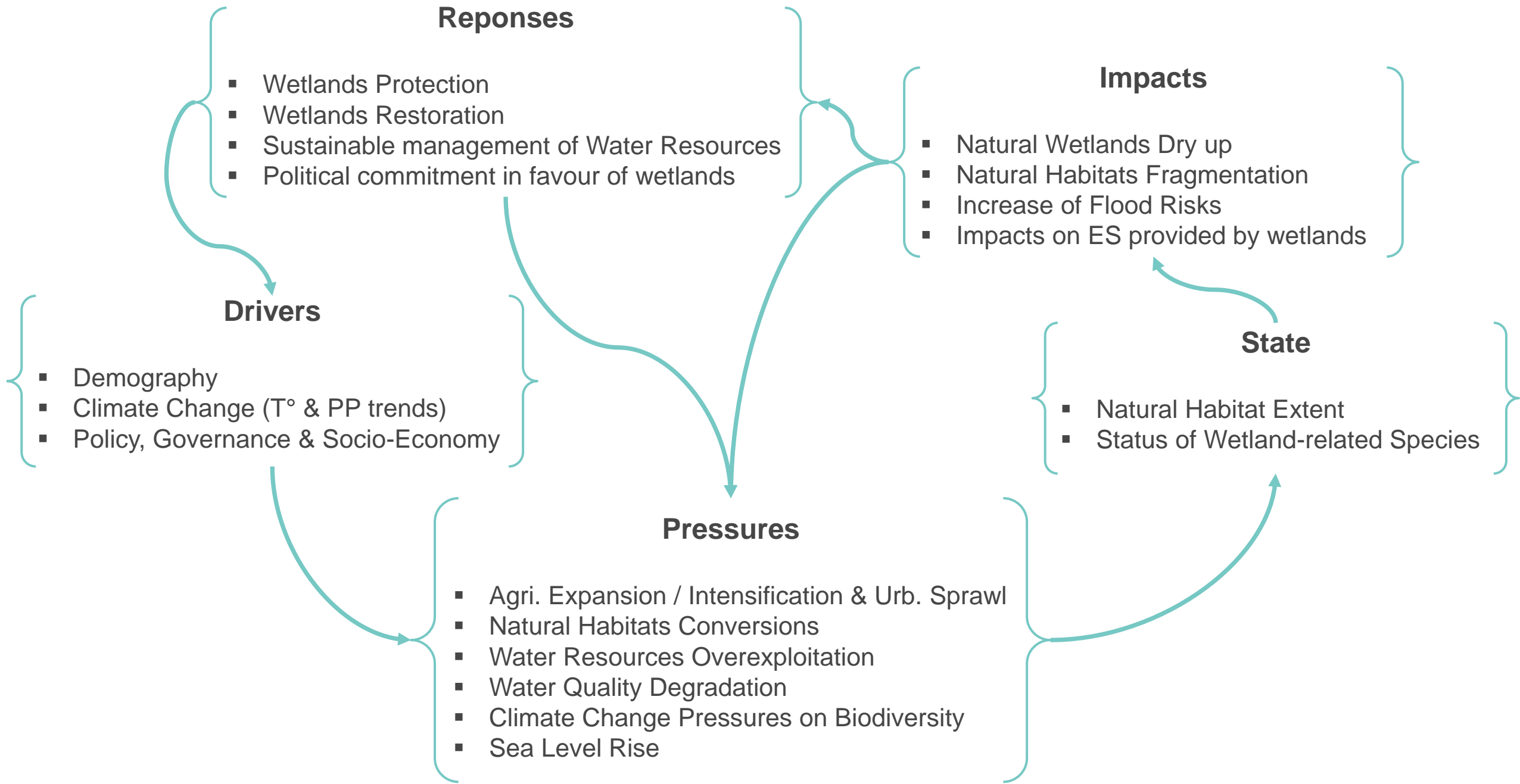
Global agreements

Sustainable Development Goals

Ramsar
Convention on Biological Diversity

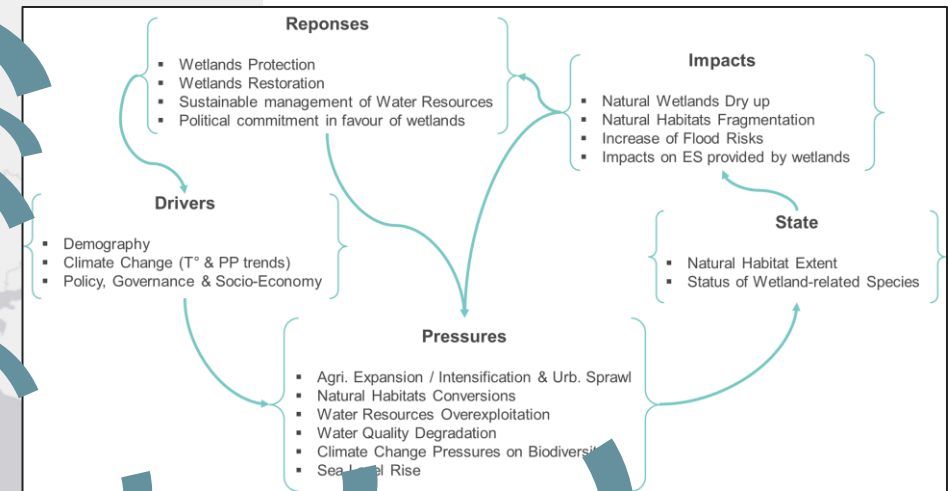
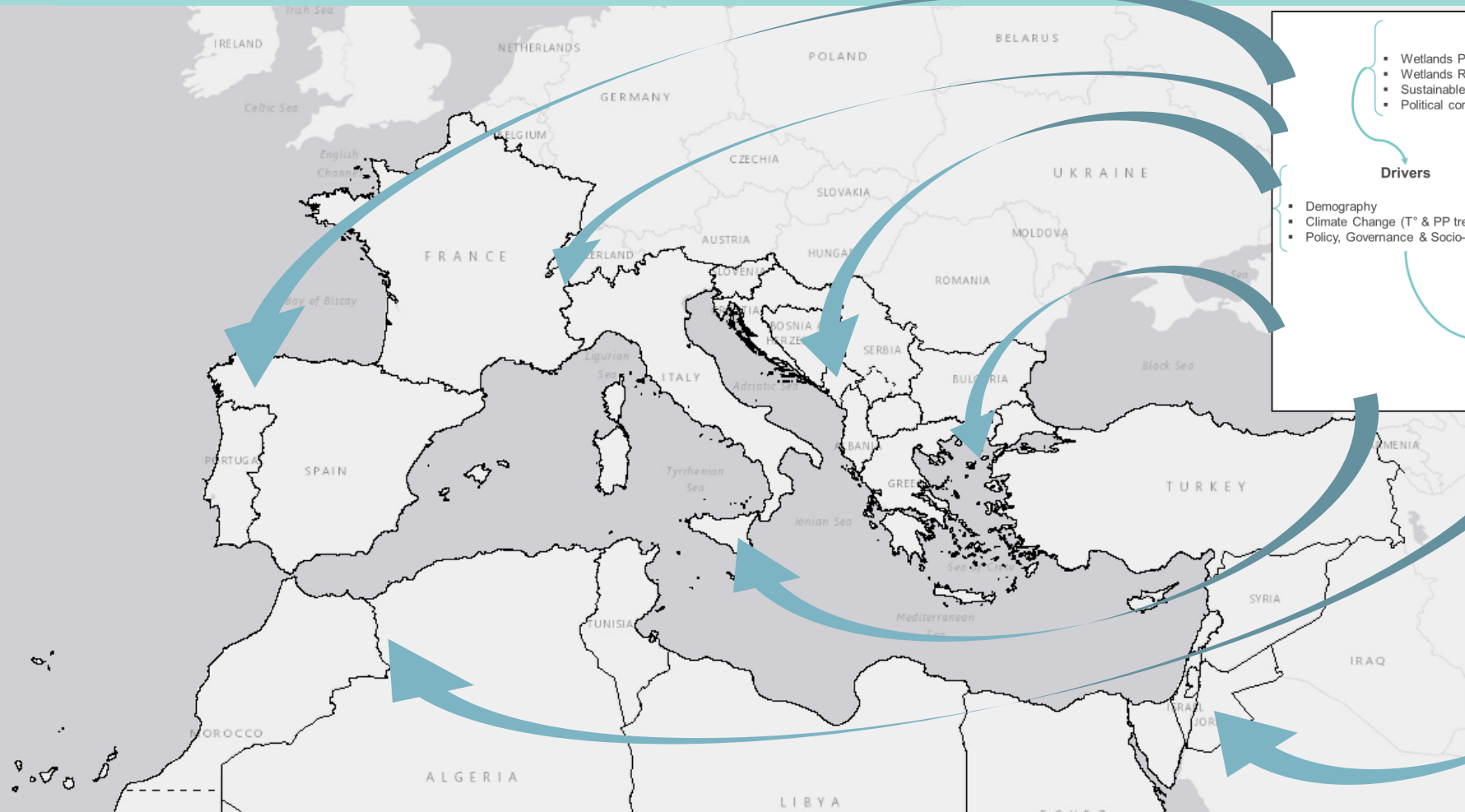


The Mediterranean Wetlands

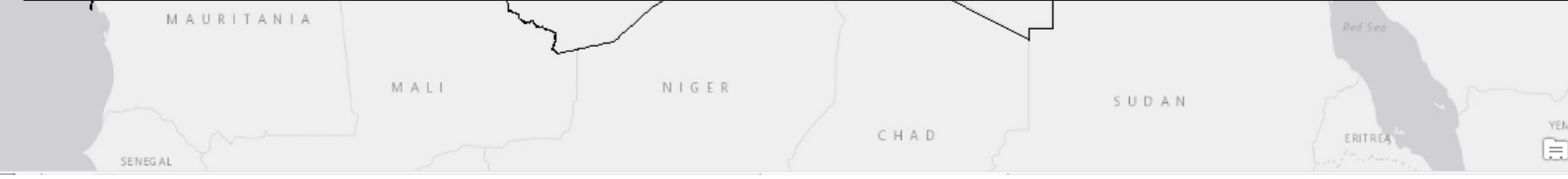




The Mediterranean Wetlands



Production of a knowledge baseline on wetlands for each MedWet country and drafting key messages and recommendations tailored to each national context





What can EO-based data do for that?

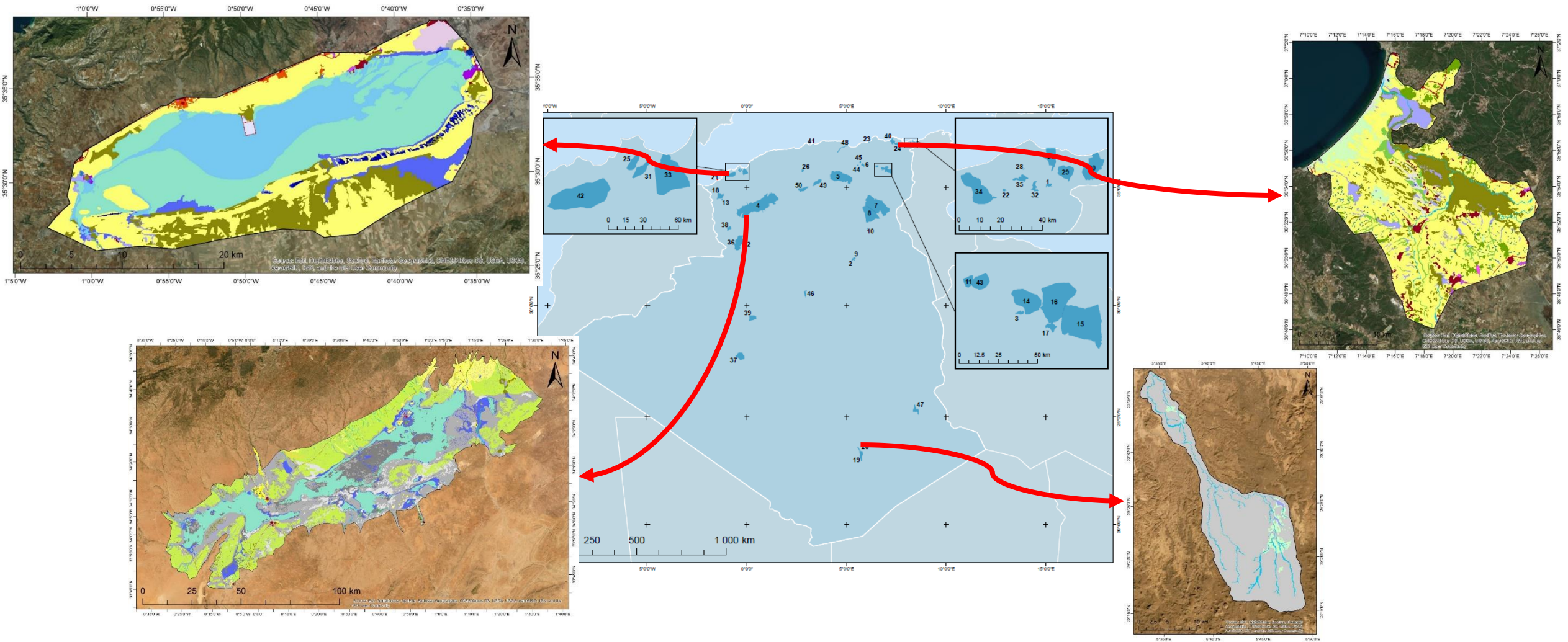


What can EO-based data do for that?

