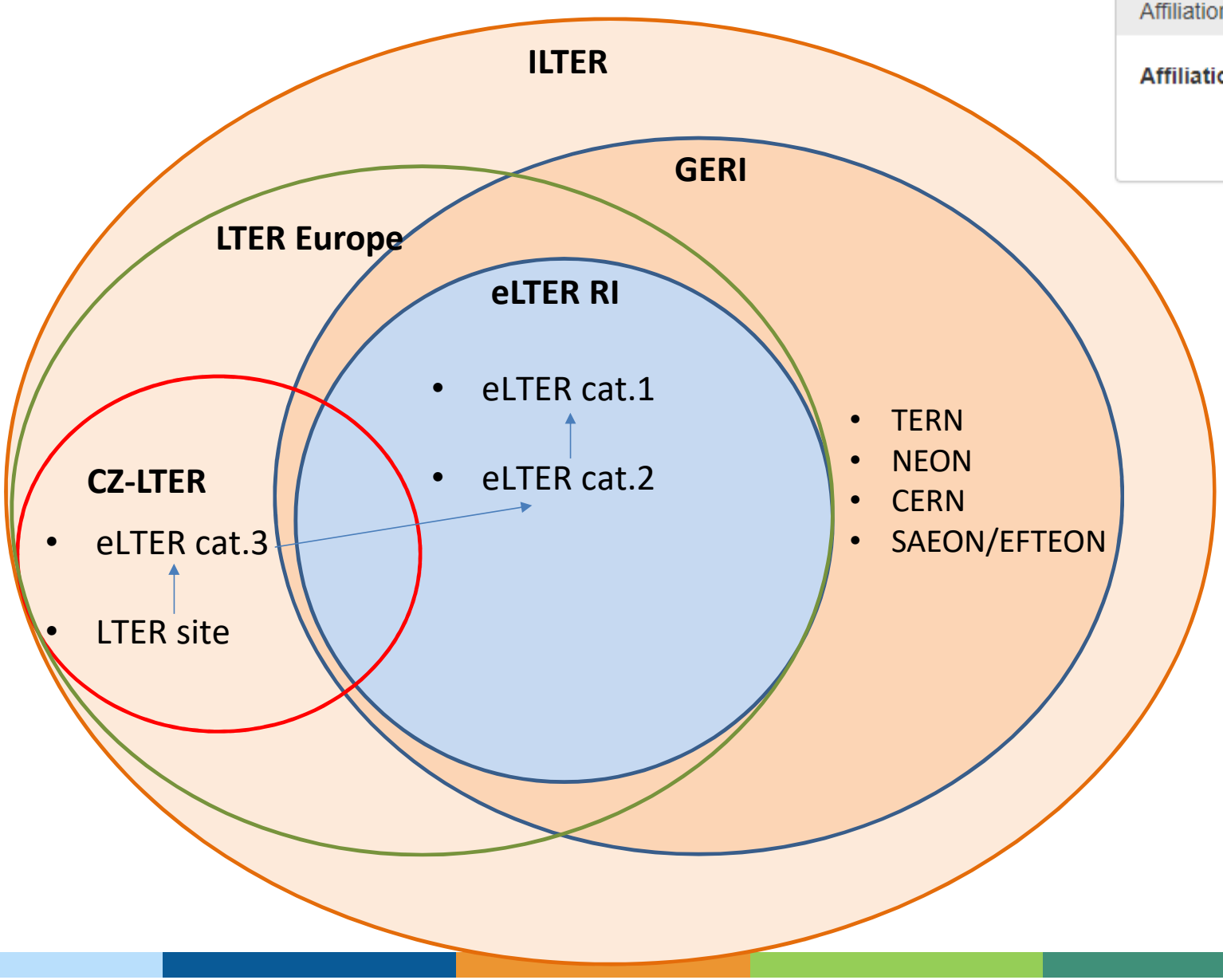
- **Vysvětlení pojmů ILTER, LTER, eLTER RI**
- **Kategorizace ploch z hlediska eLTER RI (eLTER Site labelling)**
- **Standardní pozorování (Standard Observations)**

