Wetland restoration indicators to measure progress towards EU policy targets

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European coastal wetlands definition and characteristics

Areas of saltwater and freshwater wetlands located within coastal watersheds.

With water static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m (*Ramsar Convention*).

Water is the main controlling factor of the environment. Occur where the water table is on or near the earth's surface or where the land is covered by shallow waters (*Ramsar Convention Preamble*).

Host a range of plant and animal species that are uniquely adapted to the degree of inundation, water characteristics and soil conditions (organic and mineral soils)

Under the influence of regular or occasional flooding by tides, including astronomical and wind-driven tides.

EU coastal wetland habitats include salt marshes, intertidal seagrasses, freshwater marshes, unvegetated tidal flats (mudflats) and creeks. In areas where tidal flooding is intermittent, other examples include saltpans.

European Coastal Wetland Indicators

Need for strong and comprehensive evidence to support the policy agenda

- A new demand for wetland indicators and supporting/ guiding tools to evidence-based assessments
- Indicators bring a focus of policy-makers and other end-users on the intended outcomes of policy actions with coastal wetlands.
- Must assess changes in the status of coastal wetlands over time and answer what is required to be assessed/monitored to track progress and measure it against EU policy targets.
- Baseline conditions, set a meaningful period for periodic assessment to measure progress, and track progress over time to measure performance against set targets

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European Coastal Wetland Indicators

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European Coastal Wetland Indicators

Linked metrics and units

POLICY INDICATOR OUTPUT	METRIC TITLE	UNITS
Extension of Coastal Wetlands Protected and Strictly Protected 	Total Coastal Wetland Extent in Protected Areas and in Strict Protected Areas	Percentage of area coverage (km²)
	Total Coastal Wetland Extent in N2000 sites	Area coverage (km²)
	Total Coastal Wetland Extent designated as Ramsar and/in Natura 2000	Area coverage (km²)
	Total Coastal Wetland Protected as a Proportion of Coastal Wetlands	Percentage of area coverage (km²)
Representativity of Coastal Wetland Habitats in Protected Areas 	Spatial cover of different coastal wetland habitats in Protected Areas	Percentage of area coverage (km²)
	Individual Coastal Wetland Habitat Extent in N2000	Area coverage (km²)

POLICY INDICATOR OUTPUT	METRIC TITLE	UNITS
Improved Coastal Wetland Health 	Coastal Wetland Knowledge	Proportion of sites with data available and habitat condition known
	Coastal Wetland Habitat Condition	Percentage change in good condition of different coastal wetland habitats
	Coastal Wetland Biodiversity (Species) Condition	Percentage change in good condition of different coastal wetland species
	Deterioration Status	Area coverage (km²) of deteriorated coastal wetlands
		Level of deterioration of different types
		Area coverage (km²) of drained Coastal Wetlands and organic soils
	Risk posed by invasive species	Percentage of area coverage to total coastal wetland area
		Population size
		Number of Invasive species

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European Coastal Wetland Indicators

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POLICY INDICATOR OUTPUT	METRIC TITLE	UNITS
Coastal Wetland Restoration Rate 	Hydrological Connectivity	Km of free-flowing rivers connected to coastal wetlands being restored
	Surface and Groundwater Restoration	Ecological and chemical threshold values
	Pollutant Reduction Effectiveness	Percentage decrease in concentrations of key pollutants
		Number of priority substances that met the targets (concentrations) per wetland

Coastal Wetland Restoration Rate 	Barrier Impact Index	Percentage change in natural water flow patterns due to the elimination of barriers
	Restoration Potential	National plans that prioritize coastal wetland restoration
		Area coverage (km^2) of potential restored habitats from the proportion deteriorated
	Restoration Progress	Area coverage (km^2) of habitats of coastal wetlands restored and under restoration
		Number of countries with coastal wetland restoration in progress
		Area coverage (km^2) of coastal wetlands with restored drainage systems

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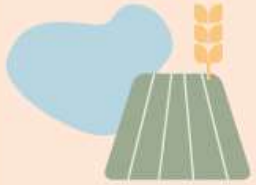
European Coastal Wetland Indicators

POLICY INDICATOR OUTPUT	METRIC TITLE	UNITS
Vulnerability to Climate-Related and Natural Disasters 	Coastal Wetland Vulnerability	Vulnerability Index score
GHG Emissions Abatement from Coastal Wetland Land Use Conversion and Restoration 	Land Use Conversion Area	Percentage change of converted coastal wetland area
	Extended Coastal Wetland Habitat Loss/ Gain Ratio	Percentage of area coverage (km^2) of total coastal wetlands
	GHG Emissions and Removals from Land Converted Wetlands	GHG emissions and removals /ha/year following wetland conversion
	GHG from Coastal Wetland Restoration	GHG emissions/ha/ year following wetland restoration

POLICY INDICATOR OUTPUT	METRIC TITLE	UNITS
Share of Utilised Agricultural Area (UAA) under Supported CAP Commitments in Coastal wetlands 	Share of Agricultural Area in Coastal Wetlands	Area coverage (km^2) of land used for agriculture within coastal wetlands. Area coverage (km^2) of UAA within coastal wetlands that are managed under CAP-supported initiatives.
	Agricultural Carbon Sequestration and GHG Reduction Index in Coastal Wetlands	Carbon sequestration Rate and GHG emissions/ ha/year from CAP Agriculture land in coastal wetlands
Overall funding sources for coastal wetlands 	Coastal Wetland Funding	Euros invested per reporting period

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Mapping the data availability

Policy outcome indicators

- Protected wetlands
- Protected habitat
- Wetland health
- Restoration rate
- Vulnerability
- GHG emissions
- Wetland in Agriculture
- Funding sources

R4Cs Information layers

- Wetland extent
- Protected areas
- Habitats maps
- Free-flowing rivers
- Land use / Land Cover
- Wetland use intensity
- Potential wetland layer
- Surface Water Quality
- Surface water dynamics

Reported / In situ data

Mapping the data availability

Policy outcome indicators

- Protected wetlands
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Coastal wetland extent in PAs

R4Cs Information layers

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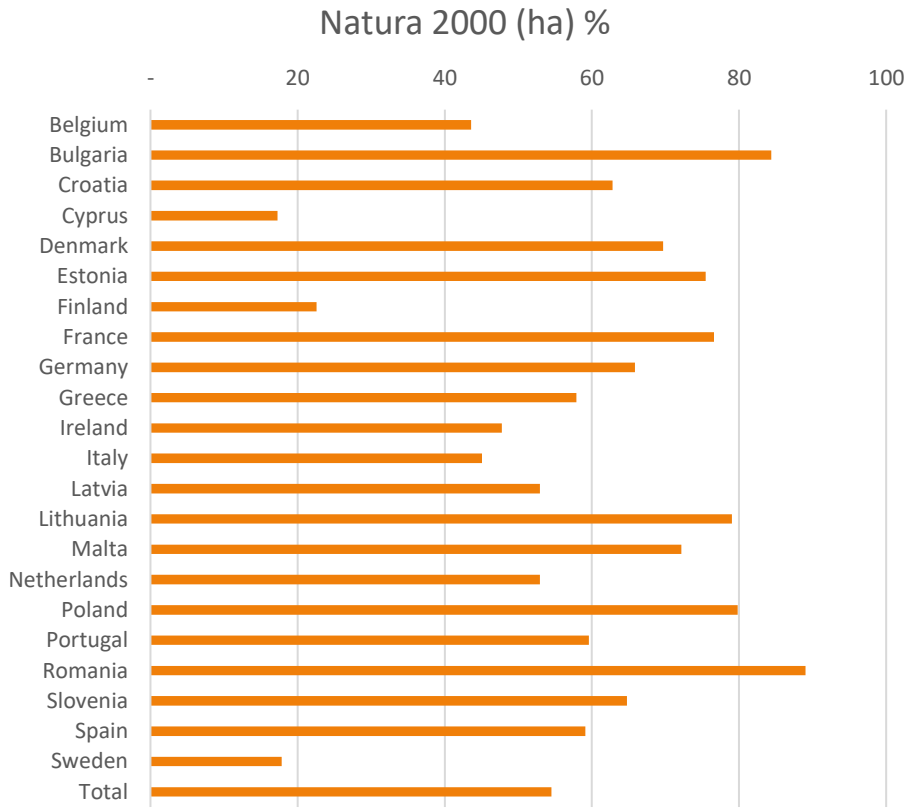
- Reported / In situ data