*Mapping Wetland Sites
Assessing Status and Trends*



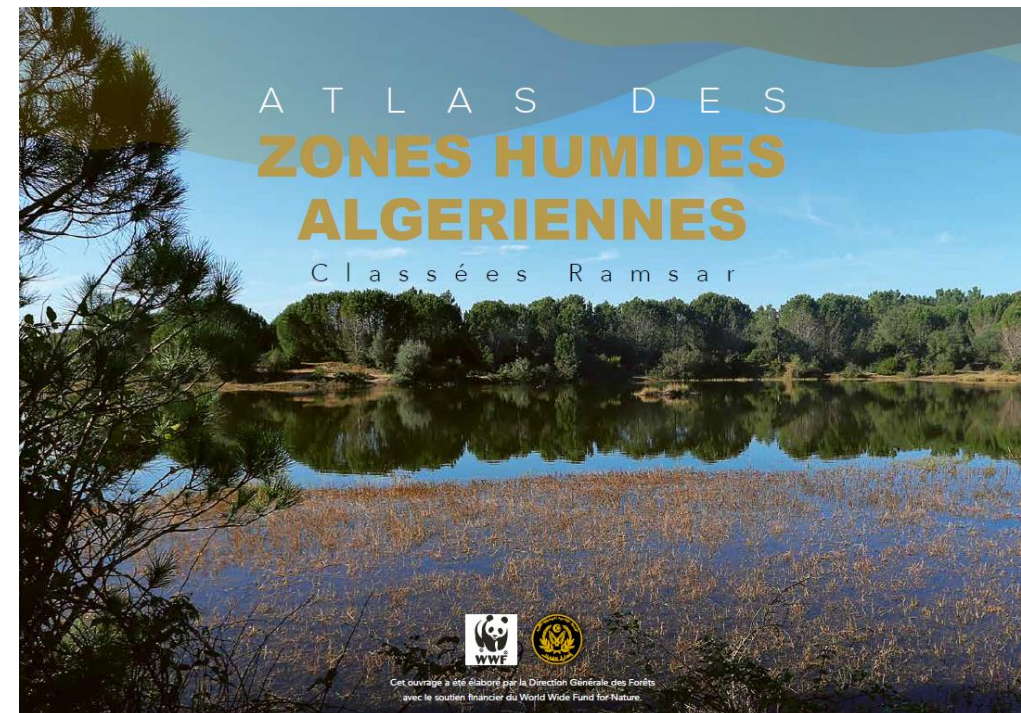
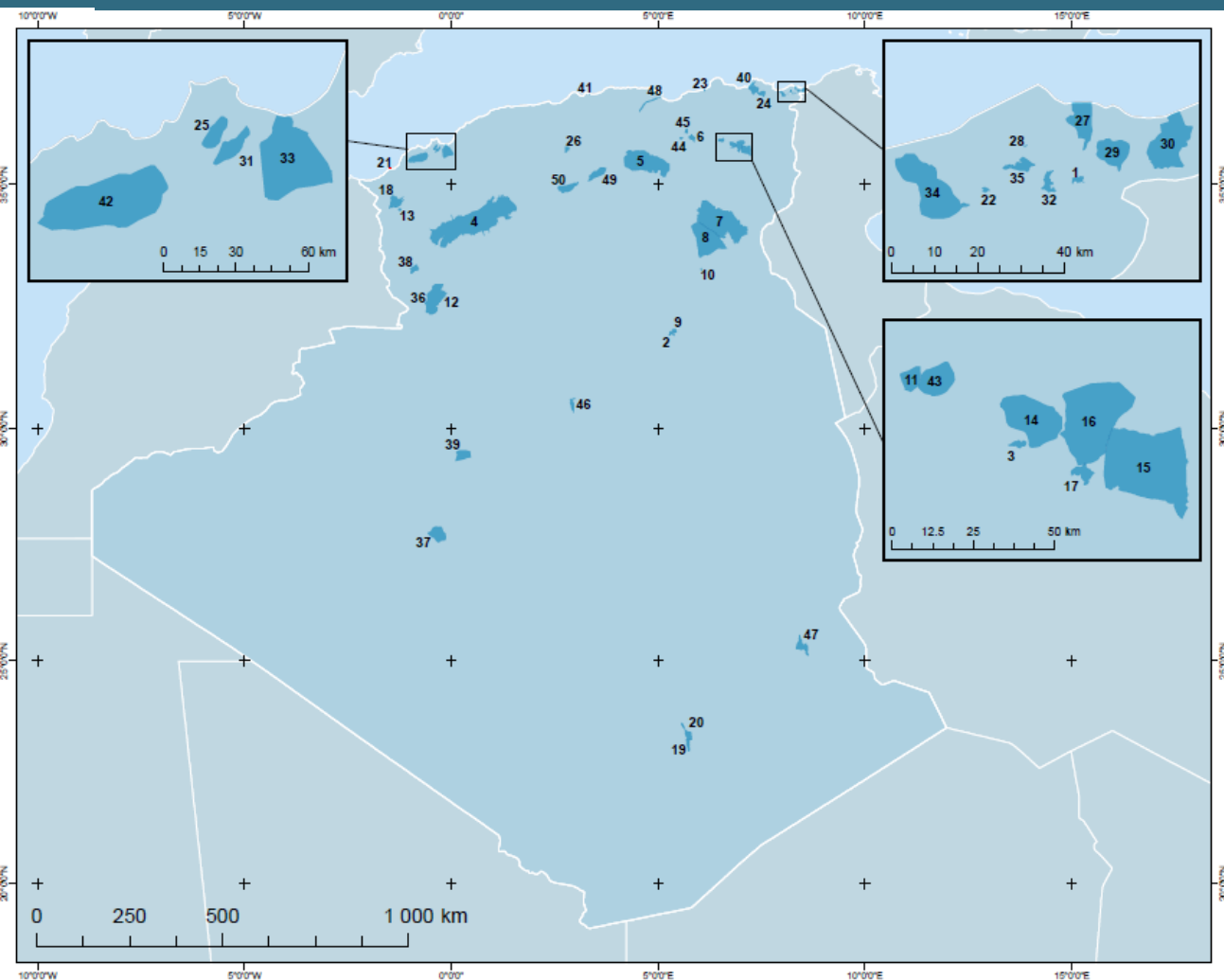
EO-based approaches – Site-based Wetland Maps



Using Sentinel-2 time series (2020) → LULC maps for all 50 Ramsar sites in Algeria have been produced based on the hybrid CLC-Ramsar classification system



EO-based approaches – Site-based Wetland Maps



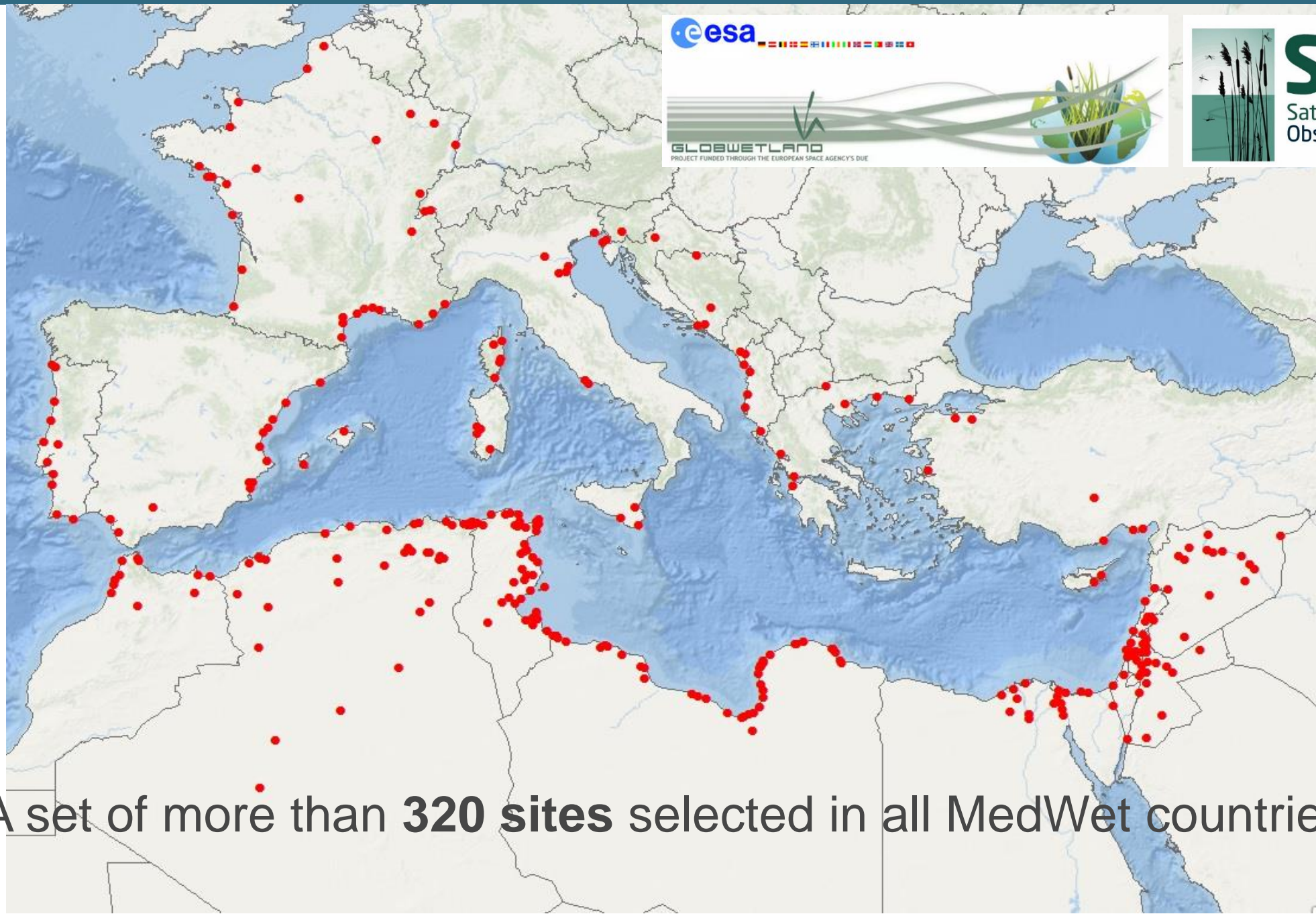
Using Sentinel-2 time series (2020) → LULC maps for all 50 Ramsar sites in Algeria have been produced based on the hybrid CLC-Ramsar classification system

*Development of a new **Atlas** on wetland Ramsar sites*

EO-based approaches – Site-based Wetland Maps



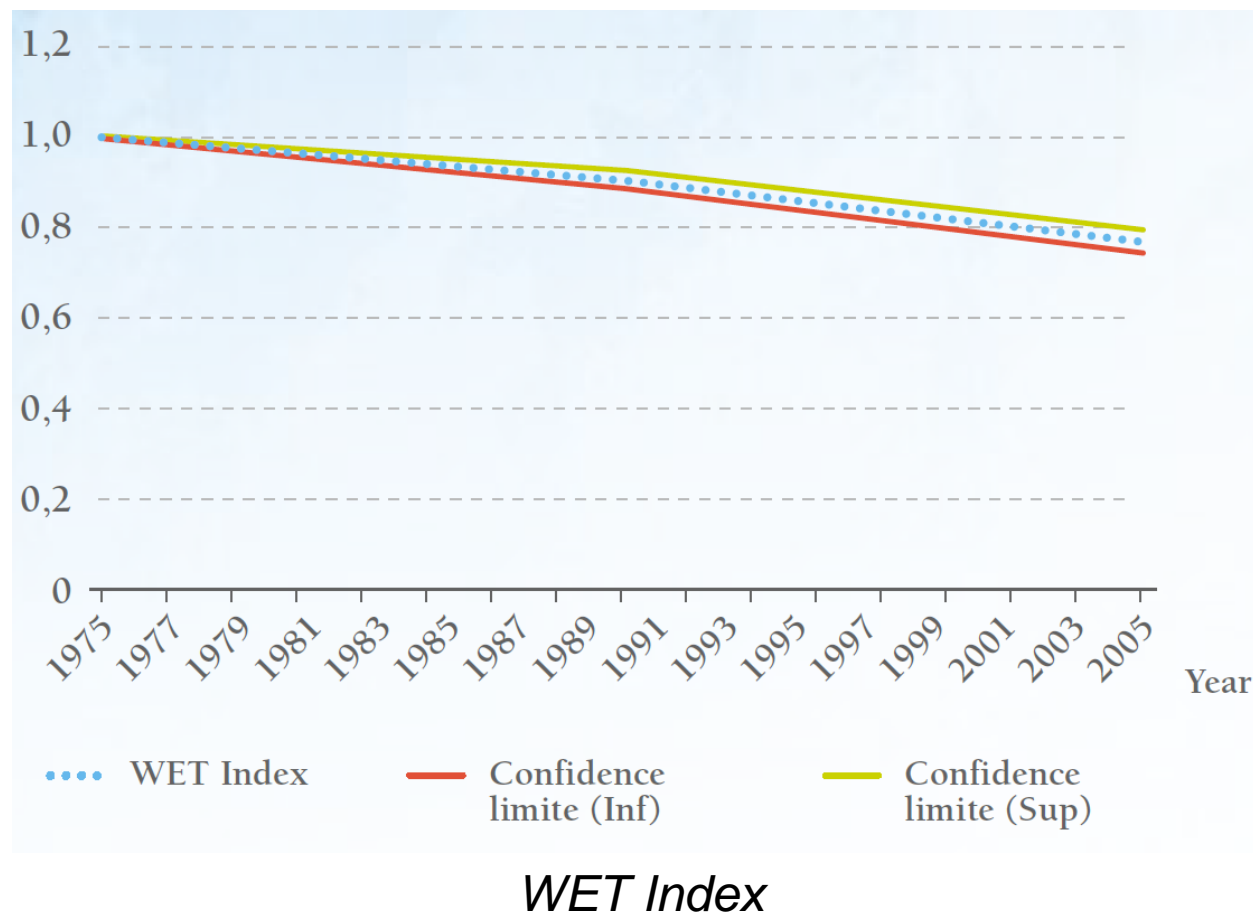
SWOS
Satellite-based Wetland
Observation Service



A set of more than **320 sites** selected in all MedWet countries



Since the 70's, we lost
-48%
Of the Natural Wetlands*



*Wetlands according to **Ramsar** definitions which integrate all types of water-related ecosystems, including ponds, rivers, peatlands, salt lakes, coastal lagoons, etc.



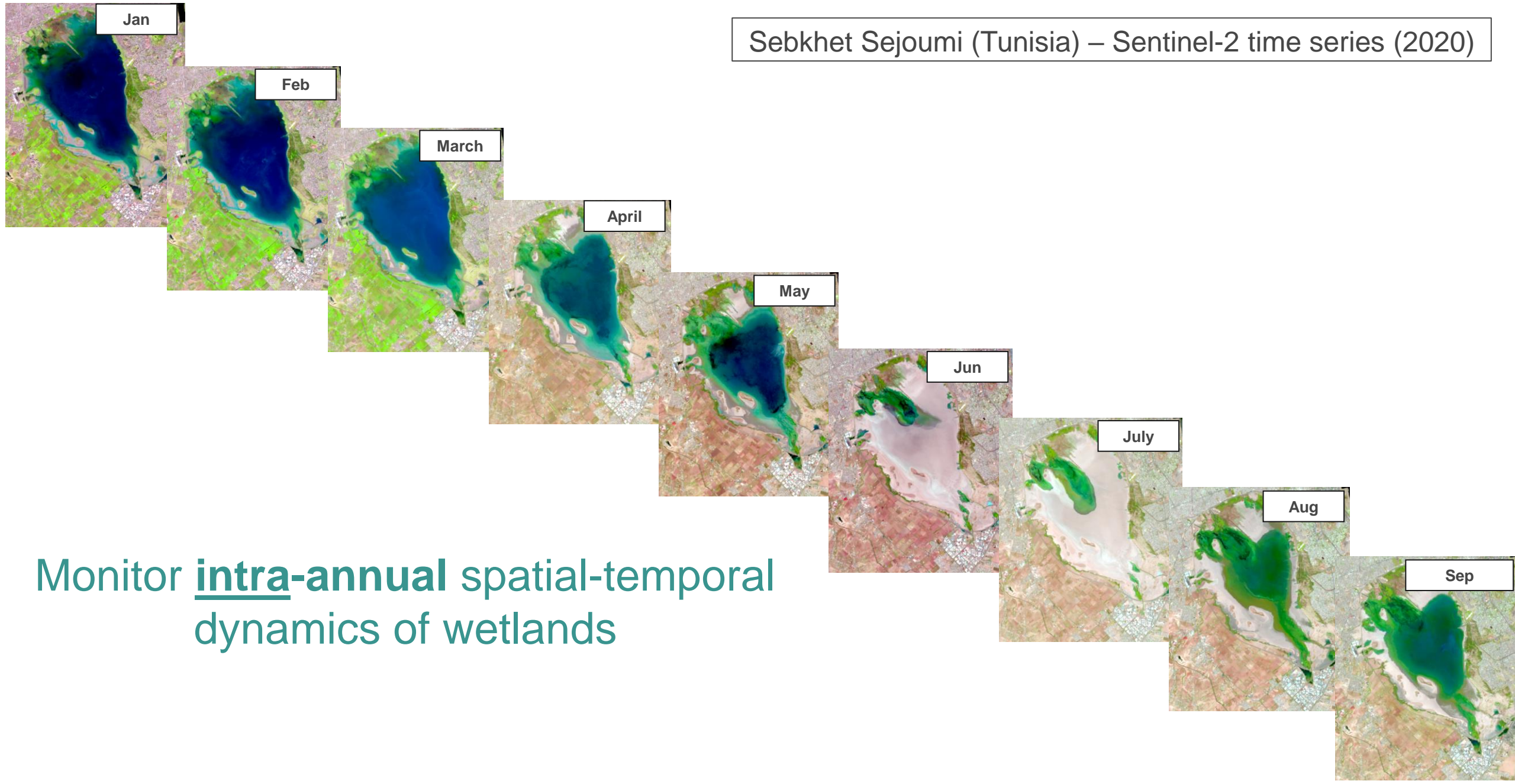
What can EO-based data do for that?