Olga Vindušková, Radim Hédl

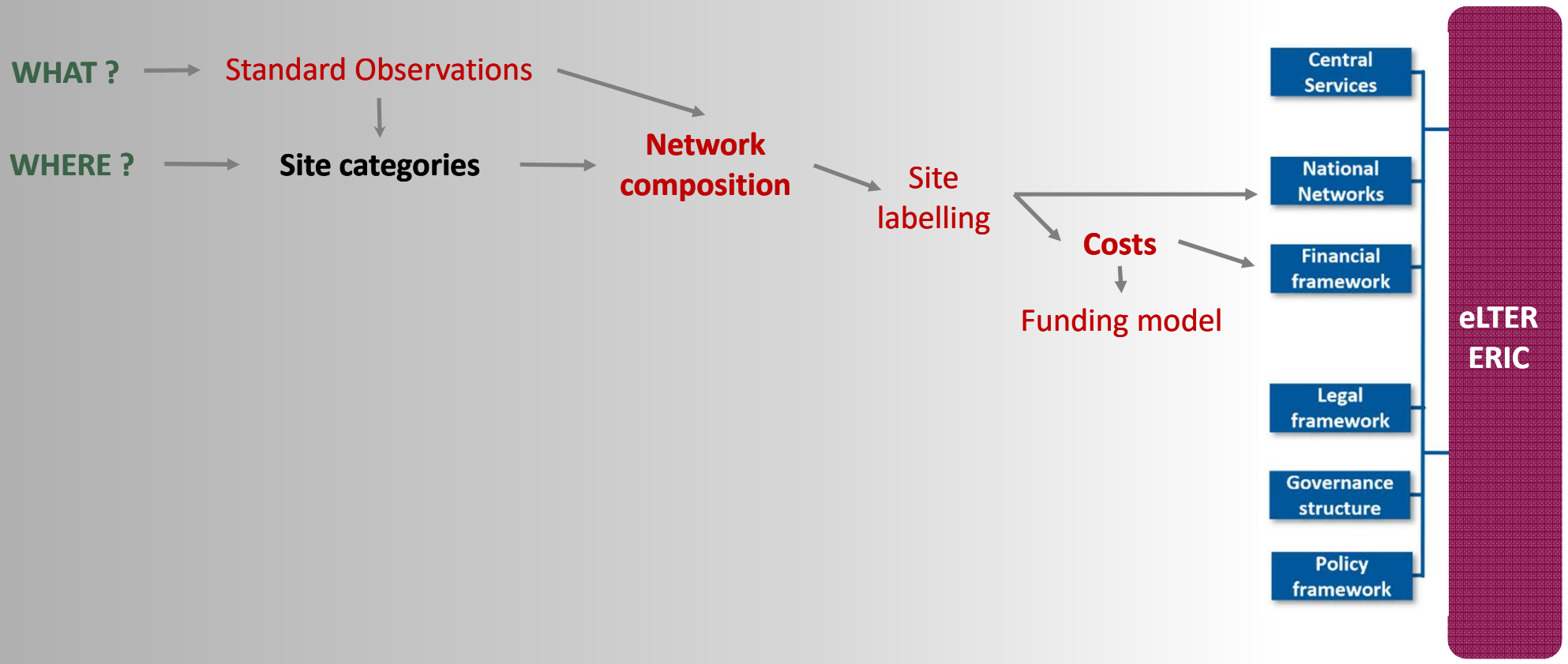


Affiliation and Network Specific Information

Affiliation: CZ-LTER ✓ (LTER_EU_CZ_026)
ILTER ✓
LTER Europe ✓

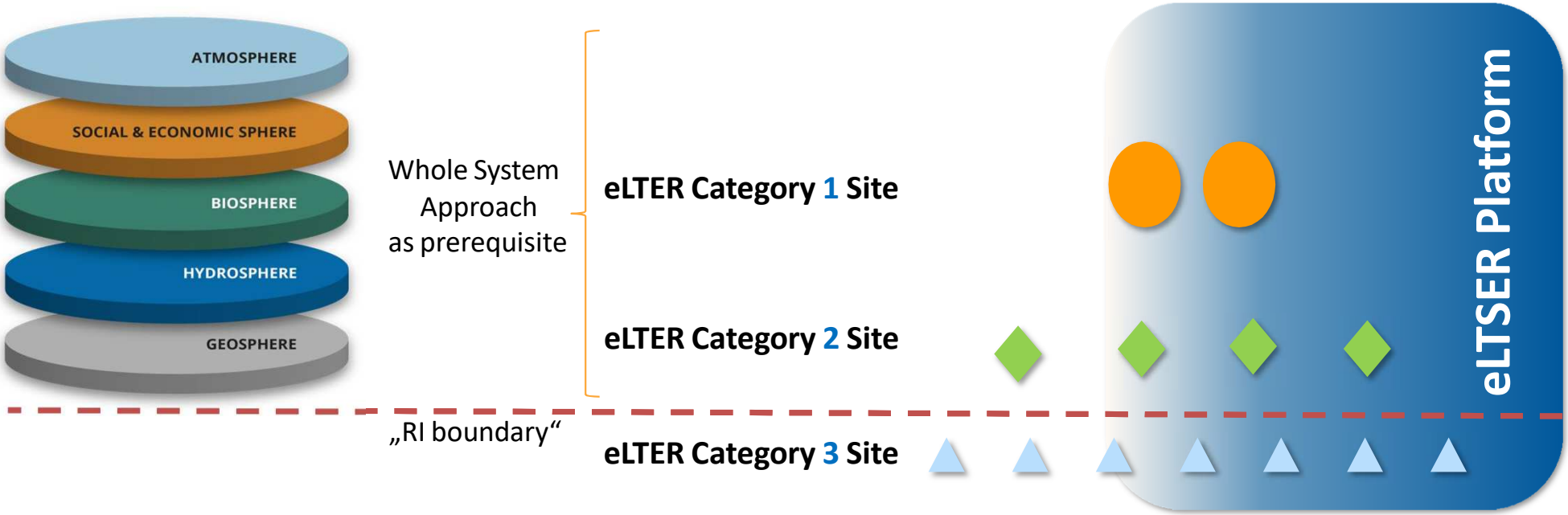
Výslovnost eLTER RI:
https://elter-ri.eu/elter-ri