Examples of mapped indicators and metrics

Coastal Wetland Extent in Natura 2000 sites



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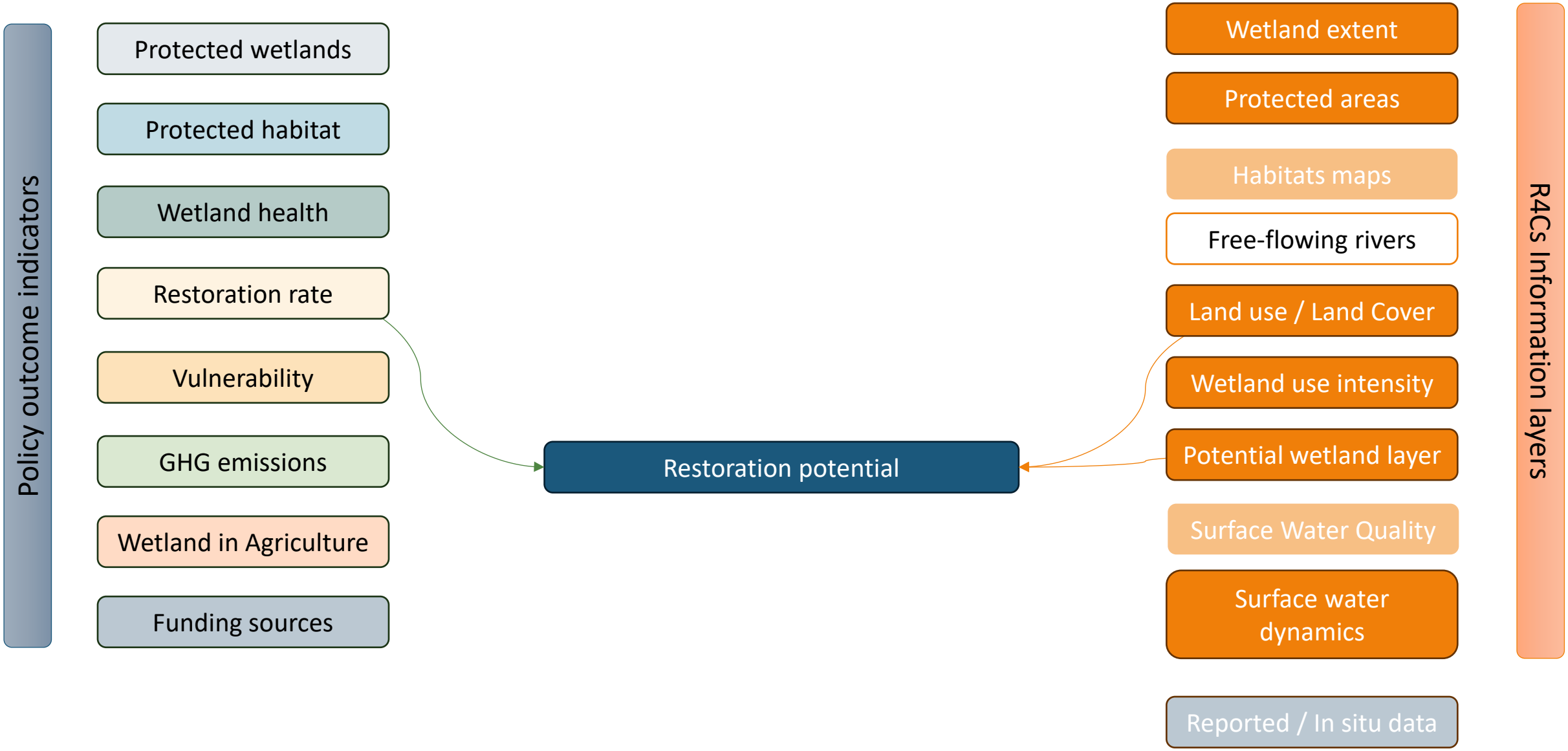
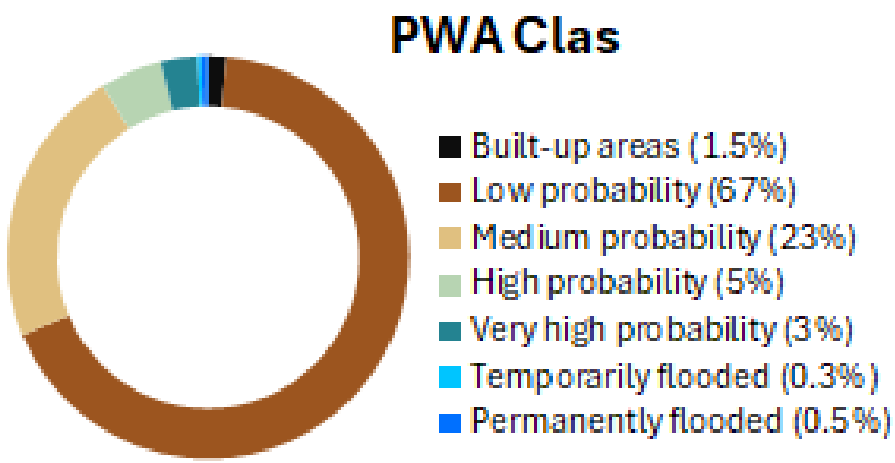
Mapping the data availability



Examples of mapped indicators and metrics

Potential Wetland Areas (PWA) - Spain



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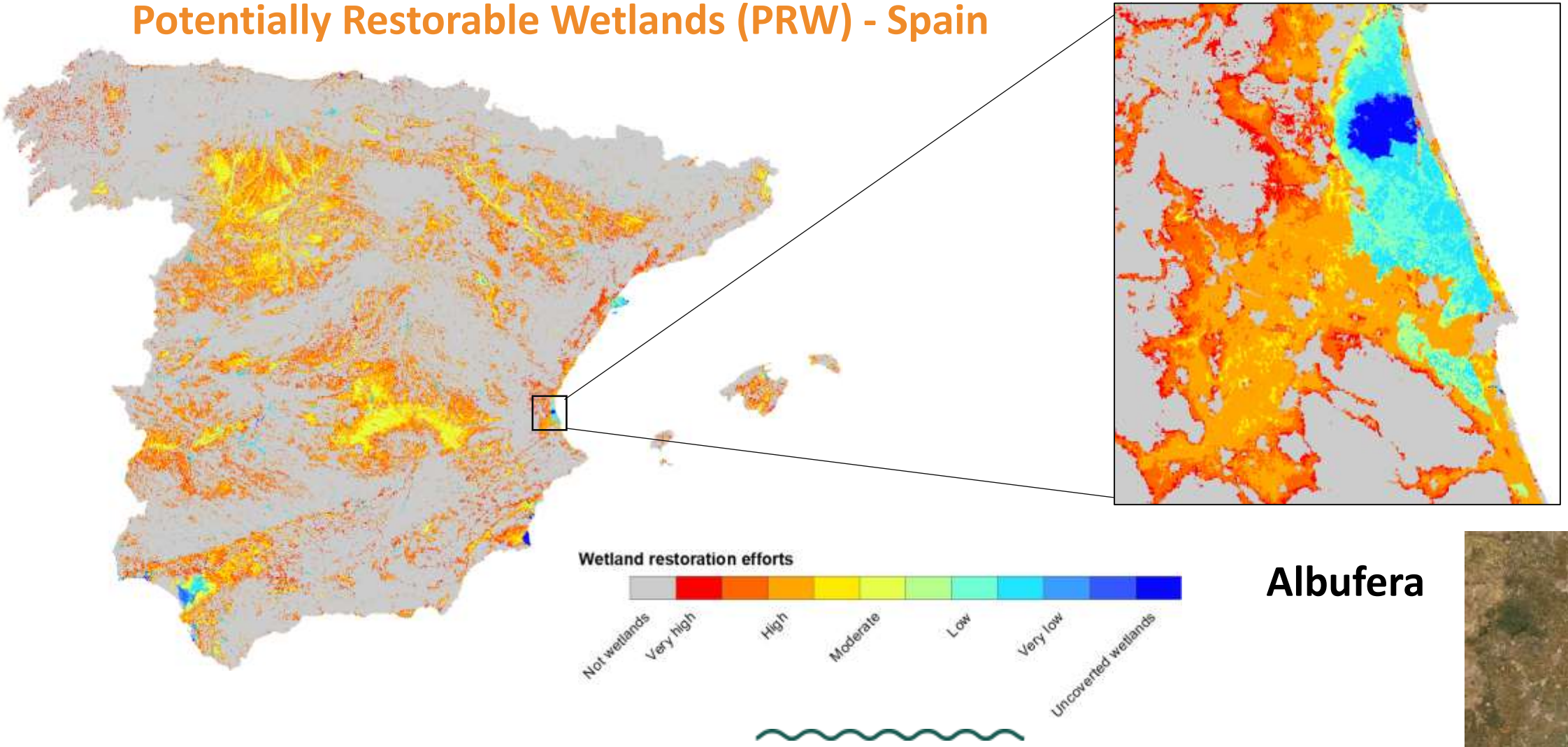
Examples of mapped indicators and metrics