*Mapping Wetland Sites
Assessing Ecological Conditions*



EO-based approaches – Site-based Wetland Maps

Sebkhet Sejoumi (Tunisia) – Sentinel-2 time series (2020)



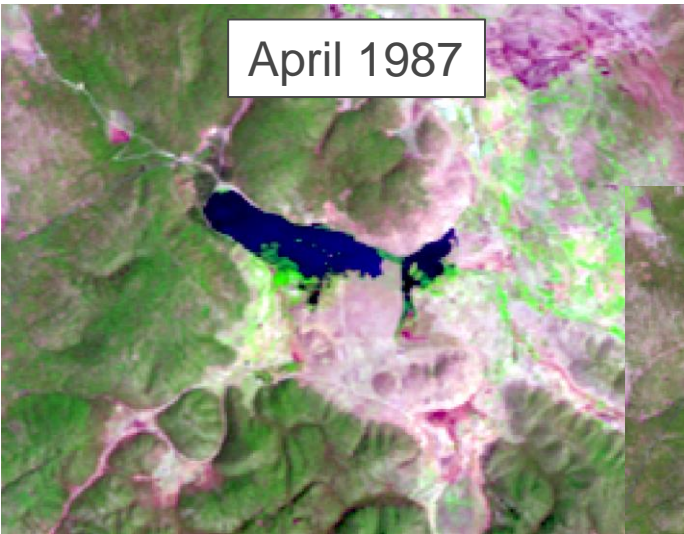
Monitor intra-annual spatial-temporal dynamics of wetlands



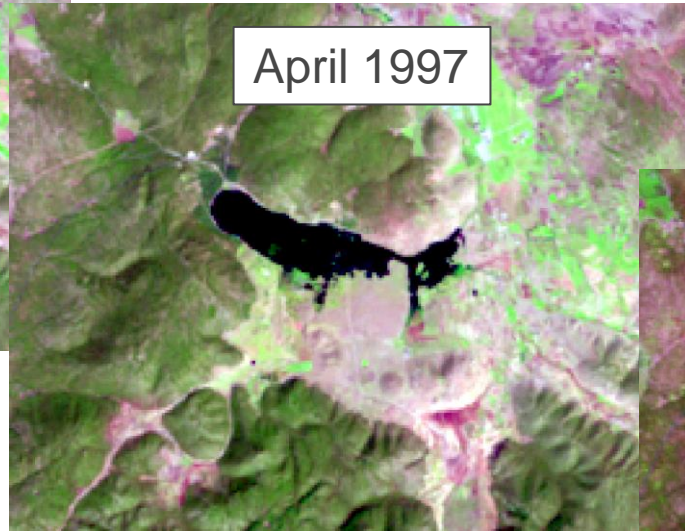
EO-based approaches – Site-based Wetland Maps

Dayet Aoua Lake (Morocco) – Landsat archives

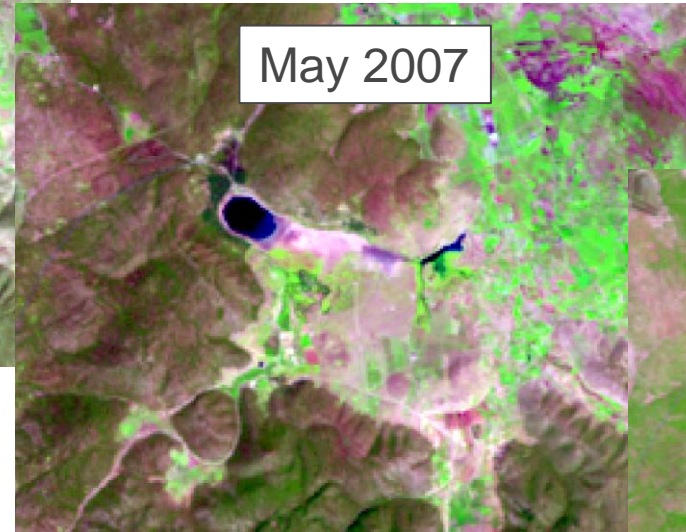
April 1987



April 1997



May 2007



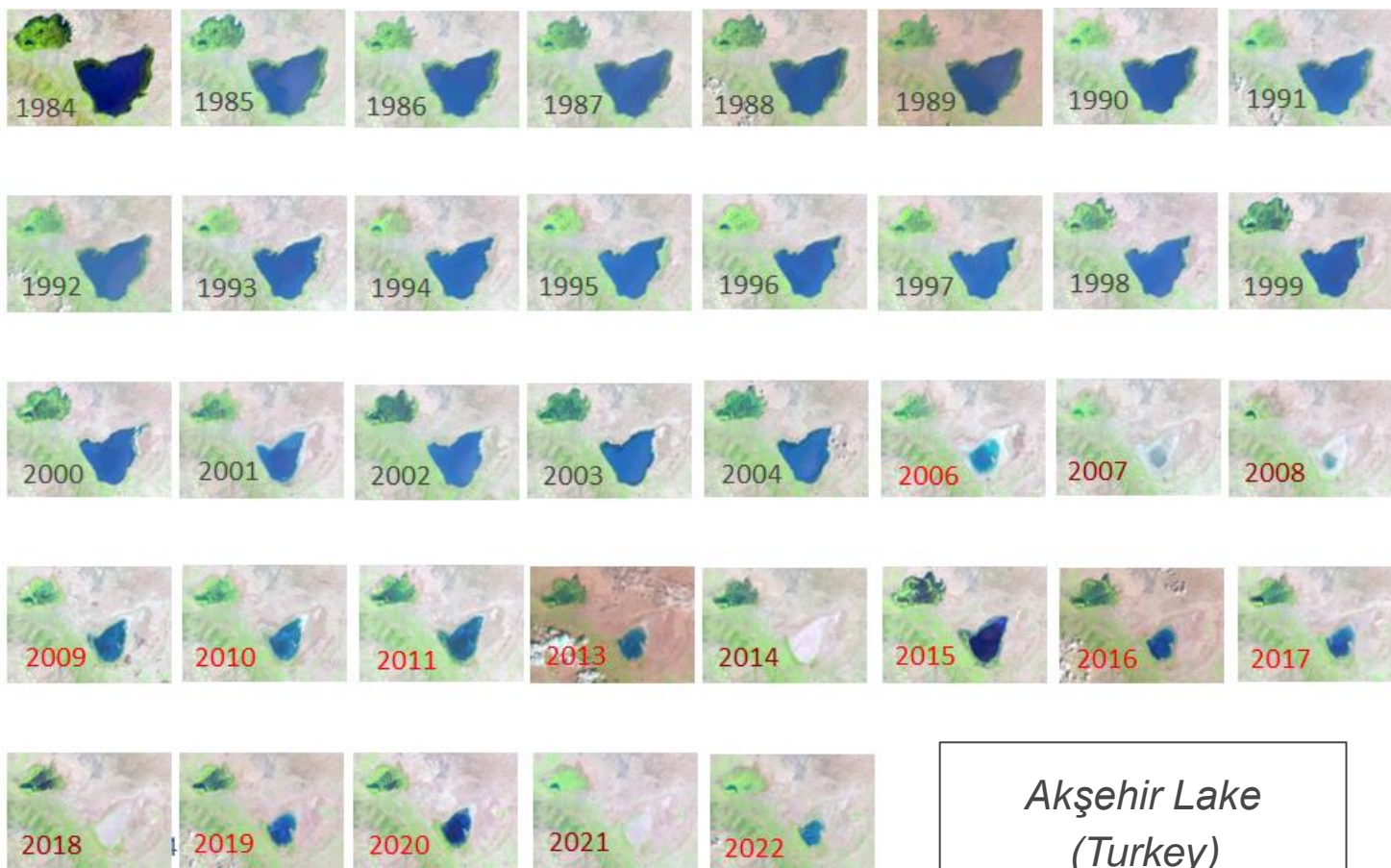
Jun 2020



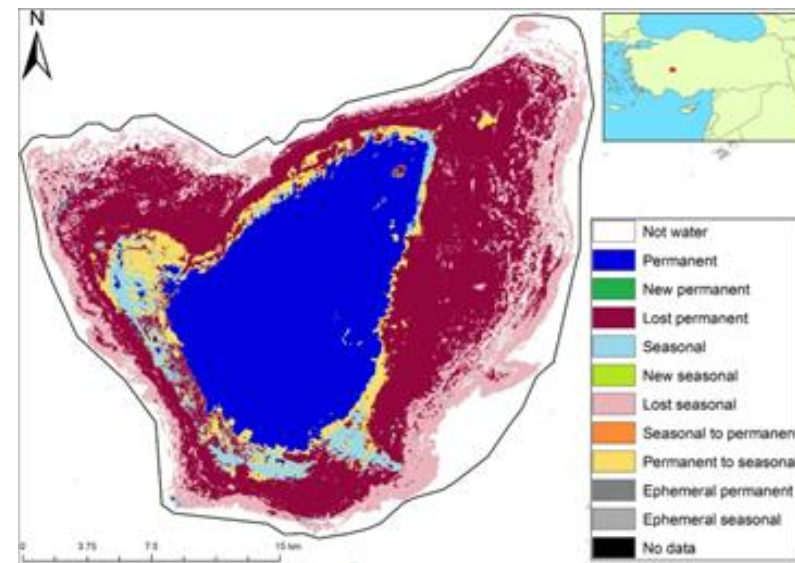
Monitor inter-annual spatial-temporal dynamics of wetlands



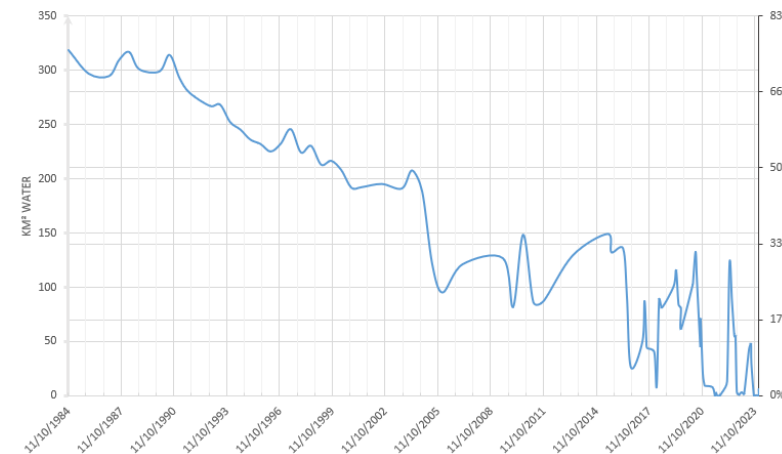
Monitoring long-term changes in the wetland conditions



Akşehir Lake
(Turkey)



TURKEY - Lake Akşehir



Natural wetlands are receiving less and less water

Dry out → Transformed from perm. into temp. flooded → Or even completely disappear



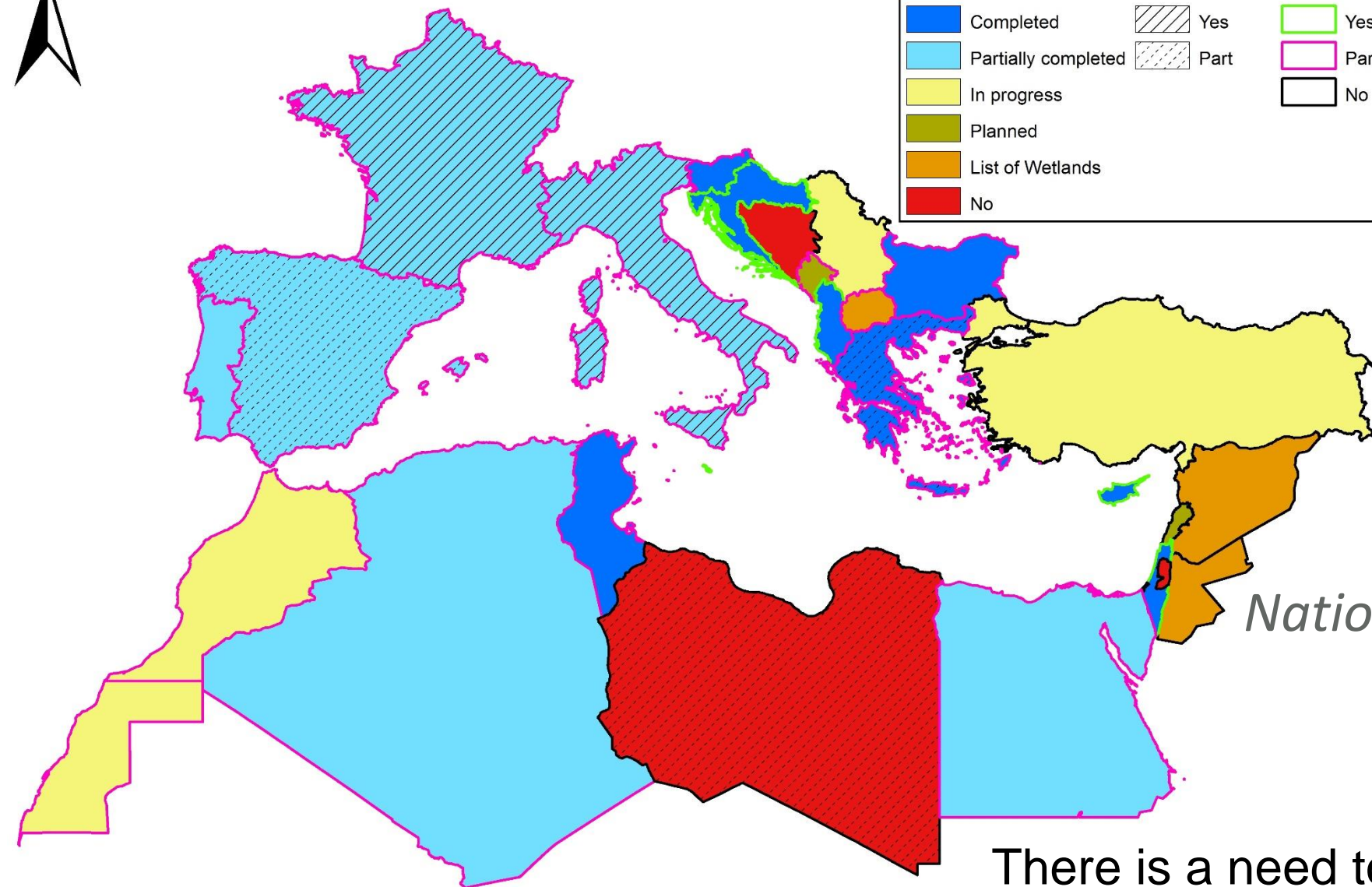
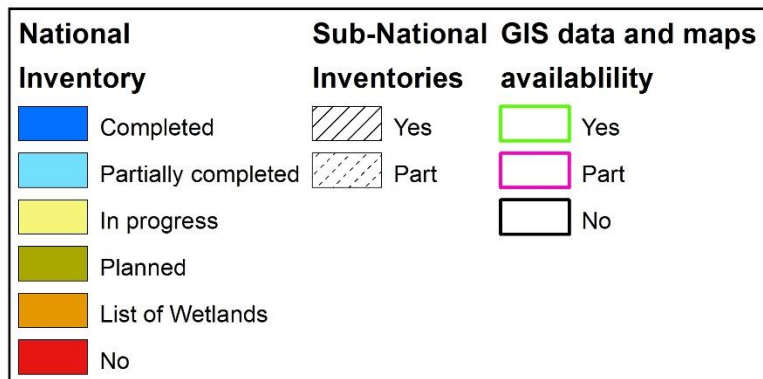
What can EO-based data do for that?