Context of matters in the Overall ESFRI process



eLTER kategorizace: názvosloví

5 sfér:



WAILS = Whole System Approach for in-situ research

eLTER kategorizace: fáze

PREREQUISITES: Criteria and categories development

TESTING: Applying draft categories & criteria

FORMAL LABELLING: NRIs as country contributions

What are the needed properties & services of in-situ facilities?

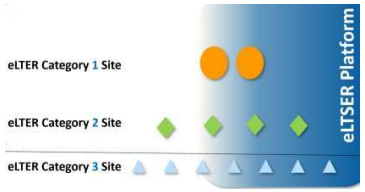
→ Standard Observations & data

→ Spatial design & size

→ Access

→ Supported research etc. etc.

→ Resulting formal CATEGORIES and their CRITERIA *D



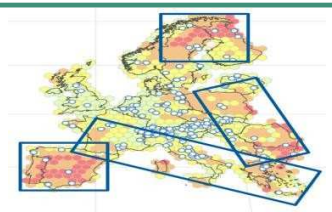
„Best guess" by countries

→ How applicable are the categories and criteria?

→ How could National Research infrastructures (NRIs) look like?

→ Gaps & redundancies

→ Needed modifications of criteria/categories



Detailled process t.b. specified (IC_06):

(2) Formal nomination by countries

→ Mandated list of in-situ facilities *D

(3) Application & Review

→ According to categories/criteria

→ According to review procedure

(4) Acknowledgement

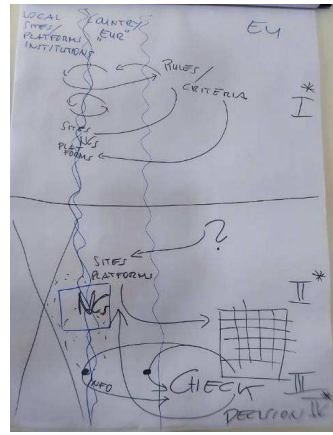
→ Resulting formal NRI with it´s collective services quality & scope *D

eLTER RI

eLTER

Summary of stages & *roles* towards the formal labelling

4 Stages, 3 of them linked to explicit decision making (***D**)



(1) Labelling prerequisties: Formulation of **criteria and their adoption**

- Development *(experts)* and consultations *(countries, NCs)*
- Adoption by the *IC*
- Testing of feasibility and previews *(countries, NCs, experts)* (→ Categories screening survey)
- Needed modifications and adoption by *IC* (***D**)

Actual formal labelling with 3 phases:

- **(2) "Mandated national list":** National decision *(NC, nat. ESFRI delegation)* on categories for national in-situ facilities: Resource loaded decision by country (funder) on the list of facilities the country wants to contribute (***D**)
- **(3) Application & Review:** Application *(operating institution)* following the respective application procedures (specified in the labelling process) and checking of applications and result of this review *(Head Office & expert teams)*
- **(4) Acknowledgement:** Formal decision *(IC or GA)* on the label to be provided (***D**)

Staged approach for category specification

Hard criteria

- overall purpose: **transparent and quantifiable characteristics** for correct assignment (where no compromises can be made)
- **simple to control** in a labeling process
- enabling **accurate cost assumptions**