Potentially Restorable Wetlands (PRW) - Spain



Albufera

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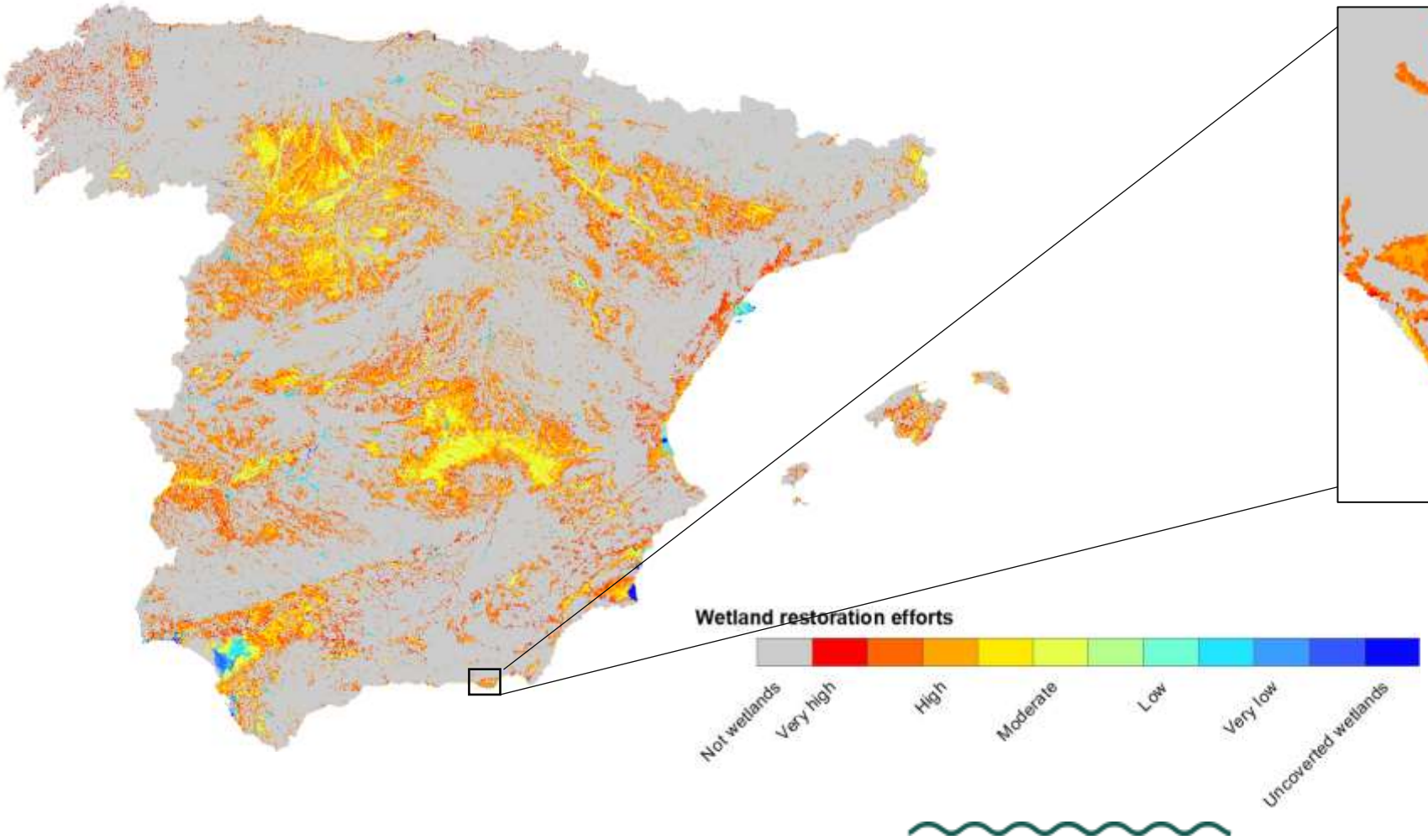
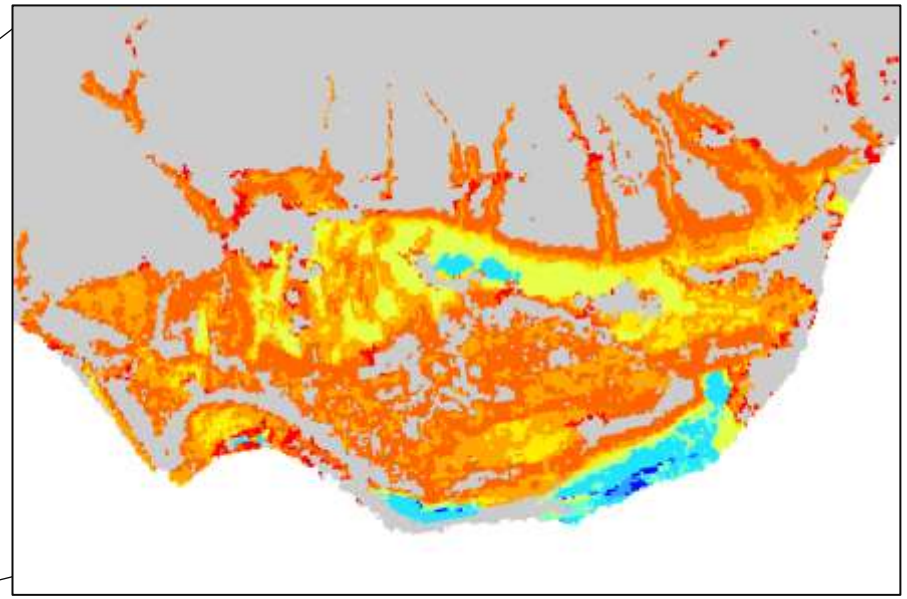
Examples of mapped indicators and metrics

Potentially Restorable Wetlands (PRW) - Spain





El Ejido

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Examples of mapped indicators and metrics