Supporting Wetlands National Inventories/Maps

Comprehensive maps on location, delineation and characterization



EO-based approaches – National Wetland Maps



*National Wetland Inventories
Status in 2020*



There is a need to develop a **regional** and **harmonized** pan-Mediterranean picture

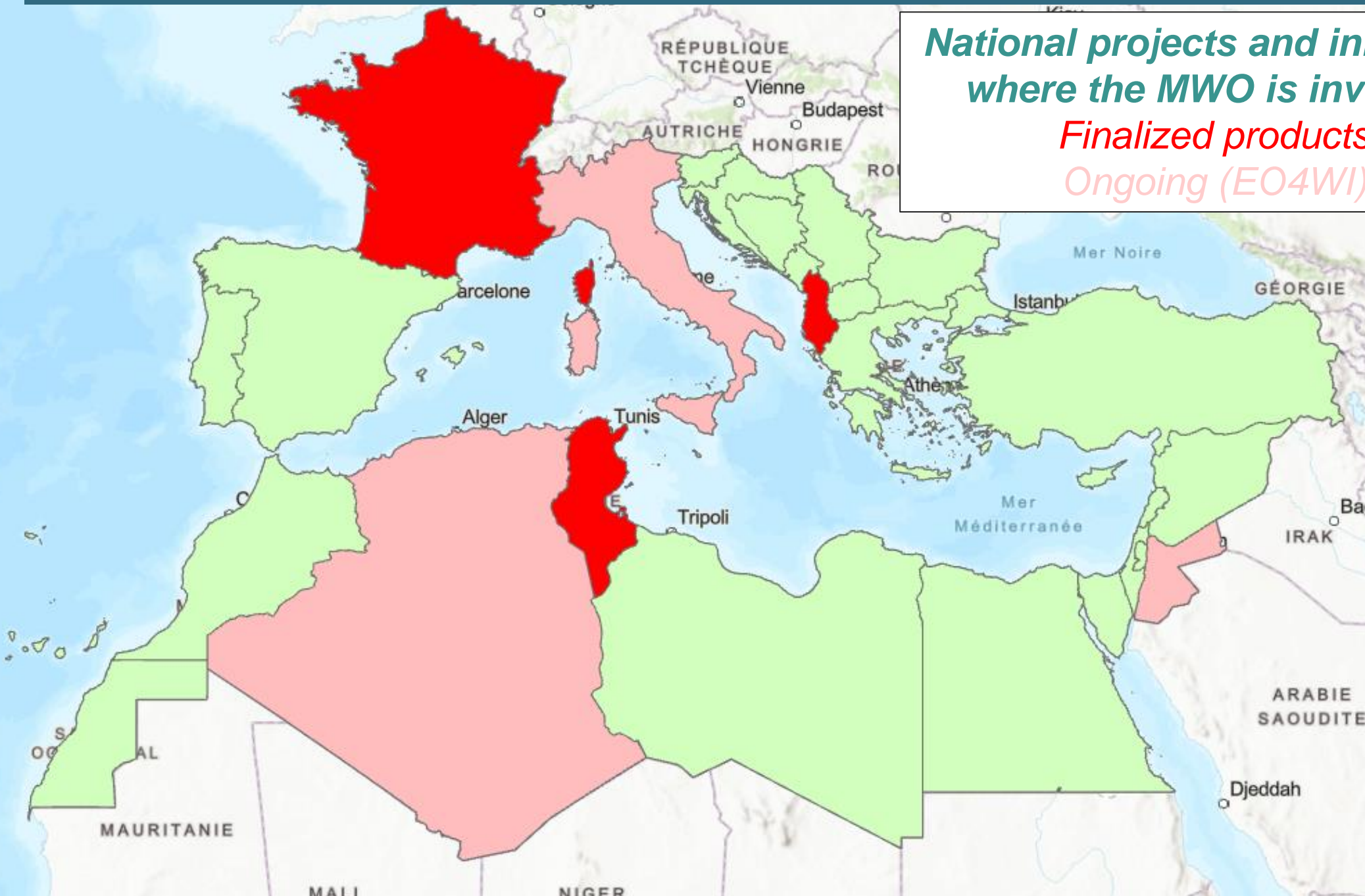
EO-based approaches – National Wetland Maps



*National projects and initiatives
where the MWO is involved*

Finalized products

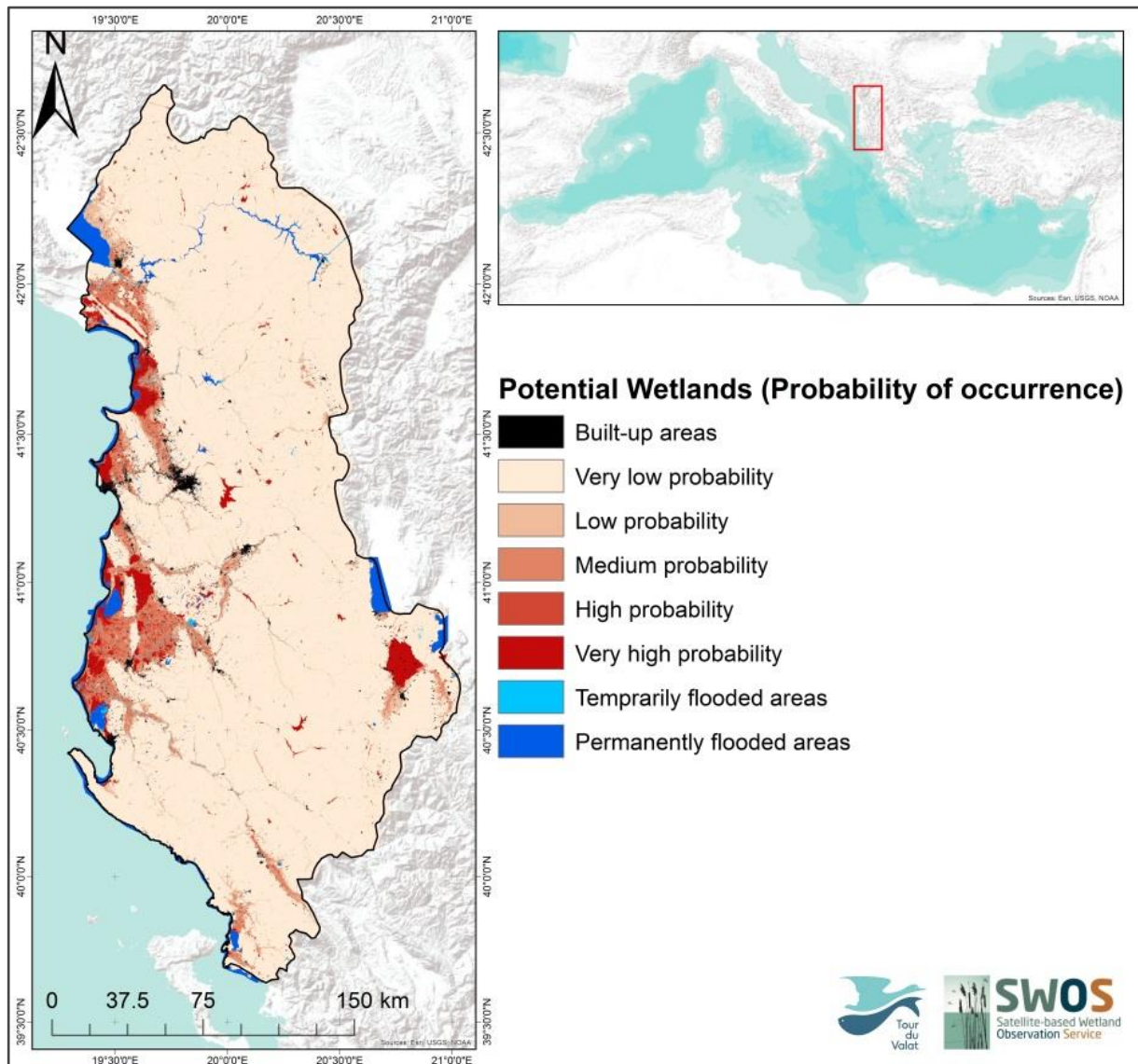
Ongoing (EO4WI)



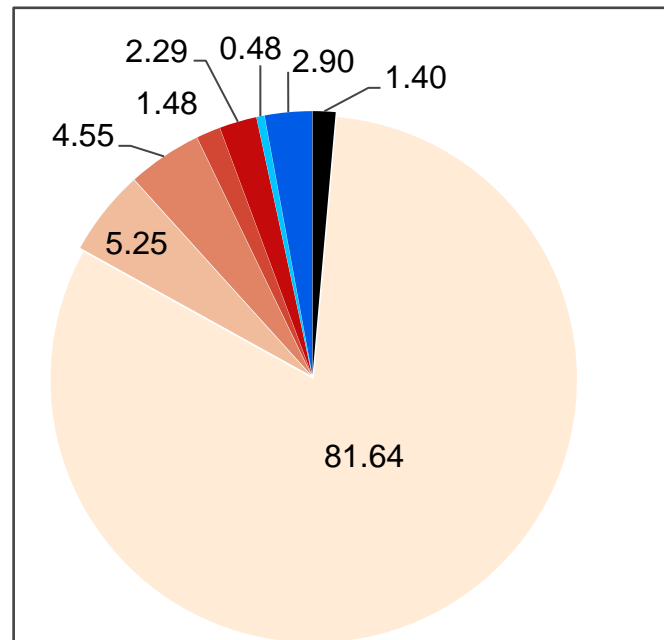


Albania

National map of Potential Wetland Areas (PWA)



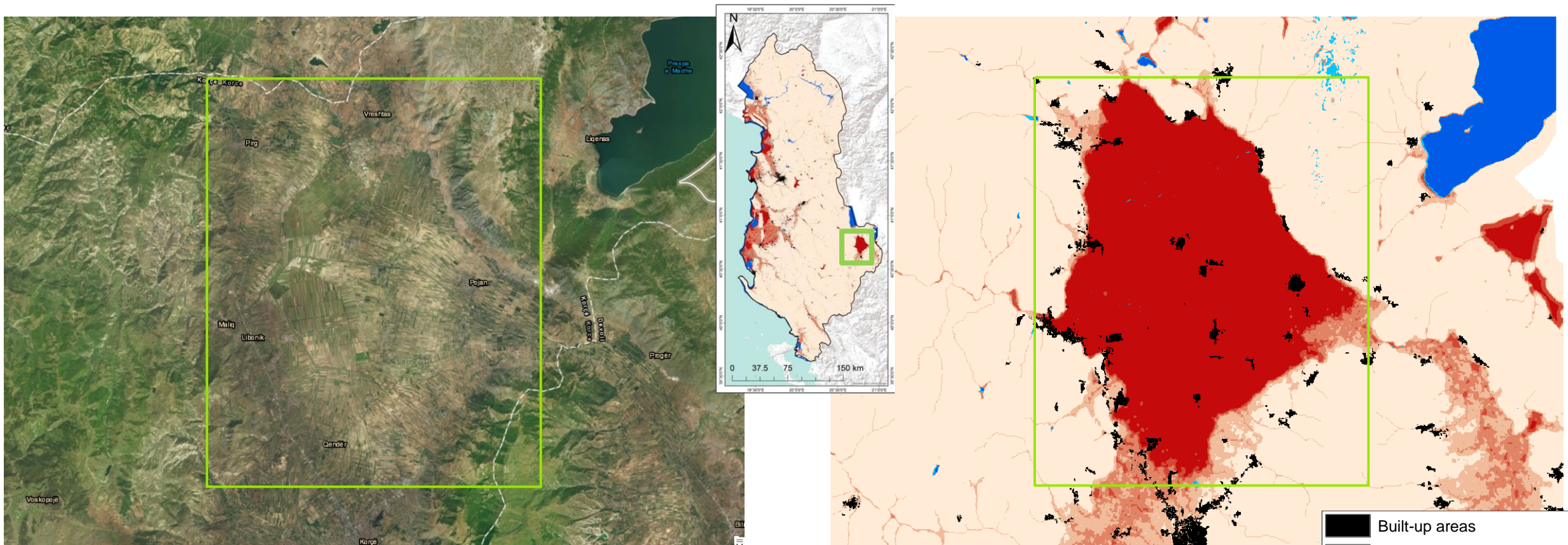
Classes in %





Albania

National map of Potential Wetland Areas (PWA) → Enables the detection of lost wetlands

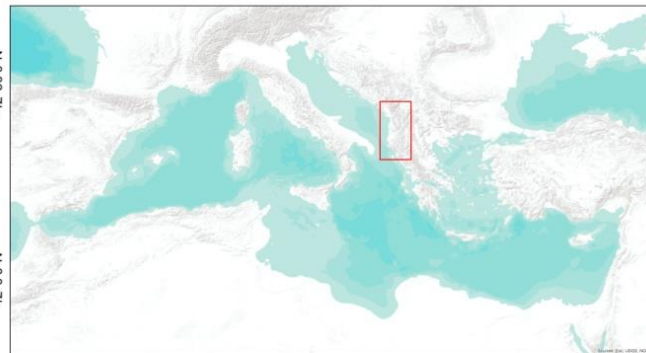
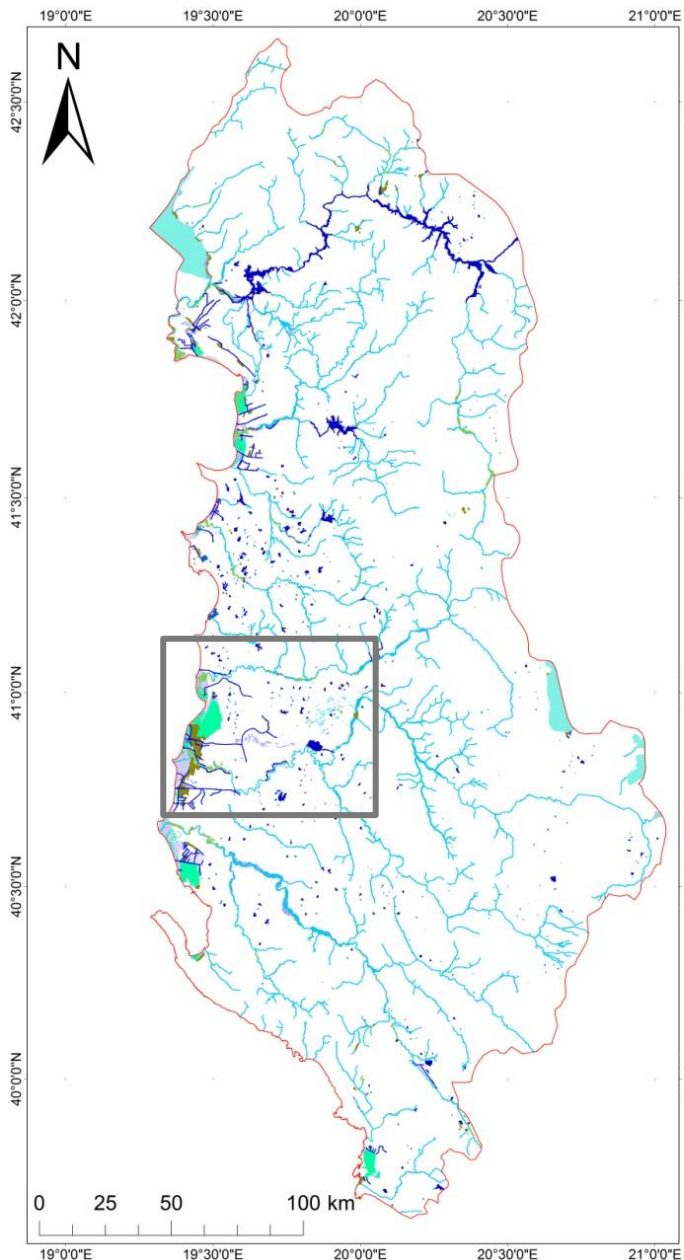