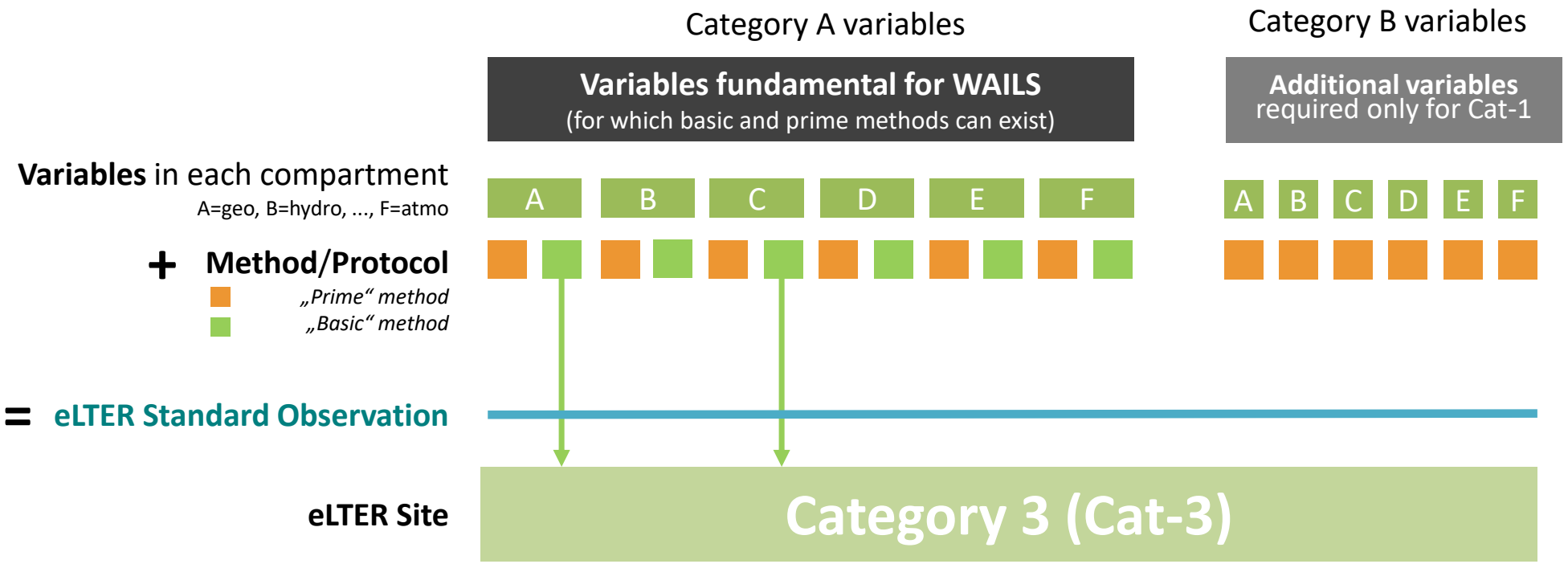
Customizable characteristics

- overall purpose: leave **space within certain limits, where no general rule is technically possible** or agreeable characteristics, where a certain range of options exist (e.g., spatial design)
- documentation and justification

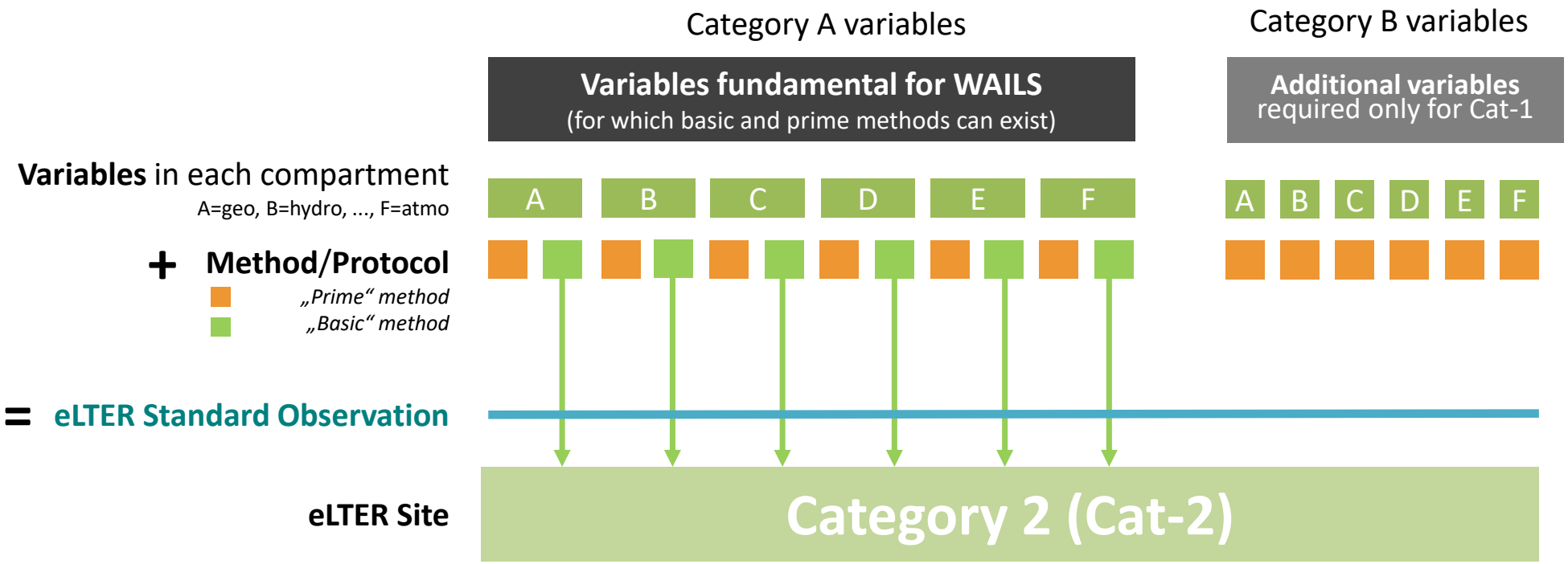
Guidelines and recommendations

- overall purpose: give **additional explanations and background information** to secure understanding & buy-in and facilitate assignment
- answers to frequently asked questions concerning application of the category
- possibly a collection of typical sites for the category