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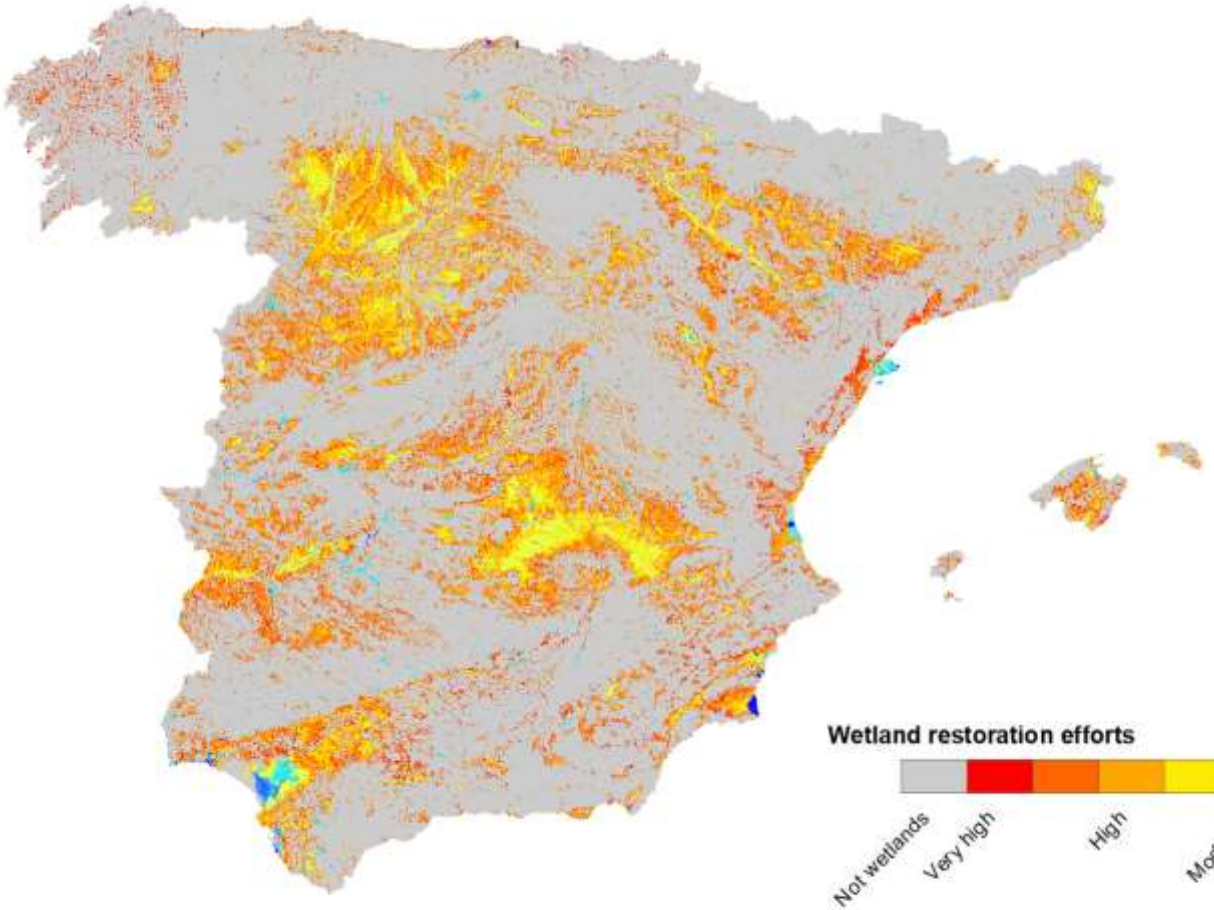