Maliqi swamp, Albania (~9 500 ha)

- Built-up areas
- Very low probability
- Low probability
- Medium probability
- High probability
- Very high probability
- Temporarily flooded areas
- Permanently flooded areas



Albania

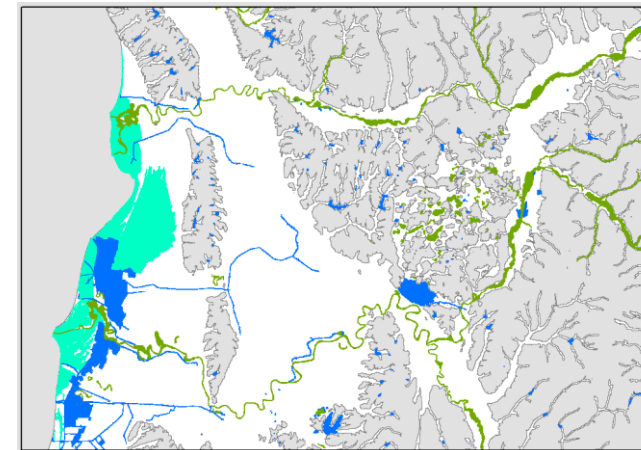


Wetland classes based on CLC-Ramsar definitions (Albania, 2015)

- CLC 1311: Excavations; gravel/brick/clay pits; borrow pits, mining pools
- CLC 2313: Wet pastures
- CLC 3112: Wet forests including riparian
- CLC 3311: Sand, shingle or pebble shores
- CLC 411: Inland marshes
- CLC 412: Peatbogs
- CLC 421: Salt marshes
- CLC 422: Salines
- CLC 511: Inland water courses
- CLC 5114: Canals and drainage channels, ditches
- CLC 512: Inland water bodies
- CLC 5125: Permanent freshwater lakes (over 8 ha) with aquatic bed vegetation
- CLC 5129: Aquaculture (e.g., fish/shrimp) ponds
- CLC 5130: Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha)
- CLC 5131: Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha)
- CLC 5132: Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc
- CLC 521: Coastal lagoons
- CLC 5231: Permanent shallow marine waters less than six metres deep at low tide

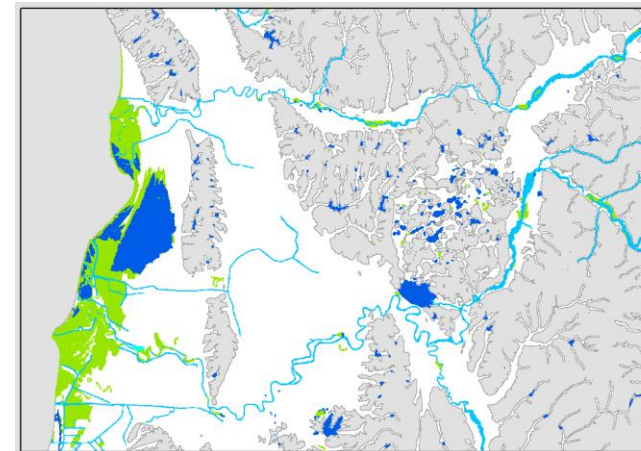


Ramsar: Total wetlands extent



- Coastal wetlands
- Inland wetlands
- Man-made wetlands

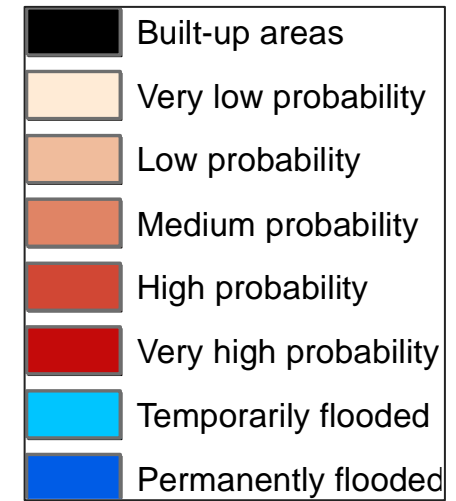
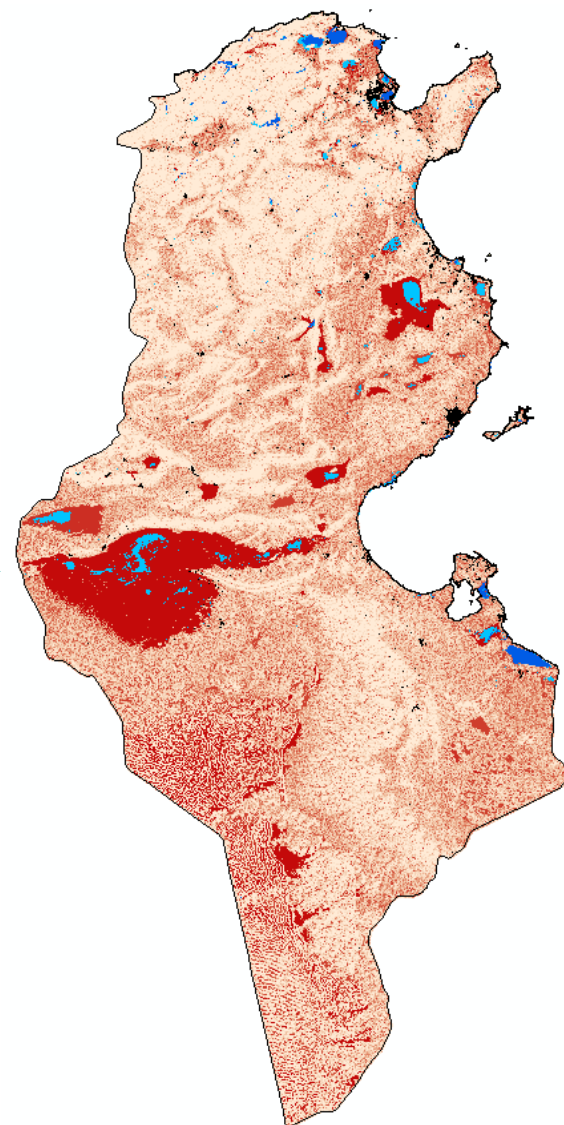
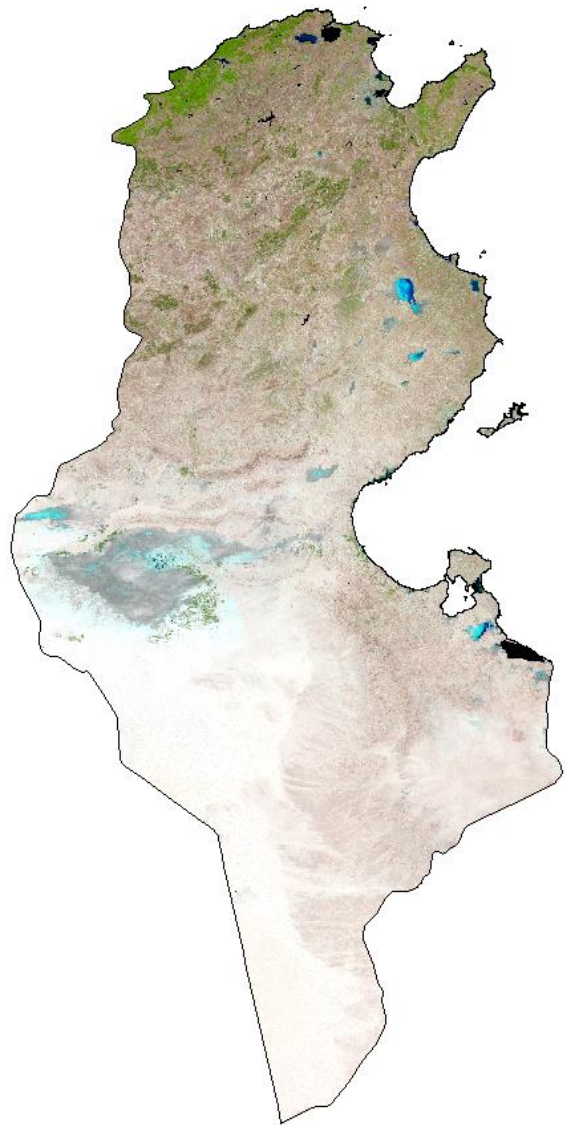
SDG 6.6.1: Water-related ecosystems extent