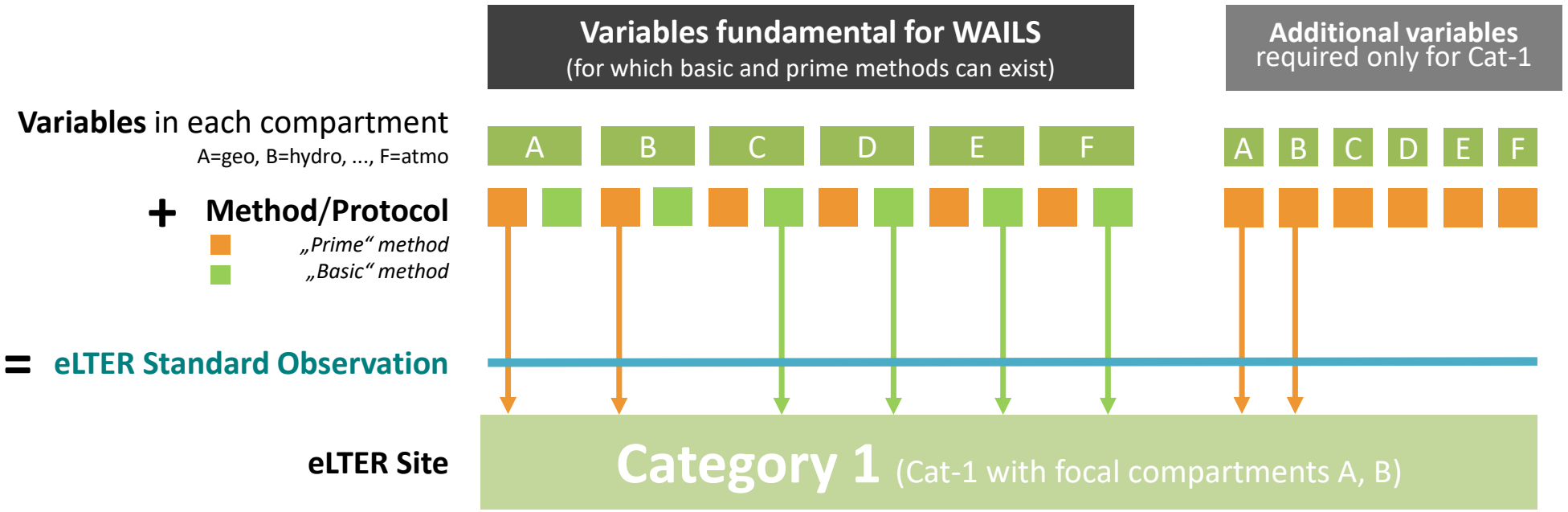
Linkage between eLTER Standard Observation Method Levels and Site Categories: *Example for Category 3 Site*



Linkage between eLTER Standard Observation Method Levels and Site Categories: *Example for Category 2 Site*



Linkage between eLTER Standard Observation Method Levels and Site Categories: *Example for Category 1 Site*



Criterion	Cat 1	Cat 2
Observational design covering the whole system (WAILS)	x	x
All system spheres covered with Standard Observations **basic method**	x	x
Specialization: for at least two spheres the Standard Observations **prime method** applied	x	
Secured capacity for Transnational (physical) Access (TA), Remote Access (RA)	x	
Guaranteeing Virtual Access (VA, i.e. open access to data)	x	x
All-year access guaranteed (road infrastructure or other infrastructure)	x	(x)
Roles populated: Site coordinator, data manager and responsible director in ROP	x	x
Full documentation in the eLTER site registry and nationally acknowledged	x	x
Long-term operation: Past operation since ≥10 yrs and future in accordance with eLTER RI planning	x	x

Examples

Variable	Basic method	Prime method
Soil moisture	• few soil moisture sensors should be operated (e.g. parallel to the weather station) providing rough impression about range and dynamics of soil moisture • TDR • 2 repetitions, 3 depths (5, 20, 50 cm) • Temporal resolution: 10 min	• Measurement of soil moisture beyond point scale • Cosmic-Ray neutron probes covering representative locations • COSMOS-Europe protocol • Number of sensors depends upon site characteristics • Temporal resolution: continuous counting, log total counts every 15 min
Streams/Rivers - Discharge	• No direct measurement required • Application of hydrological model (central service, to be discussed) resp. provision of data from national monitoring programs	• V-notch weirs + CTD probes (parallel measurement of conductivity, temperature and depth) • Temporal resolution: 15 min
Net Ecosystem Exchange – CO2 flux	• No direct measurement required • Assessment of carbon stocks by campaign-based sampling of carbon pools. Energy balance can be estimated based on climate monitoring and modeling.	• EC-Station • ICOS protocol • Temporal resolution: 10 min
Biotic diversity - Habitat structure, vegetation/plant phenology	• Remote sensing: Sentinel imagery or equivalent 10-20 m for habitat mapping	• On-site ground vegetation surveys • agreement on common protocol required!