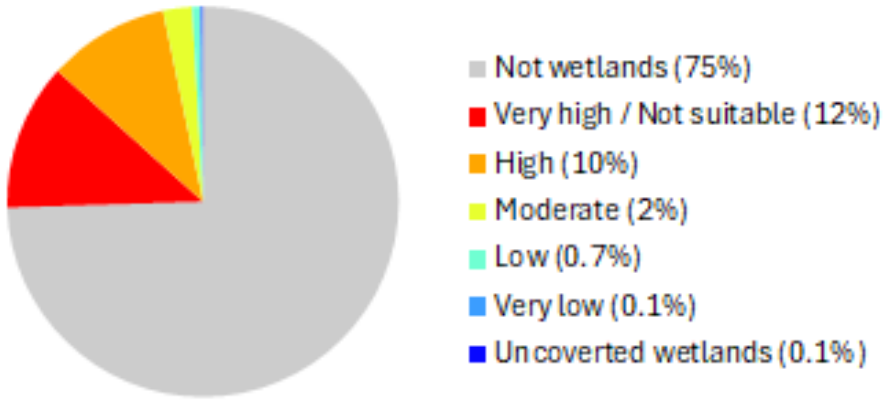

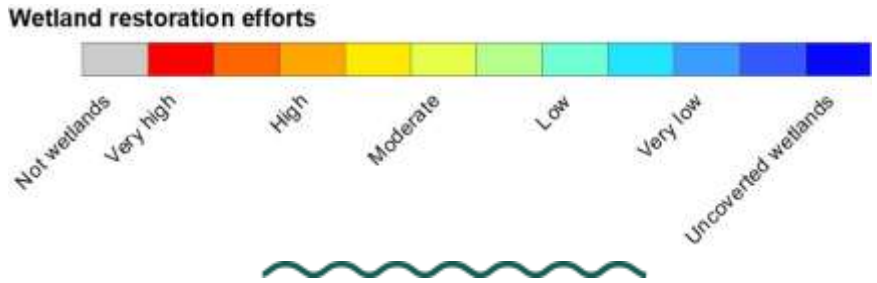

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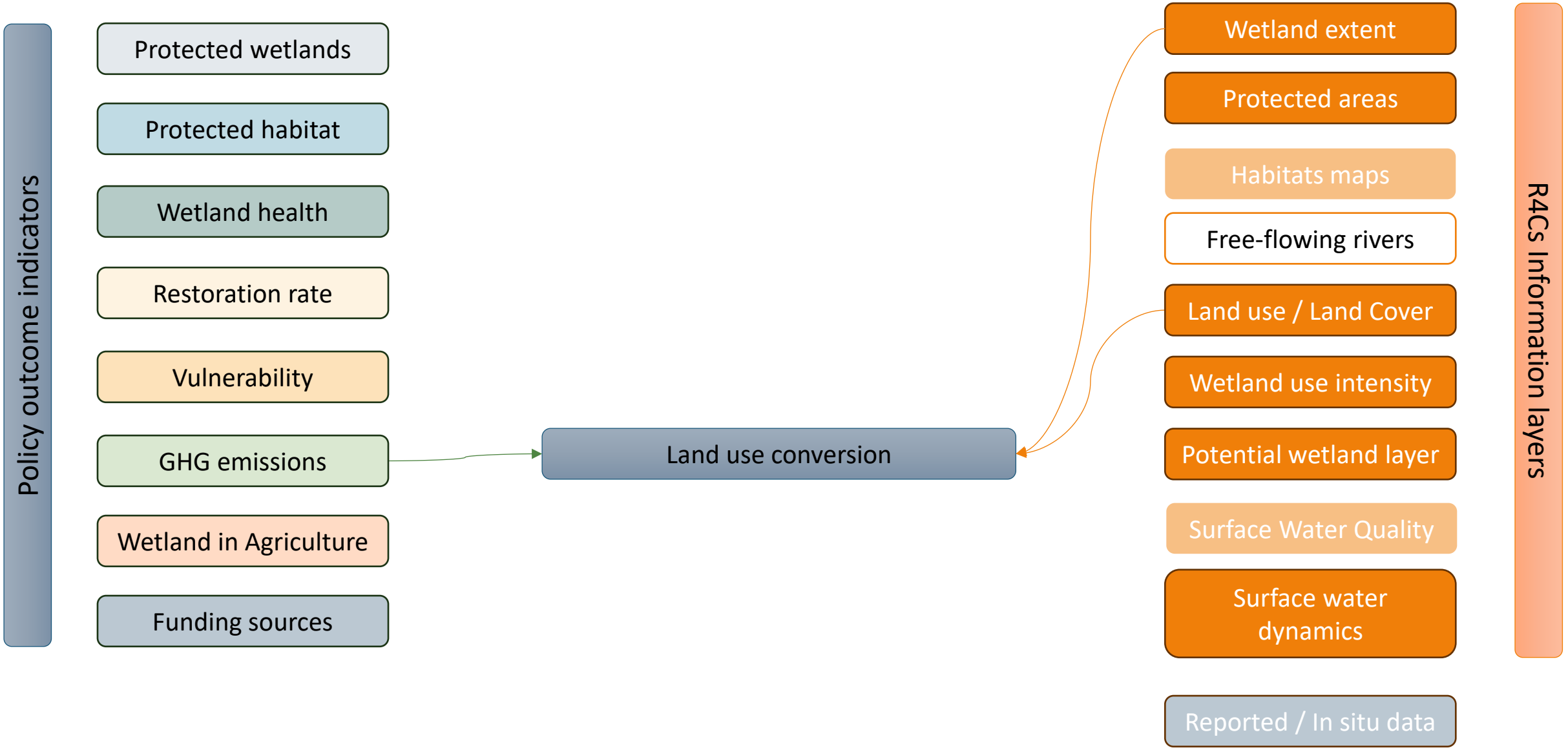
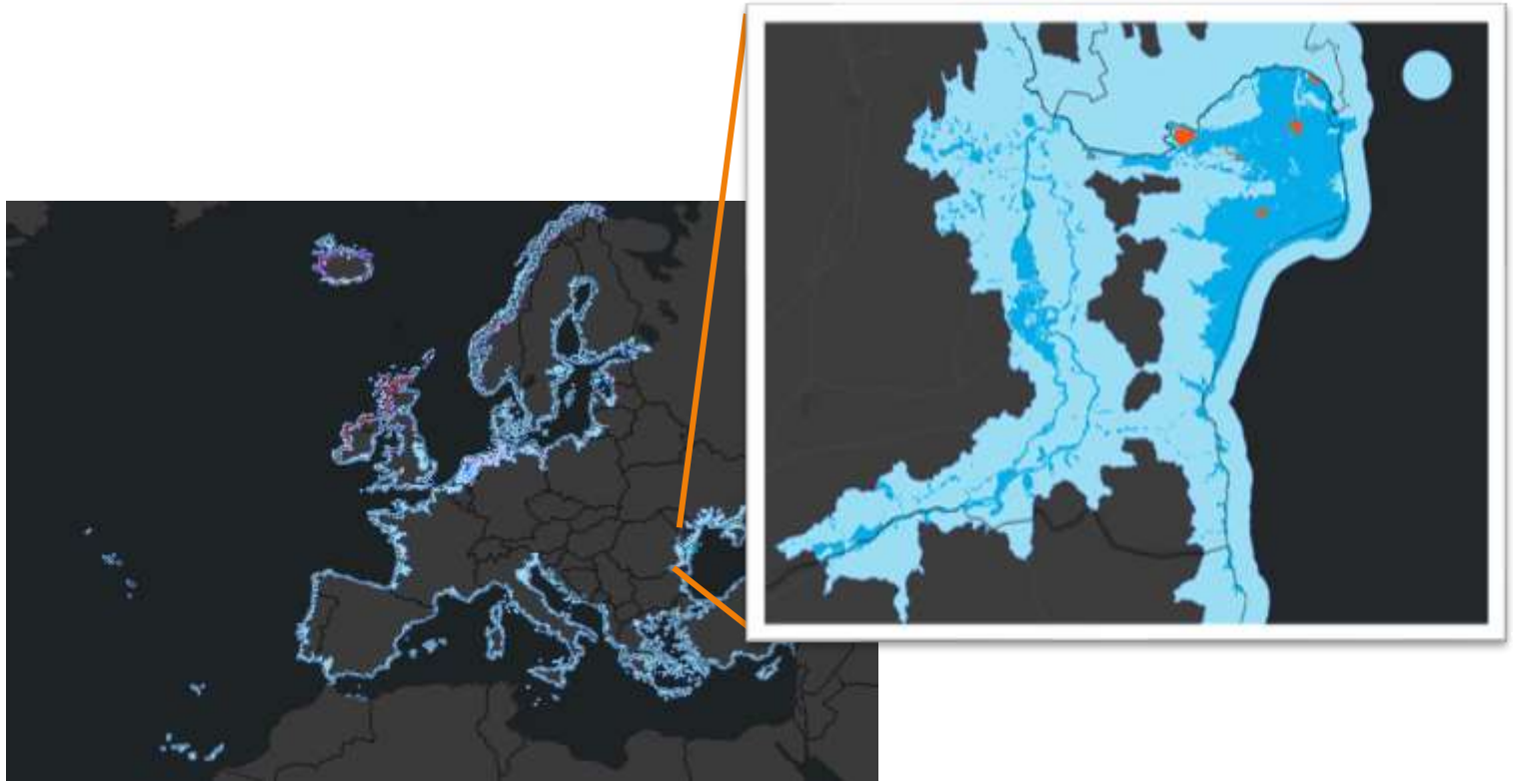
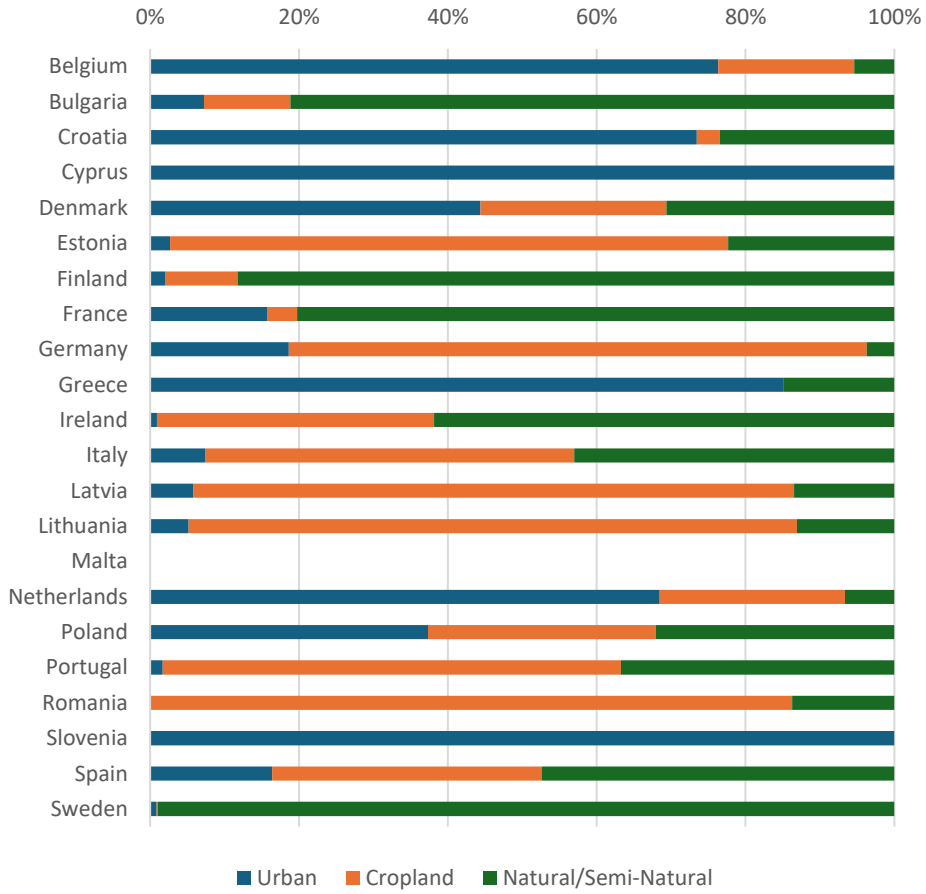
Mapping the data availability