- Vegetated wetlands
- Open water bodies
- River water bodies



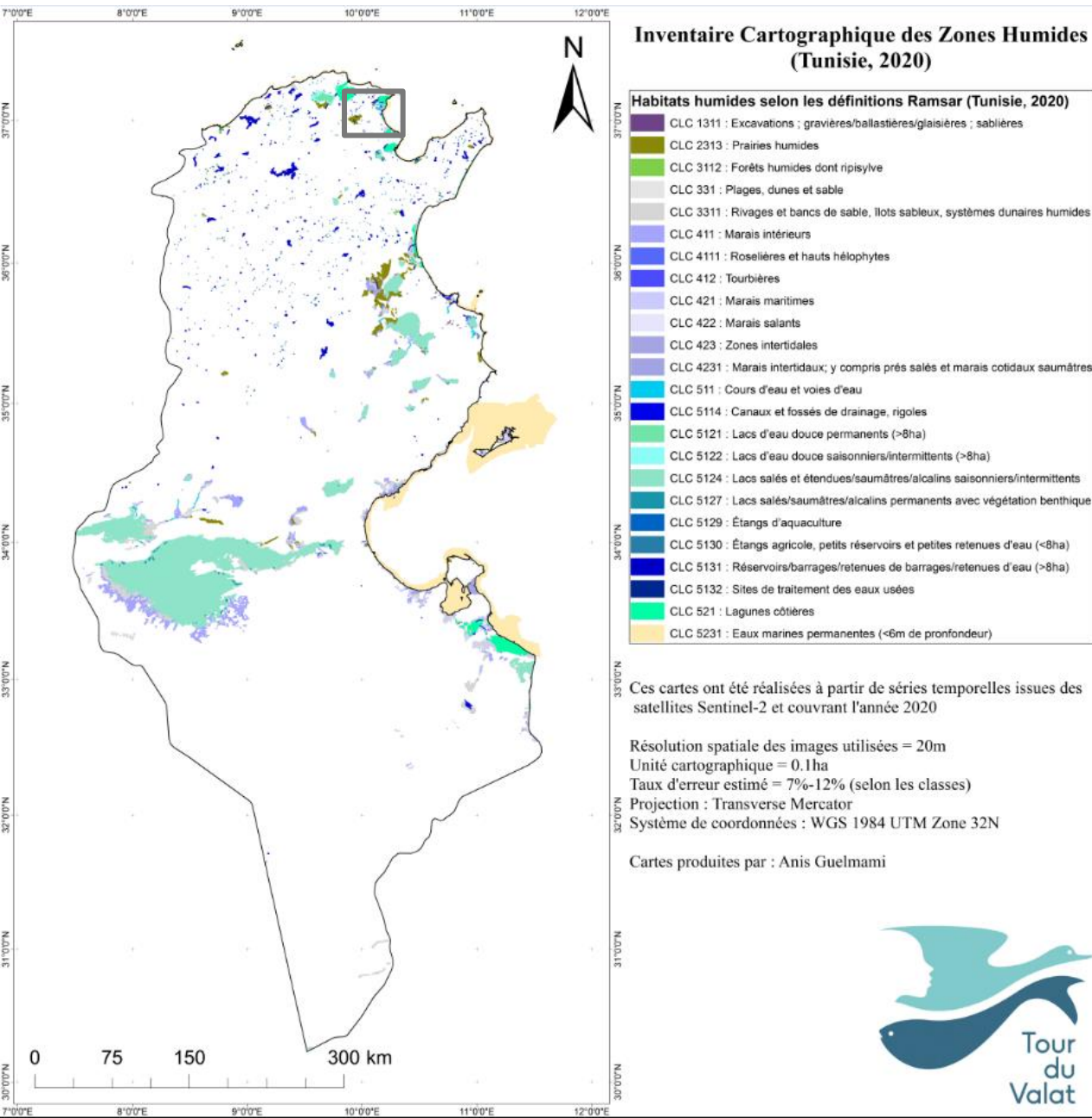
Tunisia



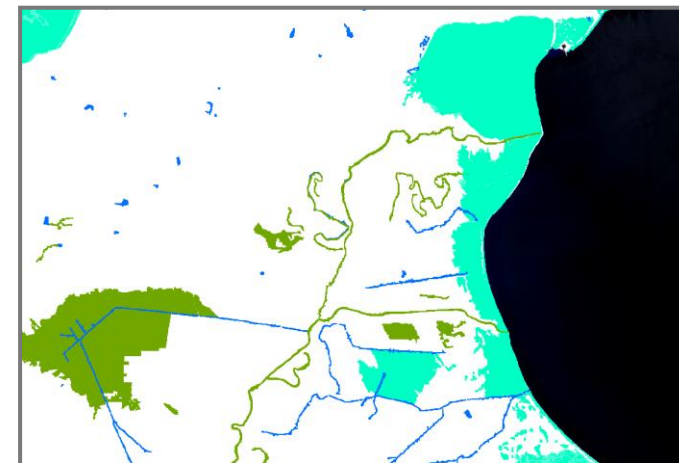
The same approach was used for Tunisia



Tunisia

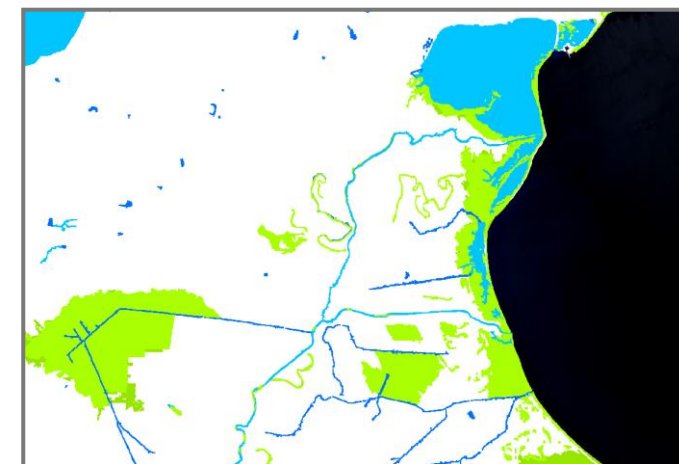


Ramsar: Total wetlands extent



Coastal wetlands Inland wetlands Man-made wetlands

SDG 6.6.1: Water-related ecosystems extent

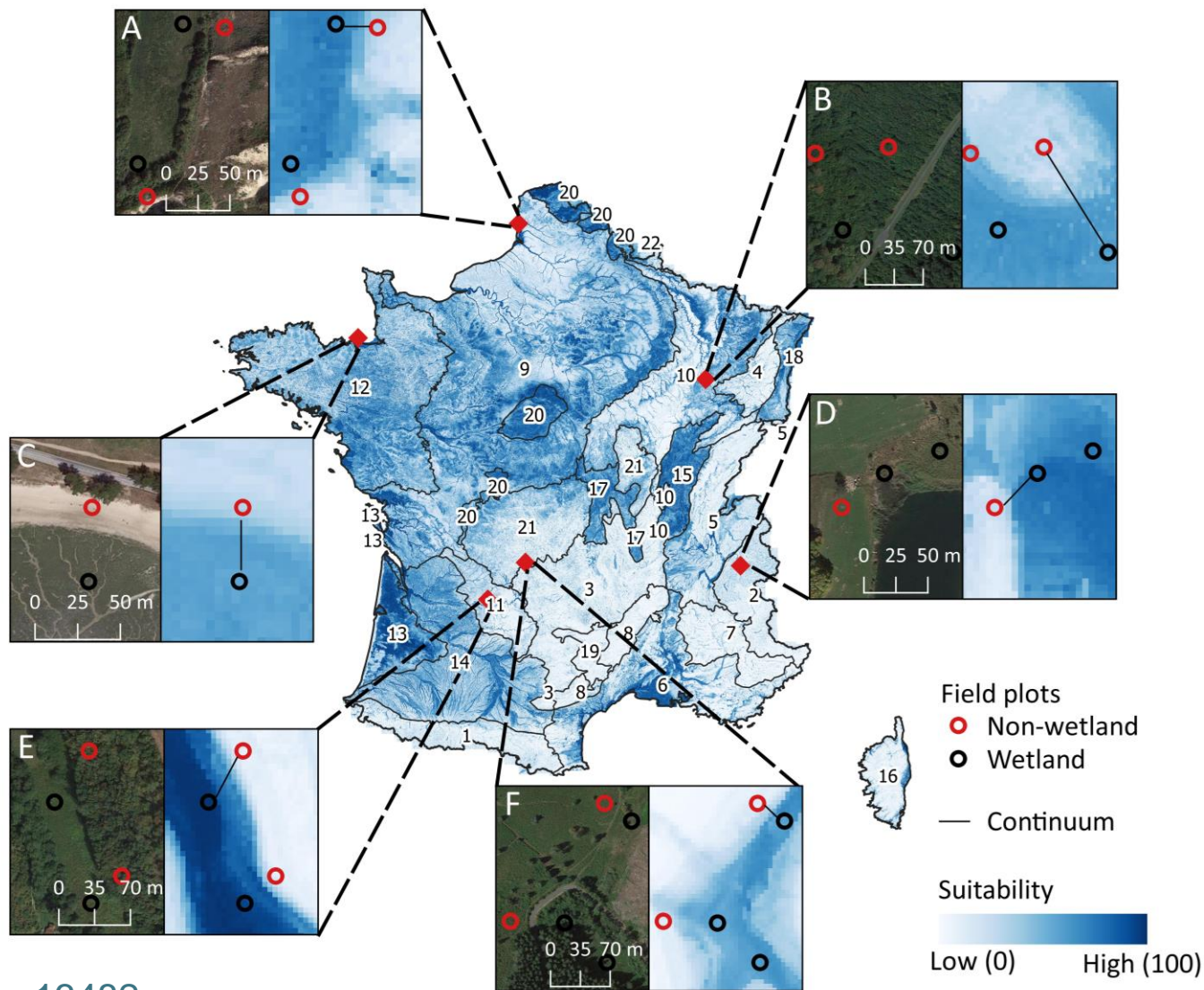
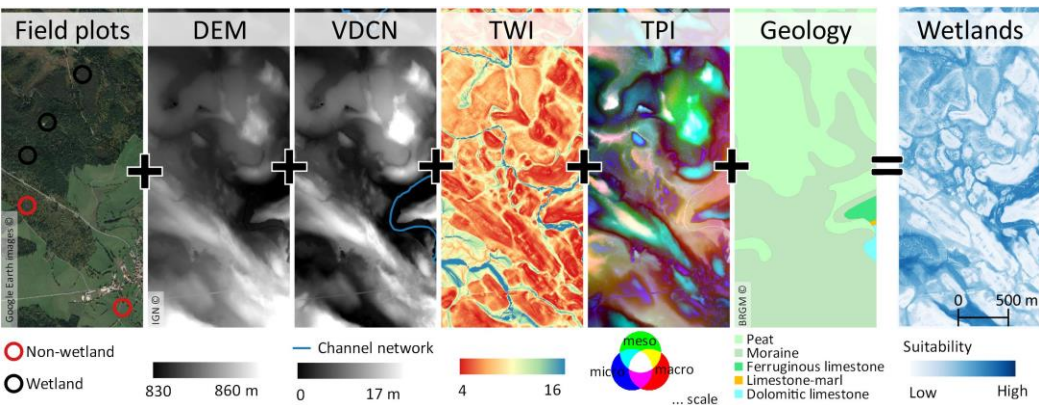


Vegetated wetlands Open water bodies River water bodies



France

Wetlands occurrence suitability map (5m spatial resolution)



- **135 000** field data from national databases

- EO-derived environmental variables

Open-access availability:
<https://doi.org/10.5281/zenodo.8389646>

Methodological paper : <https://doi.org/10.1016/j.heliyon.2023.e13482>

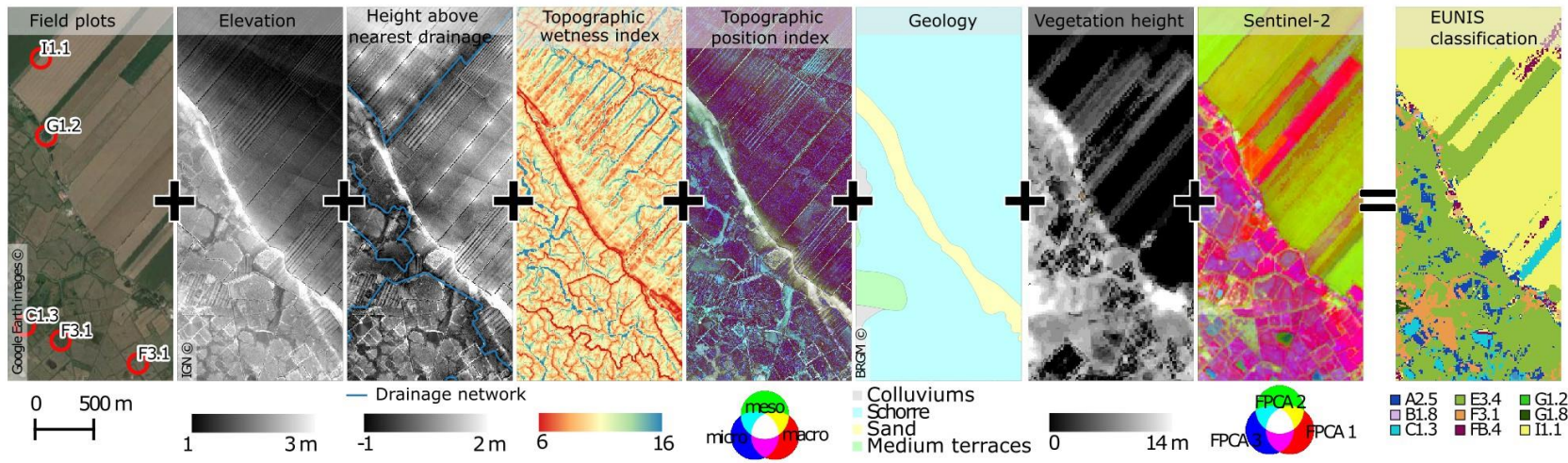
Data paper 1: <https://doi.org/10.1016/j.dib.2022.108632>

Data paper 2: <https://doi.org/10.1016/j.dib.2023.109369>



EO-based approaches – National Wetland Maps

France

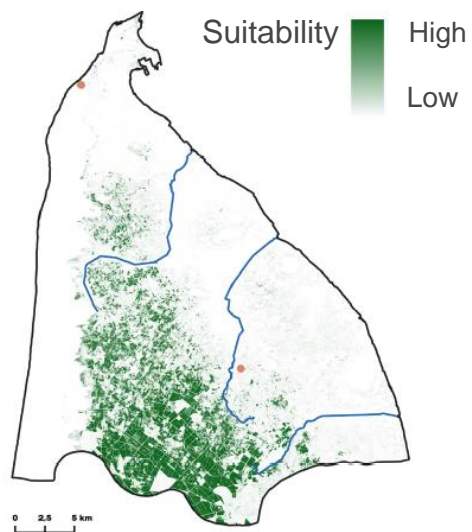


Mapping Wetland Habitats (ongoing)

Using EUNIS Typology
Hierarchical Random Forest Classification

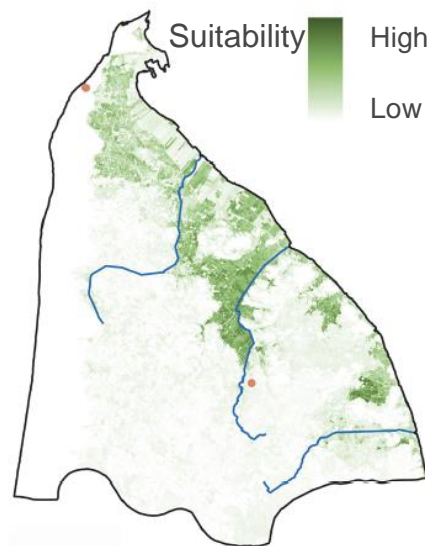
Example of high pressure from pine plantations

G3.7 - Lowland to montane mediterranean pine woodland (excluding black pine *Pinus nigra*)



Example of low agricultural pressure

E3.4 - Moist or wet eutrophic and mesotrophic grassland





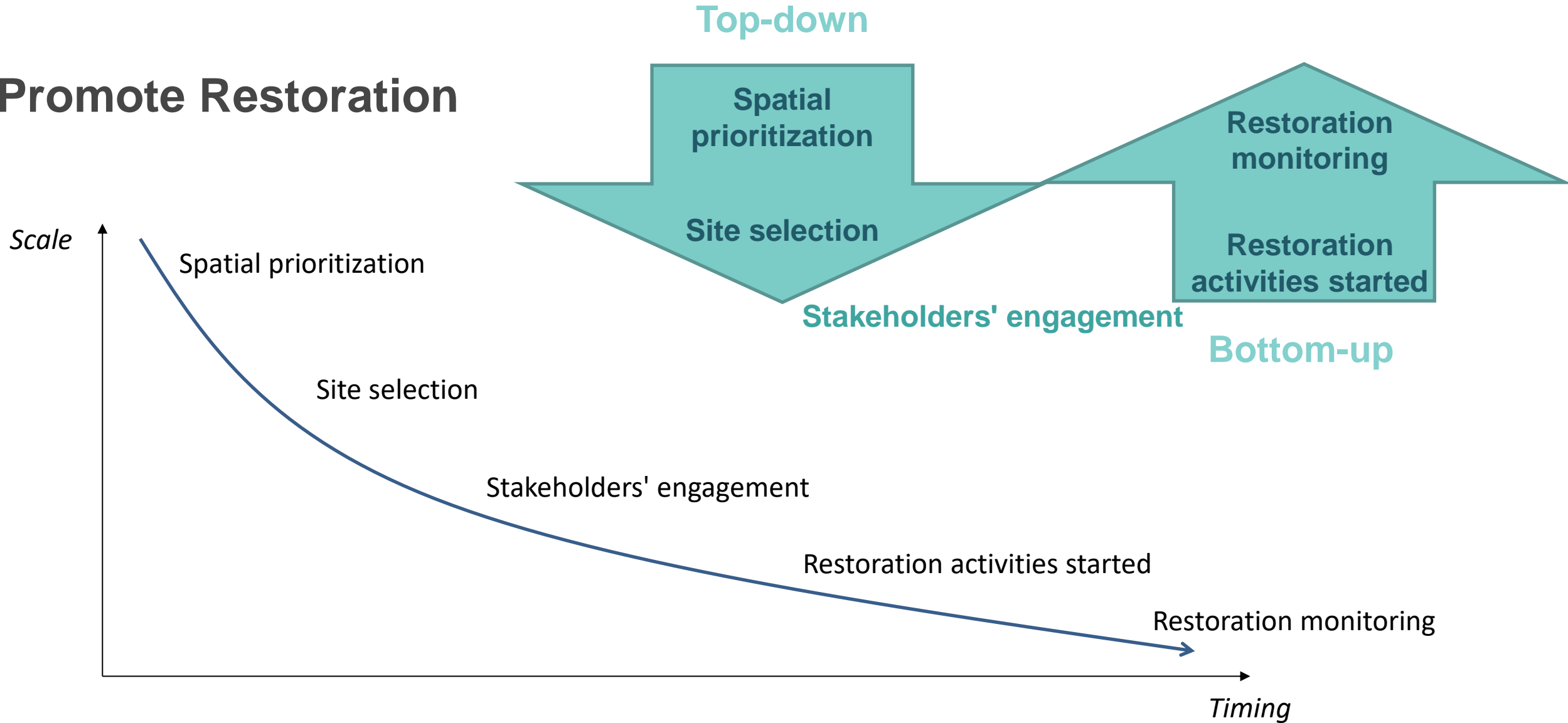
What can EO-based data do for that?