Cat-1 Sites: Hard criteria

Whole system approach implemented

- observational design reflecting WAILS
- all system compartments covered with basic method

Specialization beyond basic method, which justifies Cat-1: **For at least two compartments/layers the prime method** of Standard Observation variables is achieved

Secured capacity for **Transnational (physical) Access (TA),** Remote Access (RA)

Guaranteeing Virtual Access (VA)

All-year access guaranteed (road infrastructure or other infrastructure)

→ *Remark: in principle the resolution in time, needed technical maintenance etc. leaves hardly any space NOT to require the possibility of all-year access (in which way ever it is granted). This does not suggest that any sub-area of a site needs to be permanently accessible, but the site as a such and the location of the facilities that need to be permanently operated and controlled*
Stable power supply with reserves for potential additional TA activities

Site coordinator, **data manager** and responsible director in the operating institutions appointed

Long-term operation since ≥10 yrs: Not applicable in case of new sites

Further operation bindingly agreed by the operating institution for >5yrs (not finally decided; options: >10yrs, 5-10 yrs…?)

Cat-2 Sites: Hard criteria

Hard criteria

Whole system approach implemented
- observational design reflecting WAILS
- all system compartments covered

Standard Observations variables covered across all compartments with basic method
Supporting Remote Access (RA)
Guaranteeing Virtual Access (VA)
Secure physical access for the needed Standard Observations (installation, technical maintenance…)
Appropriate power supply
site coordinator and and responsible director in the operating institutions appointed
Long-term operation since >5 years (not finally decided; >10 yrs was also suggested)
Further operation bindingly agreed by the operating institution for >5yrs (not finally decided; options: >10yrs, 5-10 yrs…?)

LTSER platformy: Hard criteria

Contains at least one eLTER Site

research on interactions and feedbacks between the environment and society

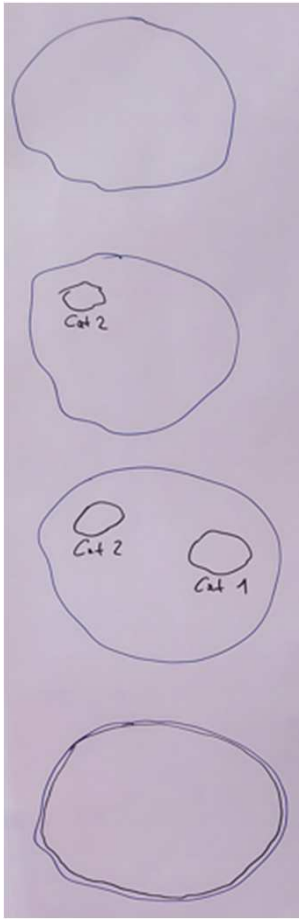
one or more Research Performing Organizations (RPOs) and/or land management administration (LMAs) are explicitly responsible for coordination of both the socio-ecological research conducted within the platform and for coordination of stakeholder integration activities

Memoranda of Understanding (MoU) based on an eLTER template written and signed by the platform directorate, coordinating bodies, and major local/regional stakeholders/actors

Demonstrable stakeholder engagement in both setting the research agenda and uptake of research outputs.