Examples of mapped indicators and metrics

- **Land Use Conversion Area**





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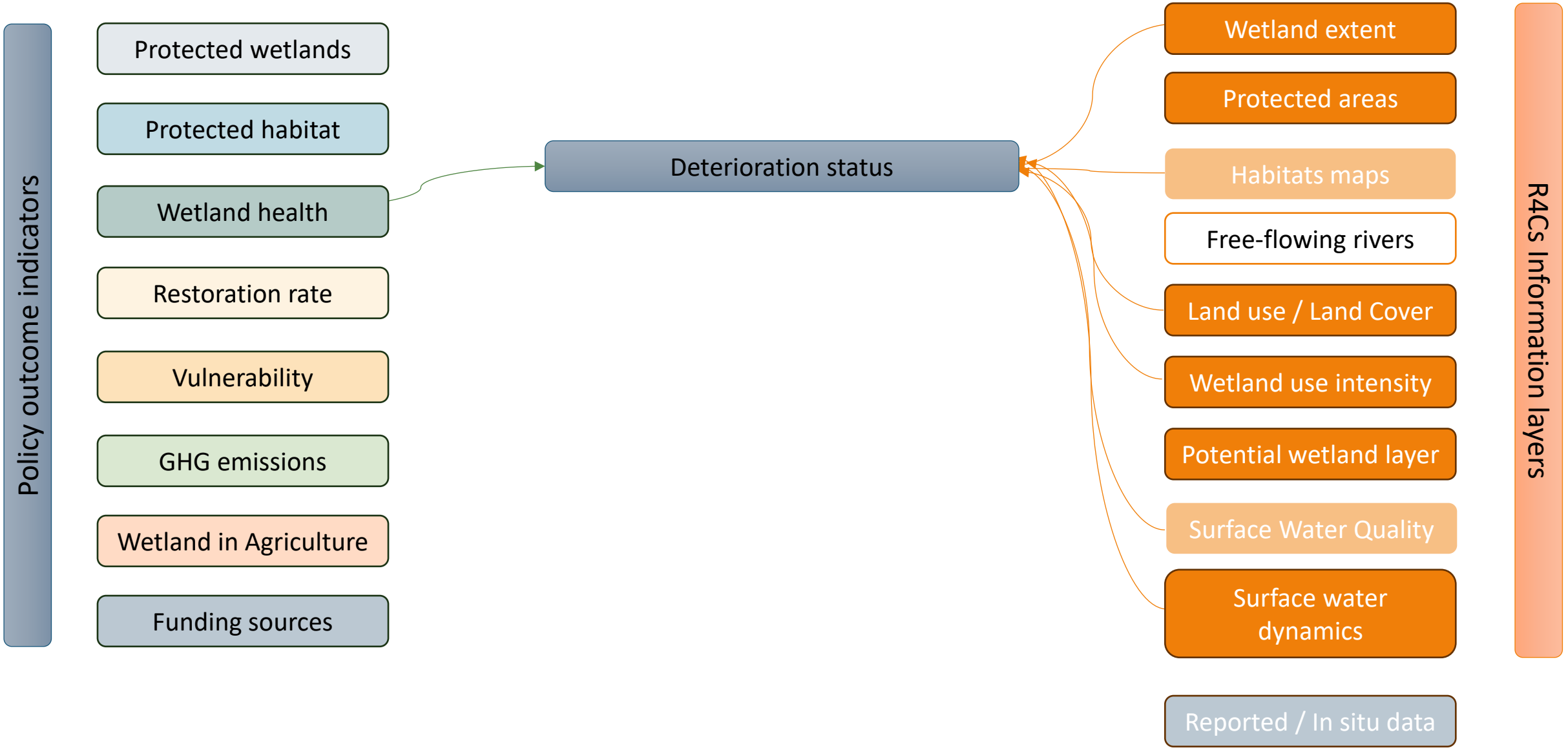
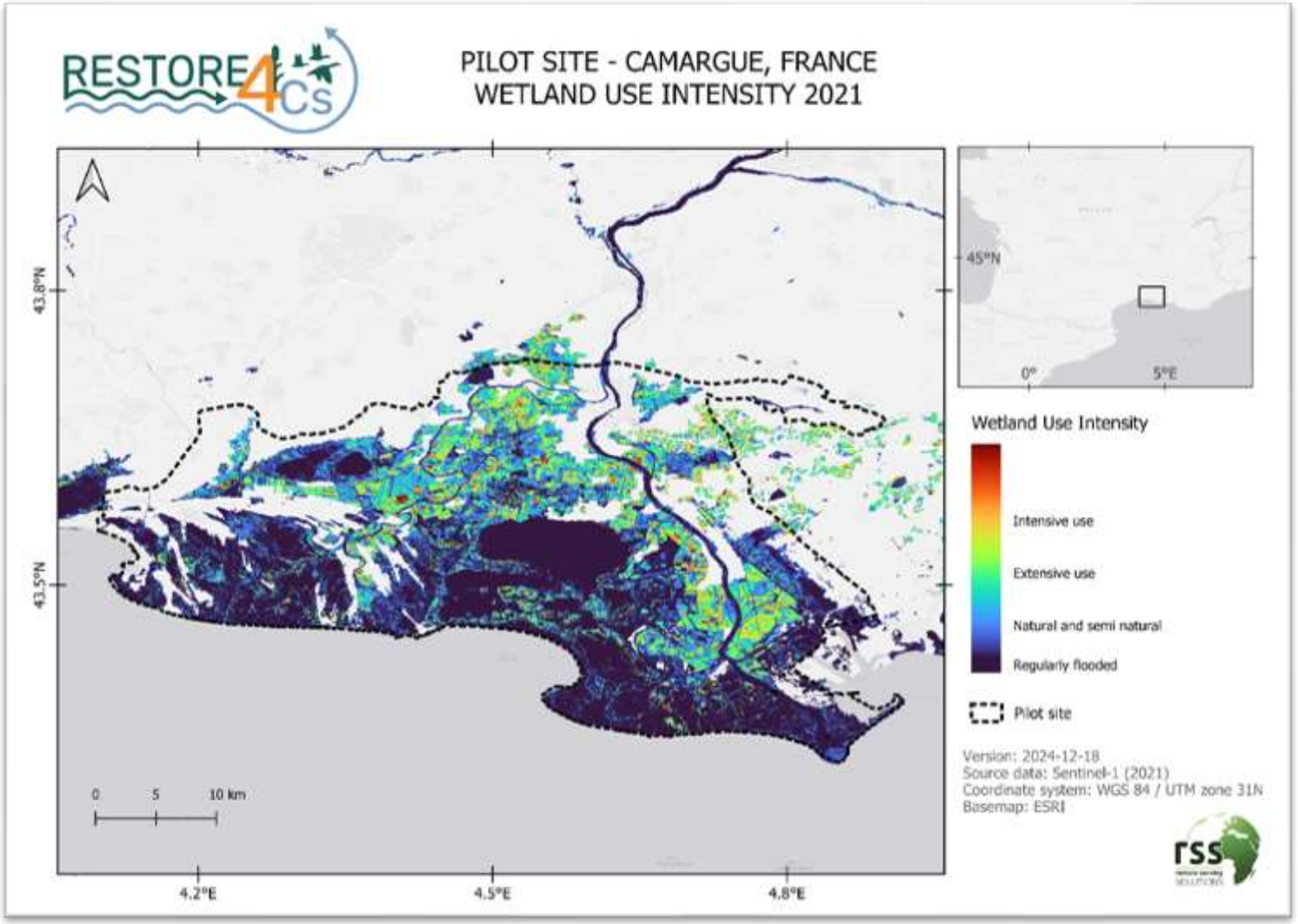


Deterioration status - Wetland Use Intensity (WUI)



WUI (Franke et al., 2012)**:** Measures how intensely wetlands are utilized for human activities.

Differentiates between:

- **Intensively used areas**: Crop fields, burned zones, peat extraction etc.
- **Less intensively used areas**: Extensive uses such as used grassland and grazing lands, semi-natural areas, permanent water

- provides insights into wetland use and status beyond classic land use categories
- is a complementary dataset to other wetland information layers that can be used to identify pressures from agricultural activities, over-use of resources etc.
- Being produced annually, it indicates trends being used for impact assessment of protection or restoration measures.