Supporting Wetlands Restoration

Priorisation maps

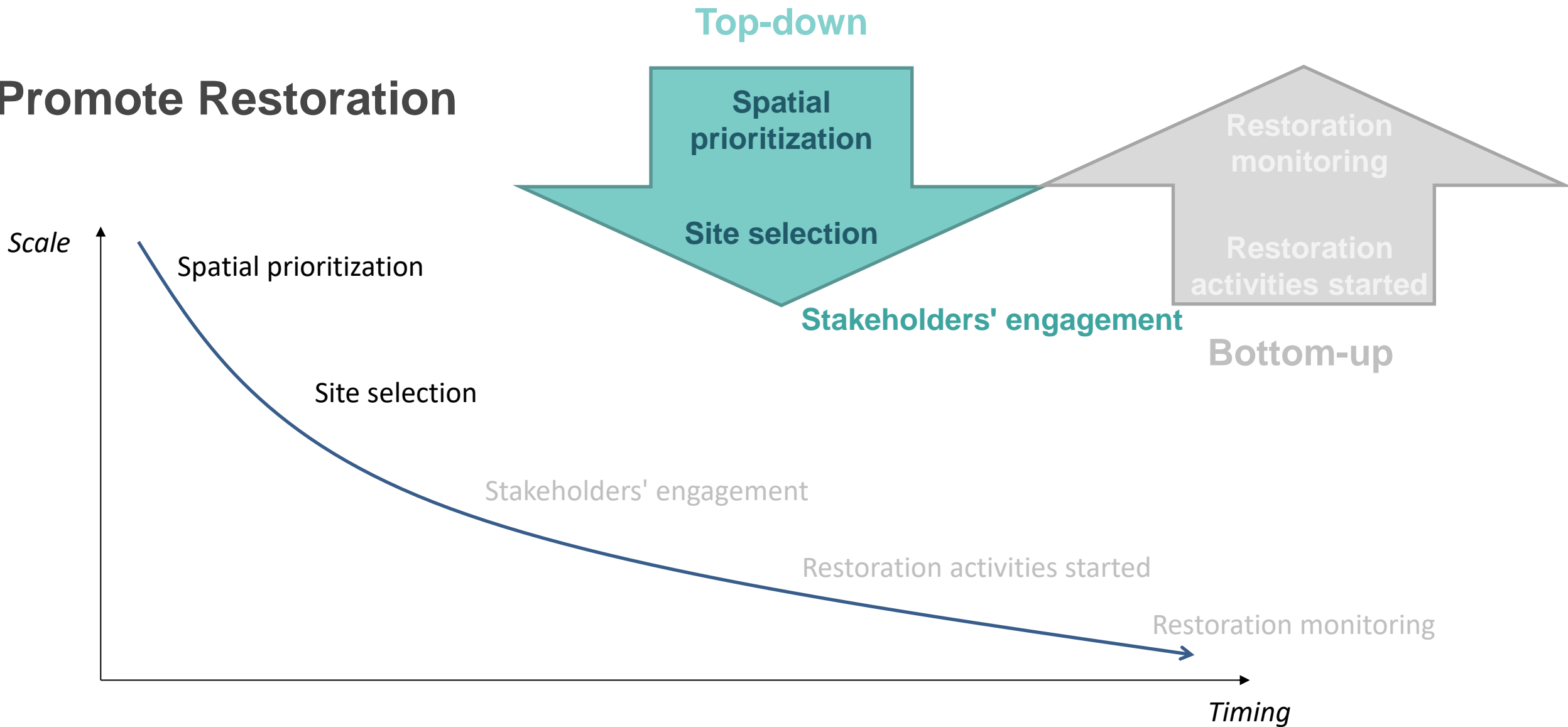


Promote Restoration





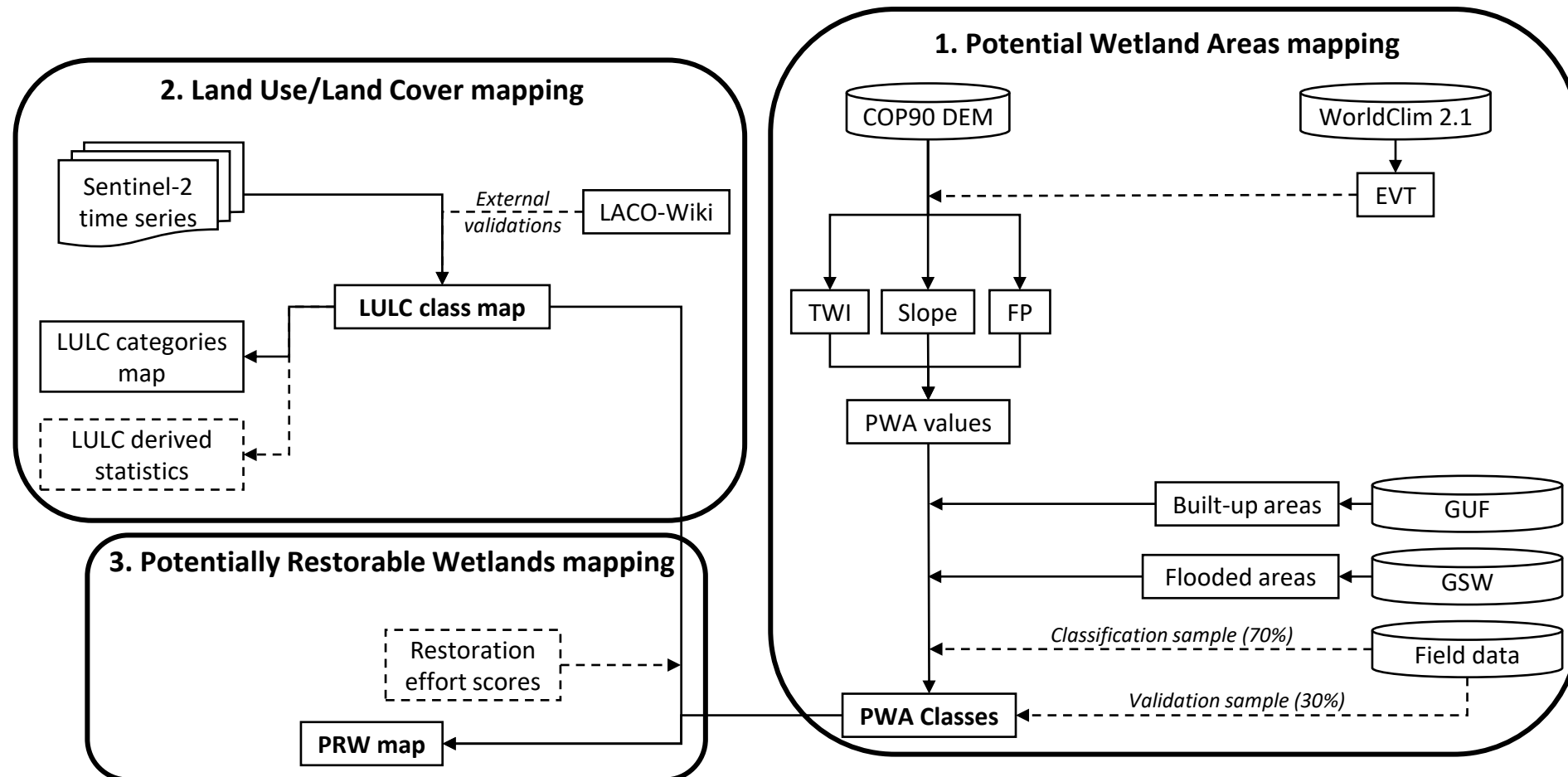
Promote Restoration





Objective:

- Map and delineate areas prone to the occurrence of wetland habitats
- Characterize existing wetlands and identify the lost ones
- Estimate the efforts needed to restore them (lost wetlands)





EO-based tools to map Potentially Restorable Wetlands

Sebou River Basin (Morocco)

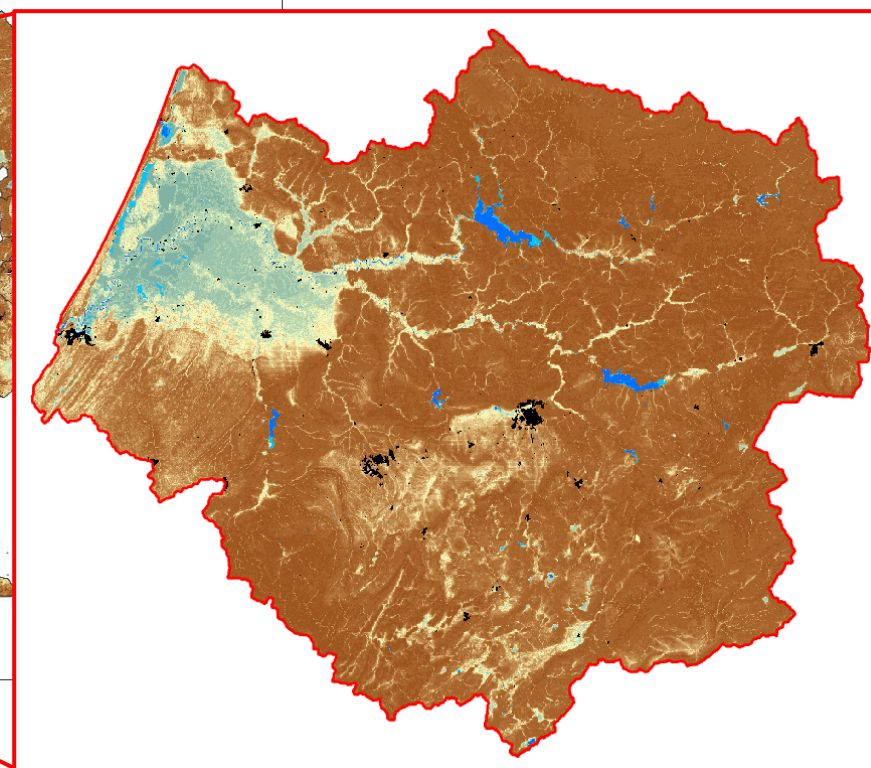
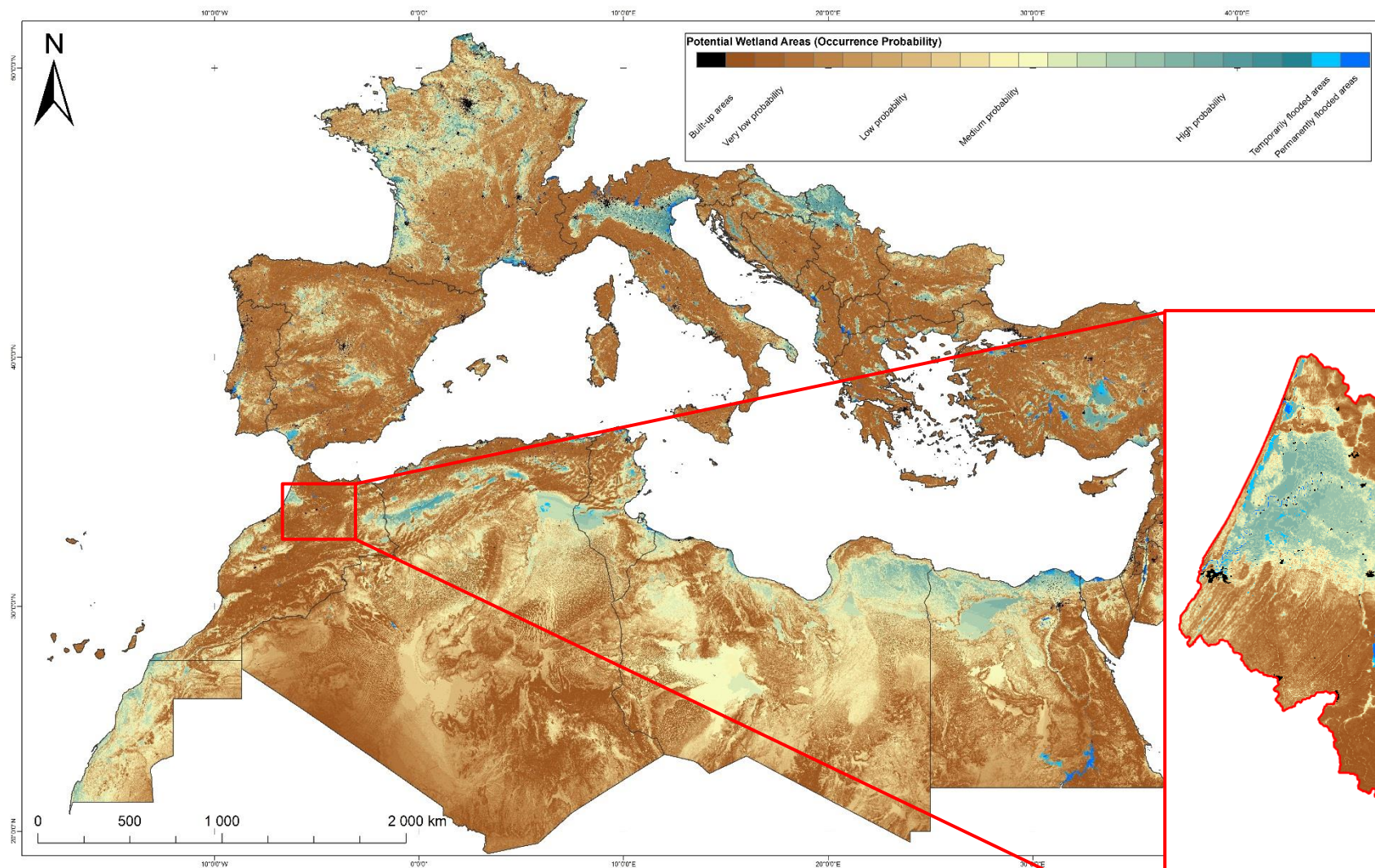


FONDS DE L'EAU DU SEBOU
INVESTIR DANS LA NATURE



Mediterranean
Wetlands
Observatory

PWA map





EO-based tools to map Potentially Restorable Wetlands

Sebou River Basin (Morocco)

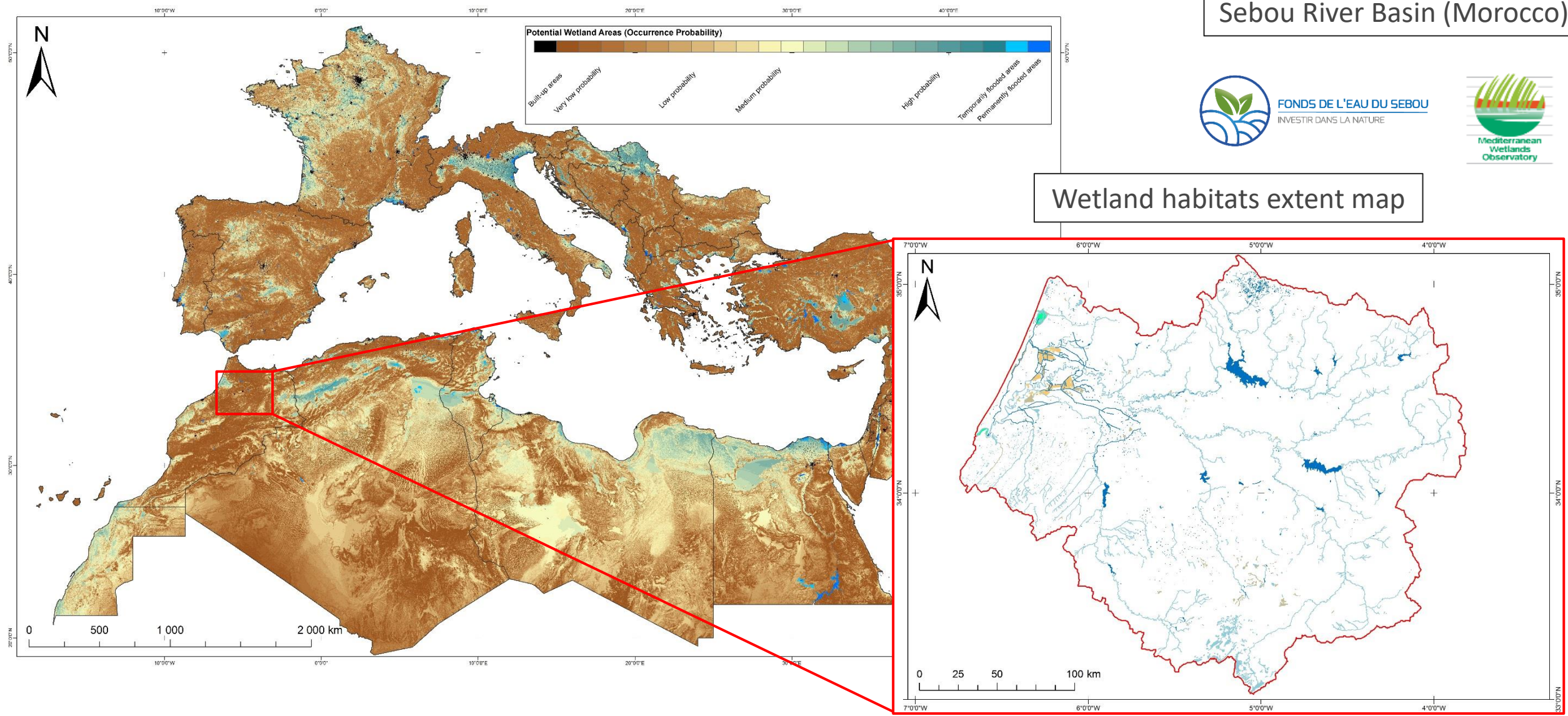


FONDS DE L'EAU DU SEBOU
INVESTIR DANS LA NATURE



Mediterranean
Wetlands
Observatory

Wetland habitats extent map





EO-based tools to map Potentially Restorable Wetlands

Sebou River Basin (Morocco)