Collection of socio-ecological standard observations

Recent clarification concerning LTSER criteria



eLTSER Platform without at least 1 eLTER Site Cat2 inside: does not comply

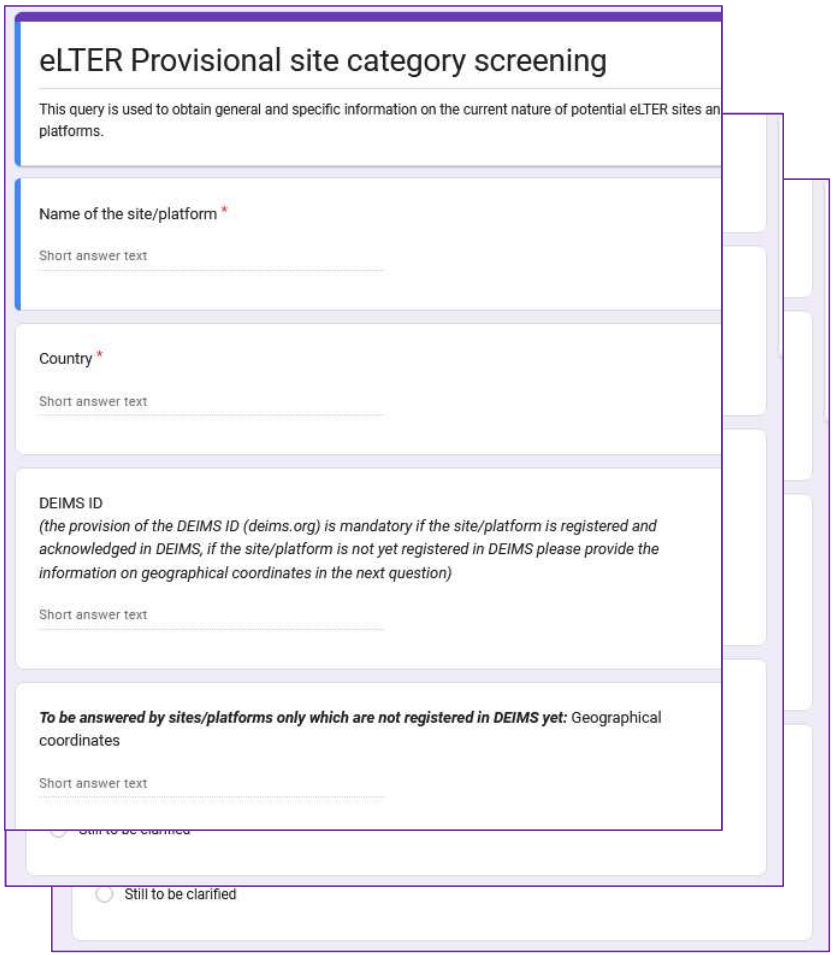
eLTSER Platform with 1 eLTER Site Cat2 inside: valid eLTSER Platform

eLTSER Platform with 1 eLTER Site Cat2 & Cat 1 inside: valid eLTSER Platform

eLTSER Platform with 1 eLTER Site Cat2 with identical boundaries: 3 declarations

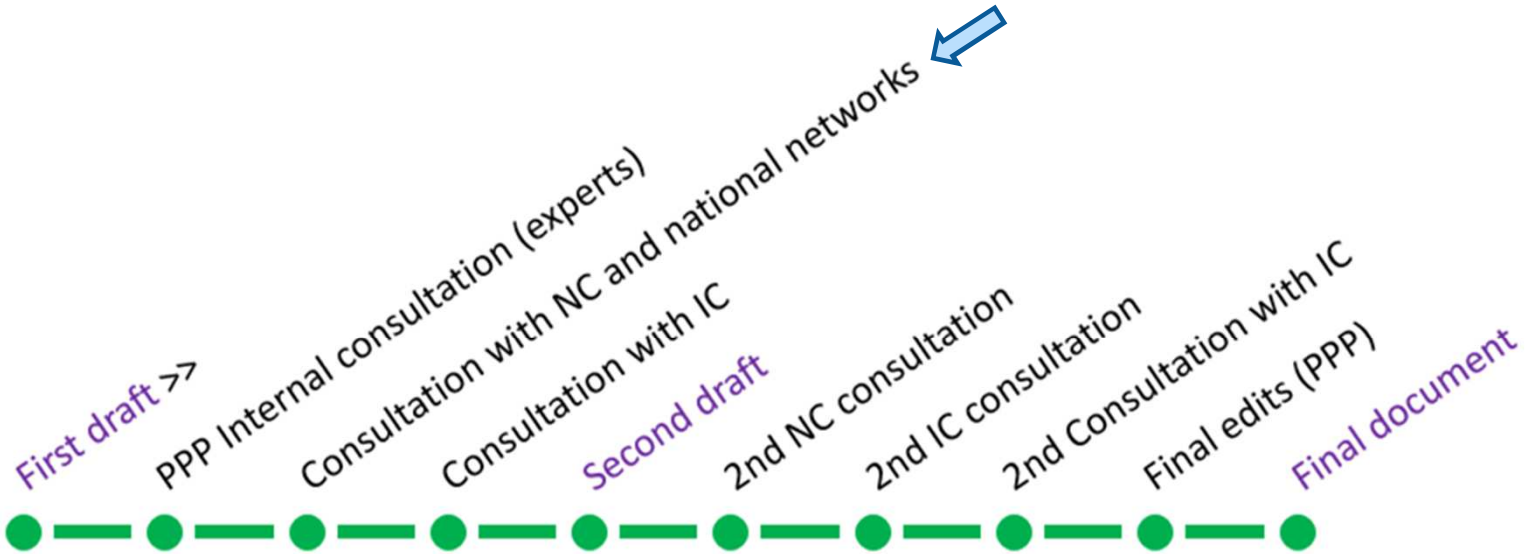
- as eLTSER Platform (for checking related eLTSER criteria)
- as eLTER Site Cat2 (for checking related Cat2 criteria)
- link between the two