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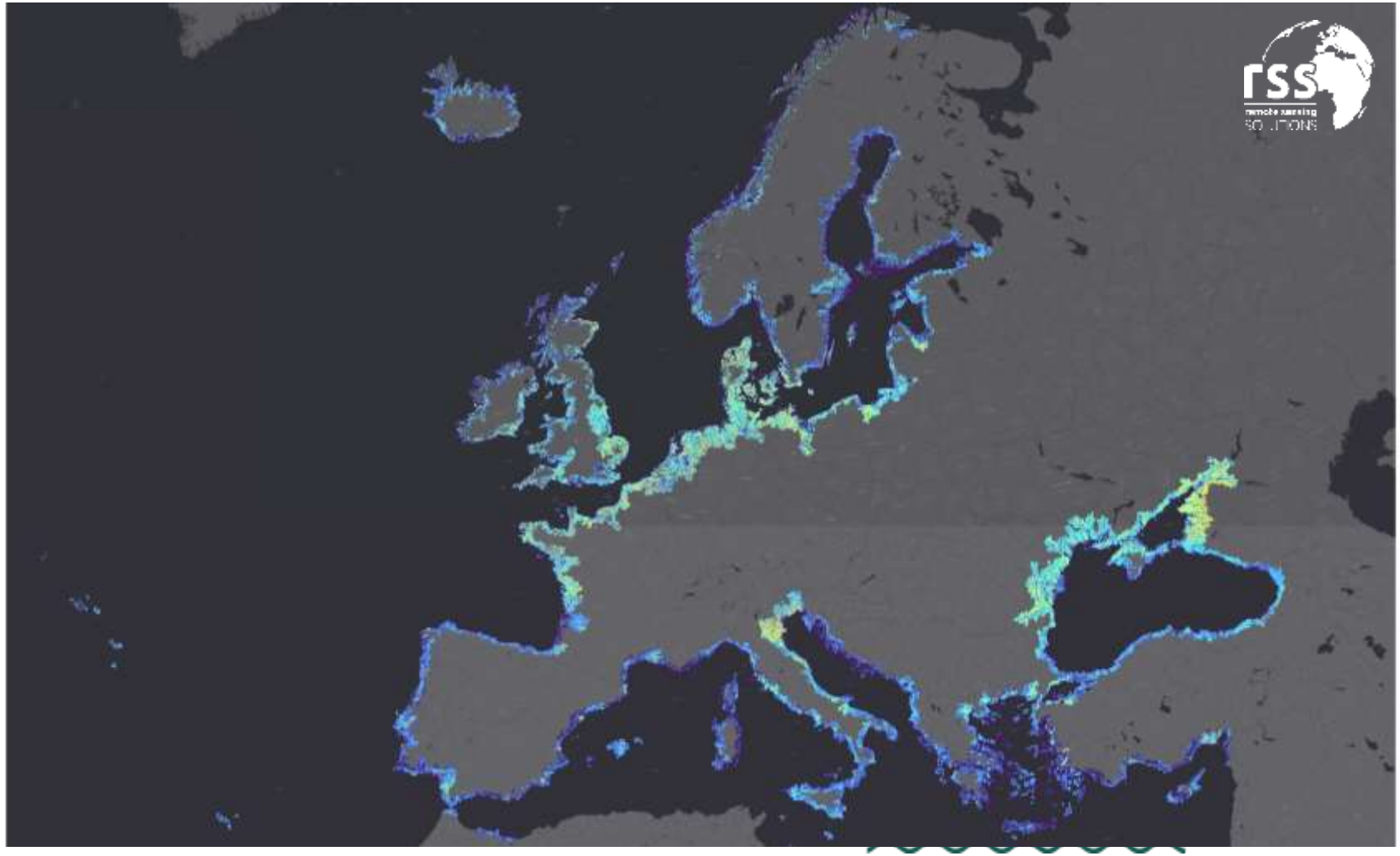
Pan-European mapping of land use intensity in coastal zones



- The land use intensity mapping was scaled up to all coastal areas in Europe
- For the cloud-based processing of the pan-European layer, an automatic Sentinel-2 scene selection procedure was developed
- Ideally, all Sentinel-2 timesteps are four weeks long, with the first scene capturing the start of the growing season and the last one the end of the growing season
- Areas with persistent cloud cover in which an insufficient number of scenes were found in a time series are marked as “no data”

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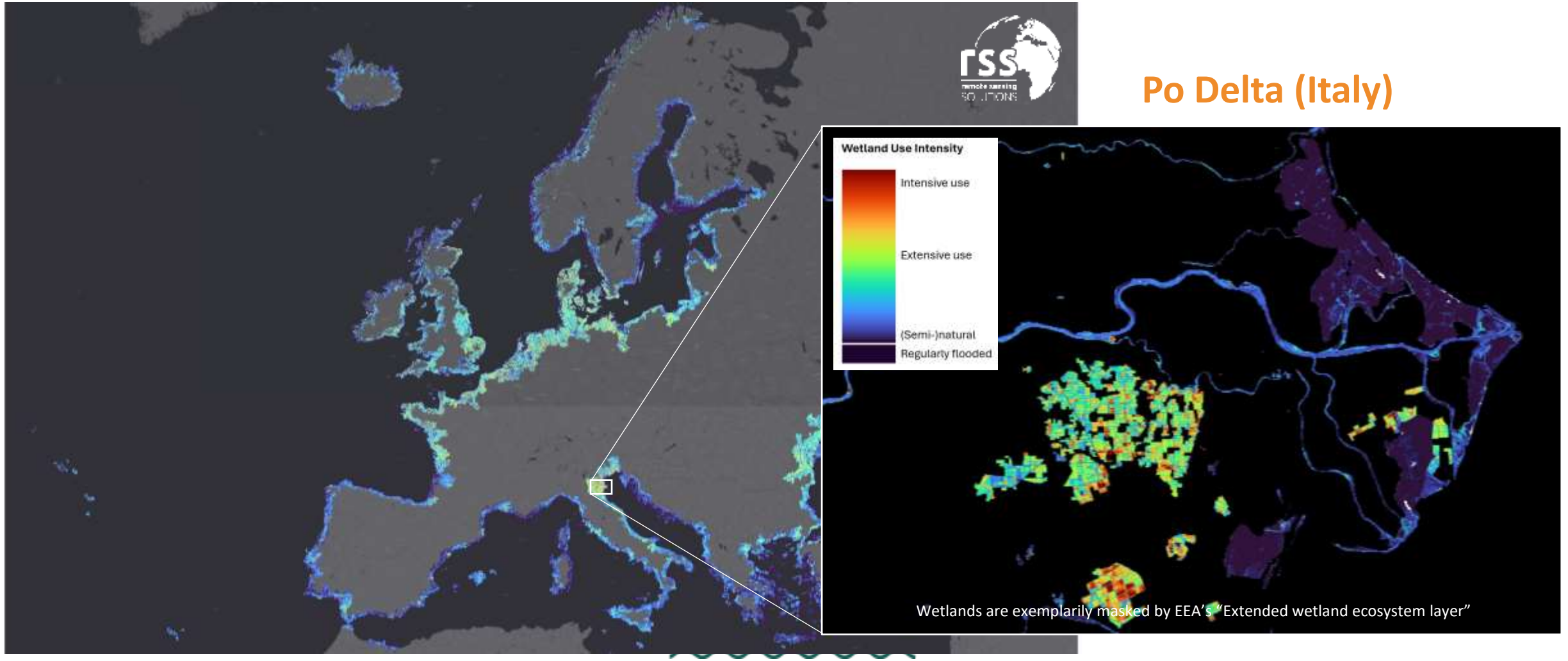
Pan-European mapping of land use intensity in coastal zones