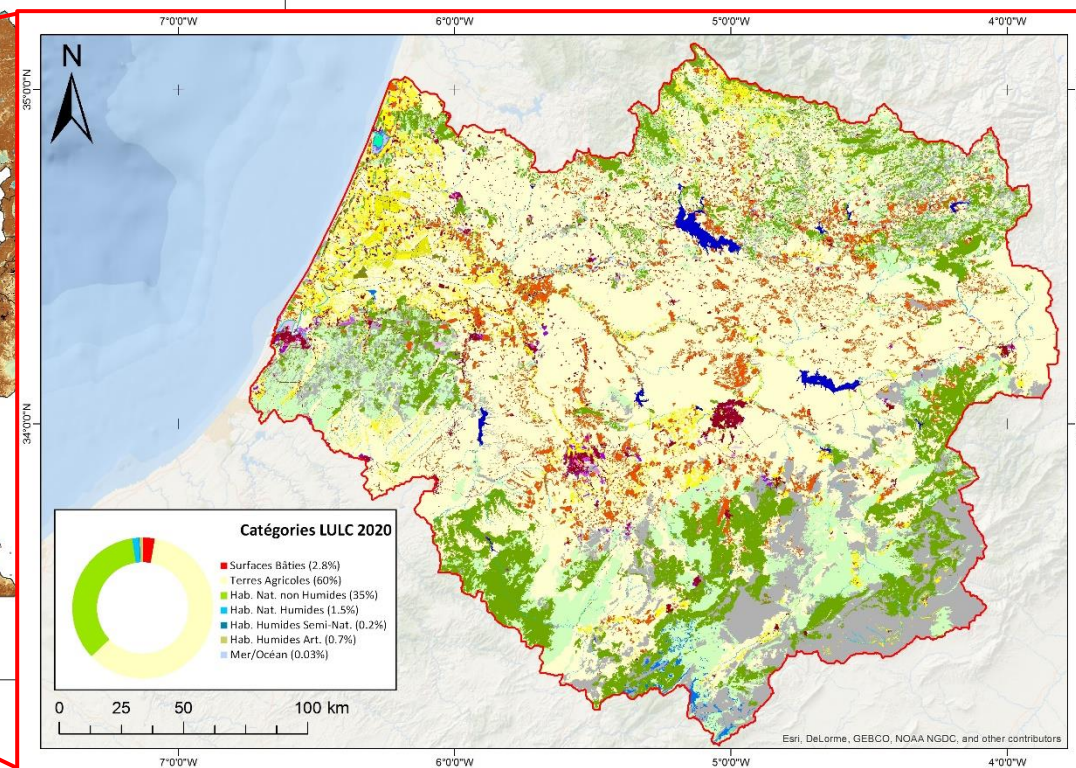
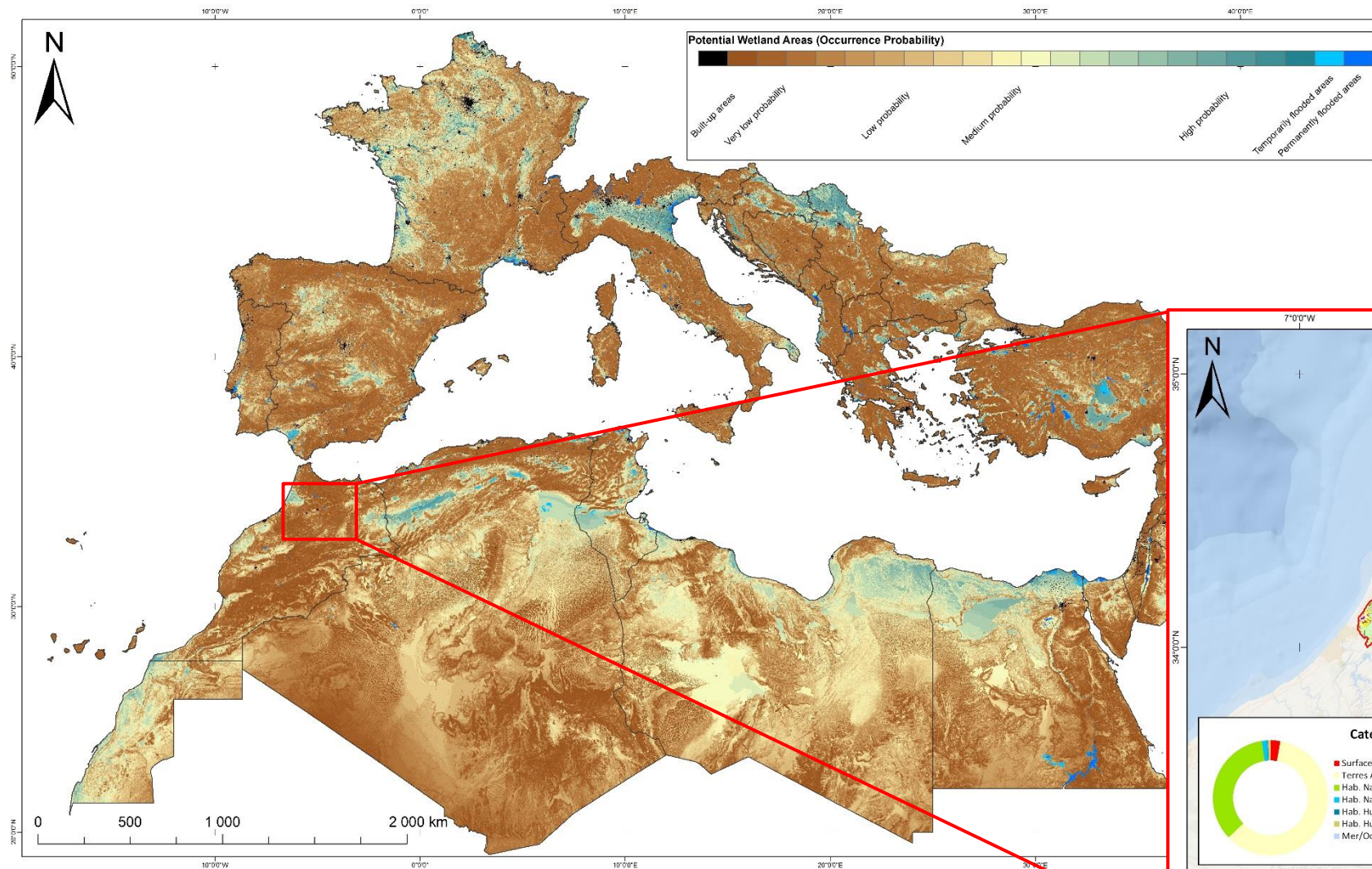


FONDS DE L'EAU DU SEBOU
INVESTIR DANS LA NATURE



Mediterranean
Wetlands
Observatory

LULC map





EO-based tools to map Potentially Restorable Wetlands

Sebou River Basin (Morocco)

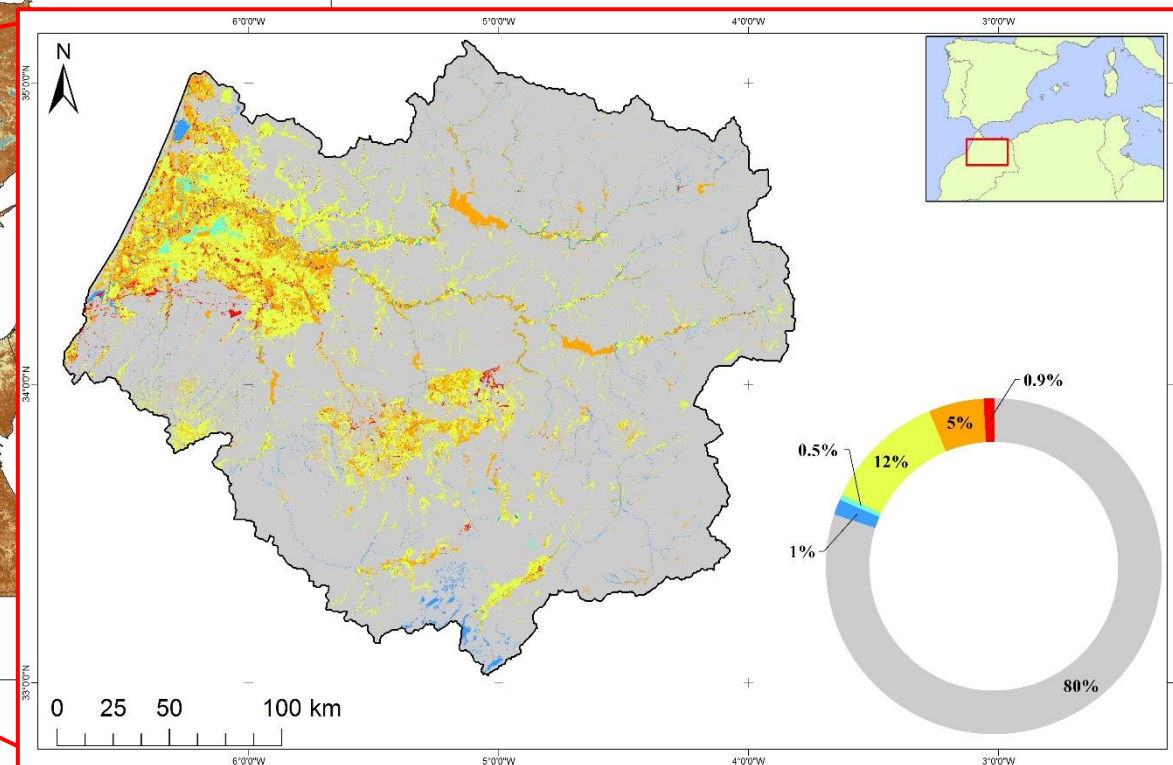
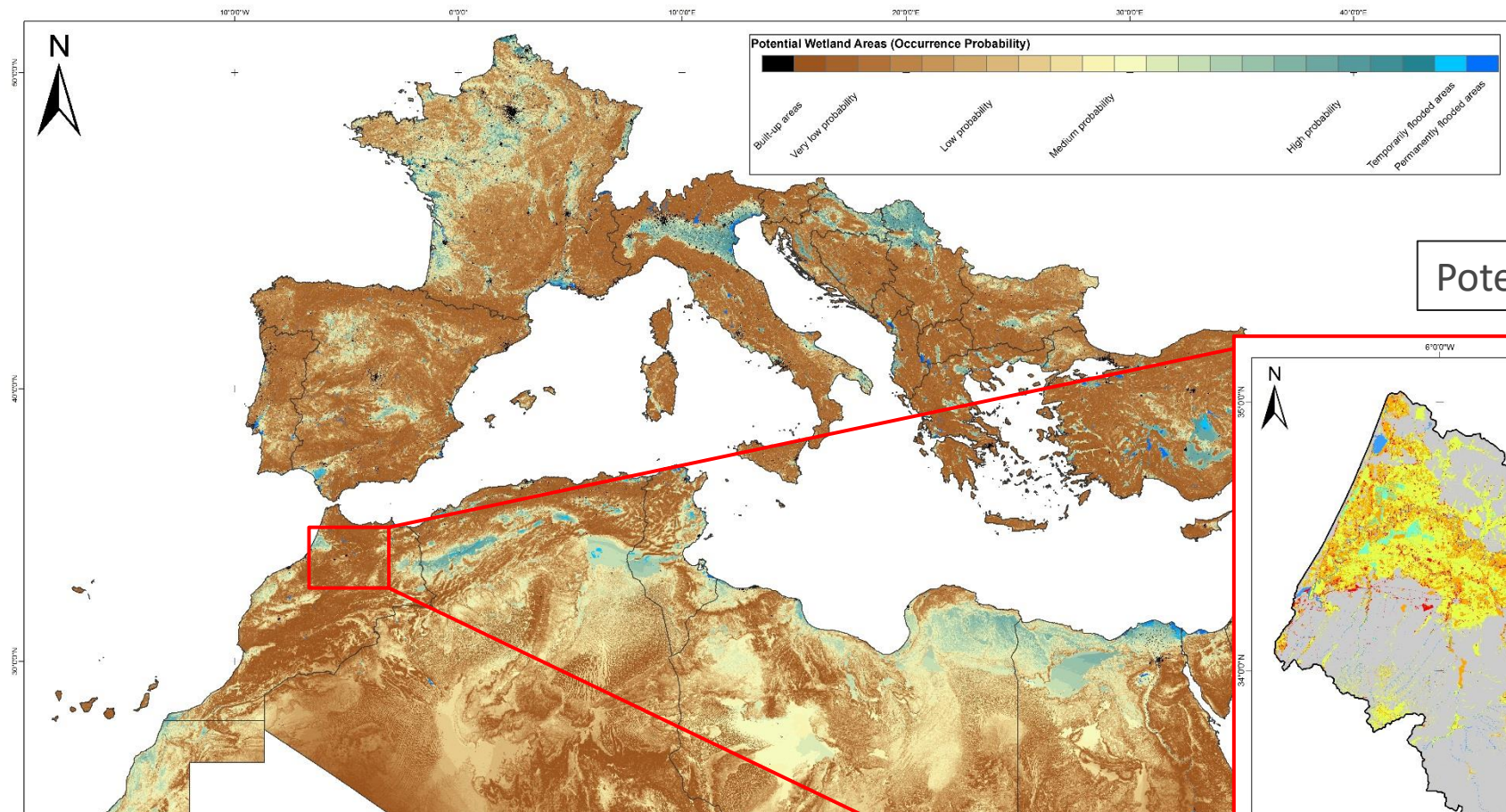


FONDS DE L'EAU DU SEBOU
INVESTIR DANS LA NATURE



Mediterranean
Wetlands
Observatory

Potentially Restorable Wetlands map





Conclusion

Data availability is no longer a problem



EO-based tools and data are increasingly integrated into national programmes

The development of a pan-Med knowledge platform on wetlands is progressing well

Too many data to process → Limited computing capacities of national partners



Lack of field data to calibrate and validate the mapping models

Lack of standardization across countries

The results produced at global and regional pan-Med scales are not sufficiently integrated into the countries' strategic documents



Lack of endorsement



Thank you

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Anis Guelmami | Tel. +33 4 90 97 06 32 / Email guelmami@tourduvalat.org