Po Delta (Italy)



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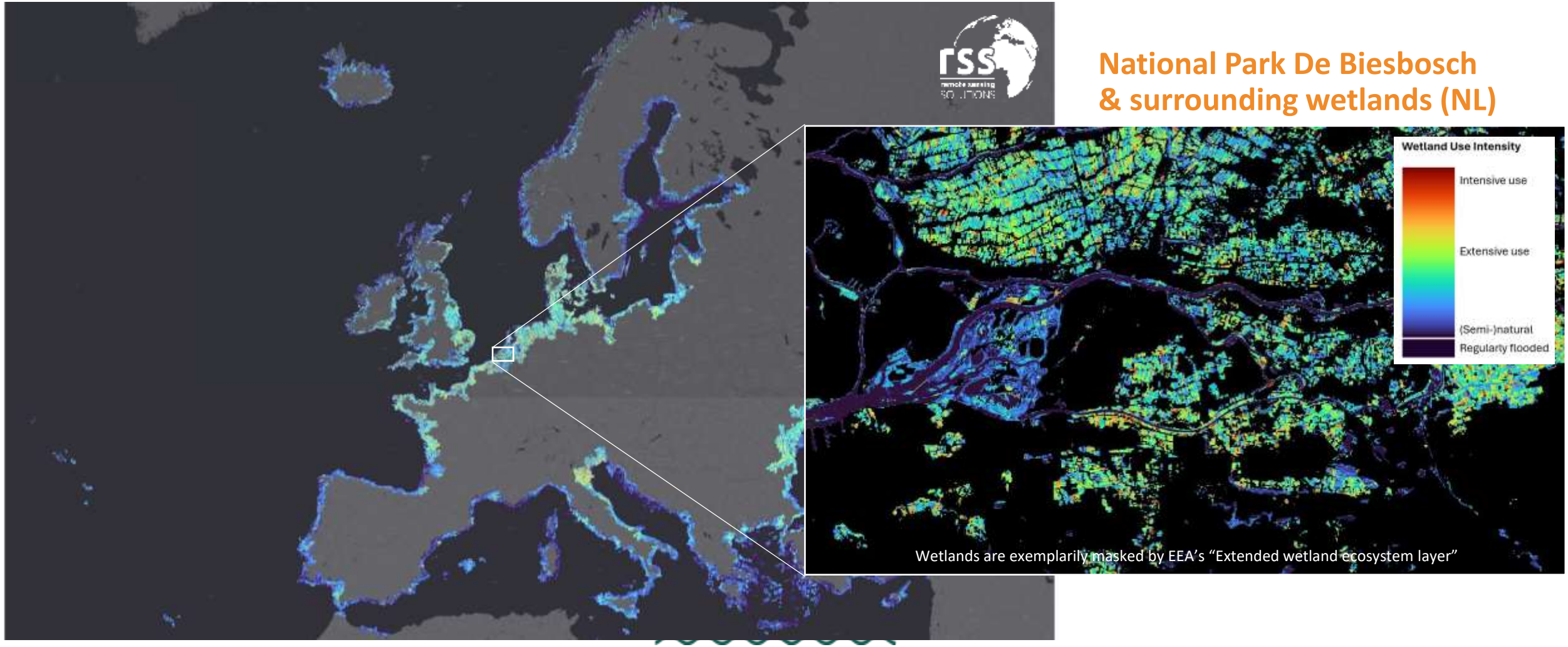

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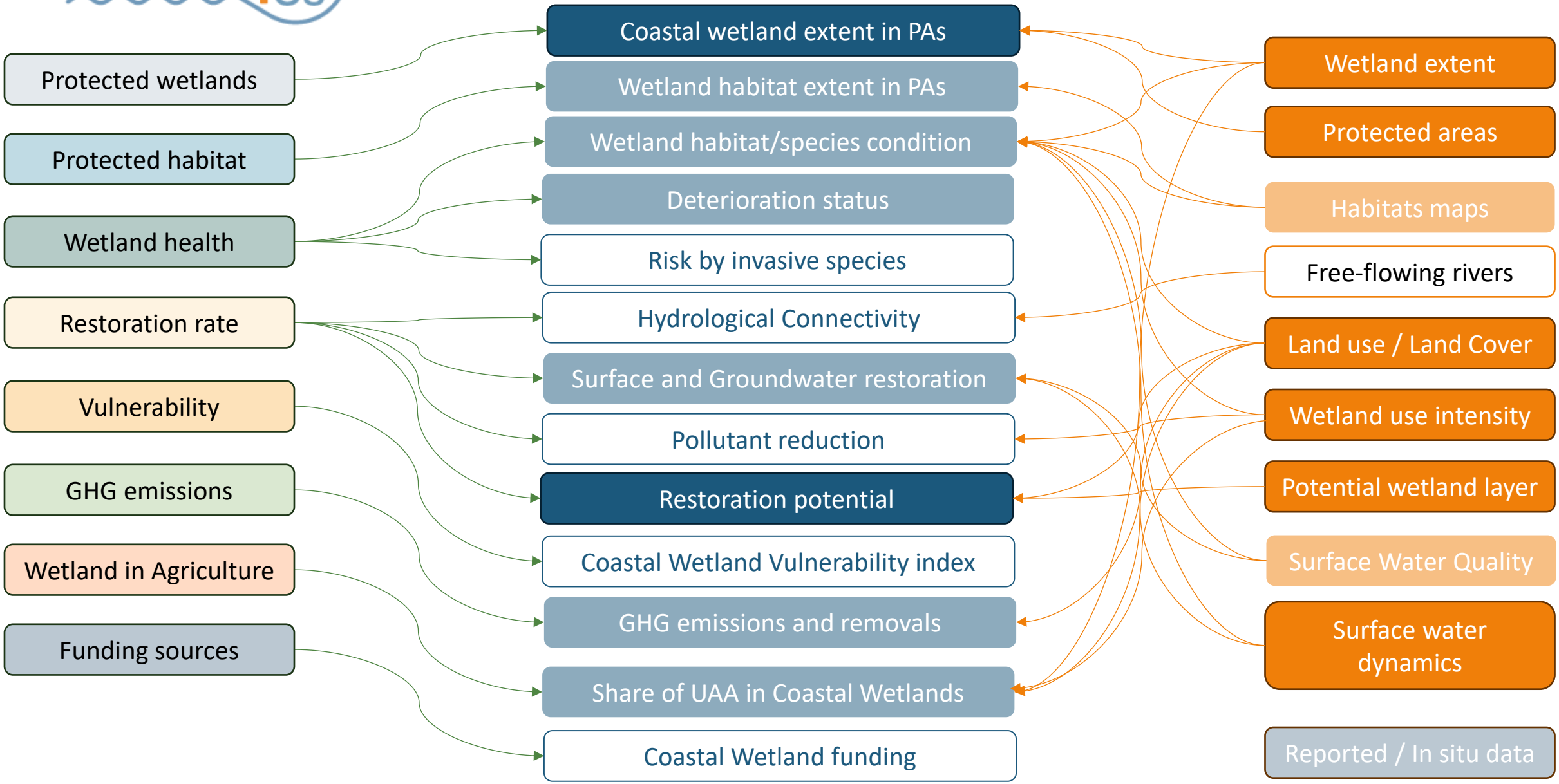

Open issues and next steps

- **For some indicators and metrics (e.g. Coastal wetland vulnerability, coastal wetland funding, groundwater quality) the final way of processing and data sources need to be clarified.**

- **Data issues for several coastal wetland indicators need to be solved**
  - Need for in situ data for habitat characteristics, GHG emissions, water quality
  - Data on free-flowing rivers and connectivity with coastal wetlands

- **Next steps:**
  - Final data gathering for GHG emissions on EU scale for the estimation of GHG profiles of coastal wetland types
  - Assessment of coastal wetland condition (MAES2IPBES) as a proxy for the wetland habitat condition indicator

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Thanks

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