Dotazník



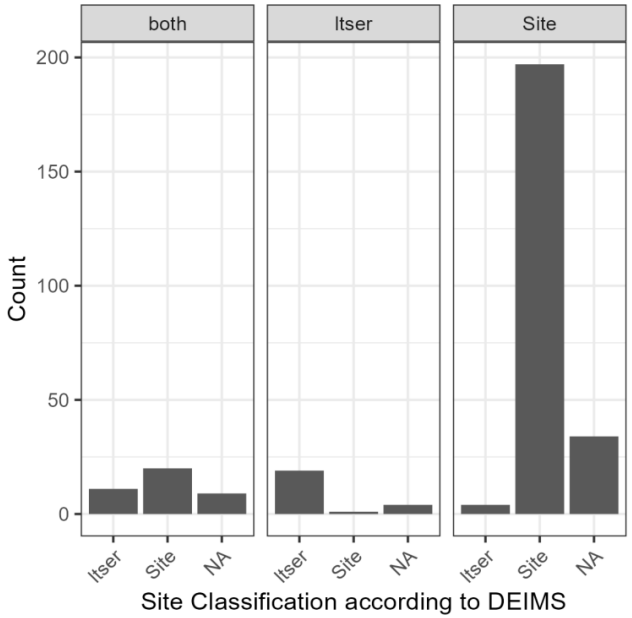
- Engagement with national coordinators (NCs)
  - Screening exercise was presented at the NCs meeting of 20 January 2023
  - Details provided, questions answered
- Questions decided
- Testing and refining
  - Questions added, modified or discarded
- Context provided
  - Document prepared and shared
    https://tinyurl.com/survey-context
  - Ancillary material prepared and shared:
    - eLTER site category scheme (adopted by the IC_04)
    - “Pre-labelling process slides” on the process steps
    - A Standard Observations (SOs) table indicating their applicability to each habitat type.
    - The “SO-Method” table with suggested methods, protocols for each of the SOs

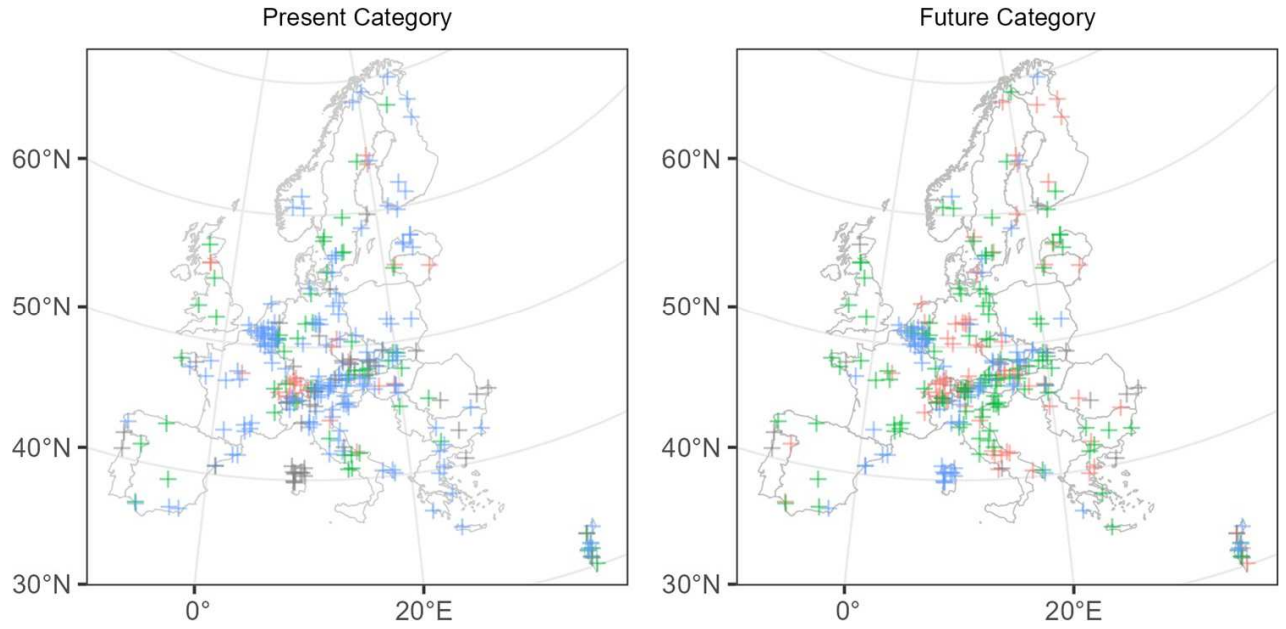
Význam dotazníku v celém procesu



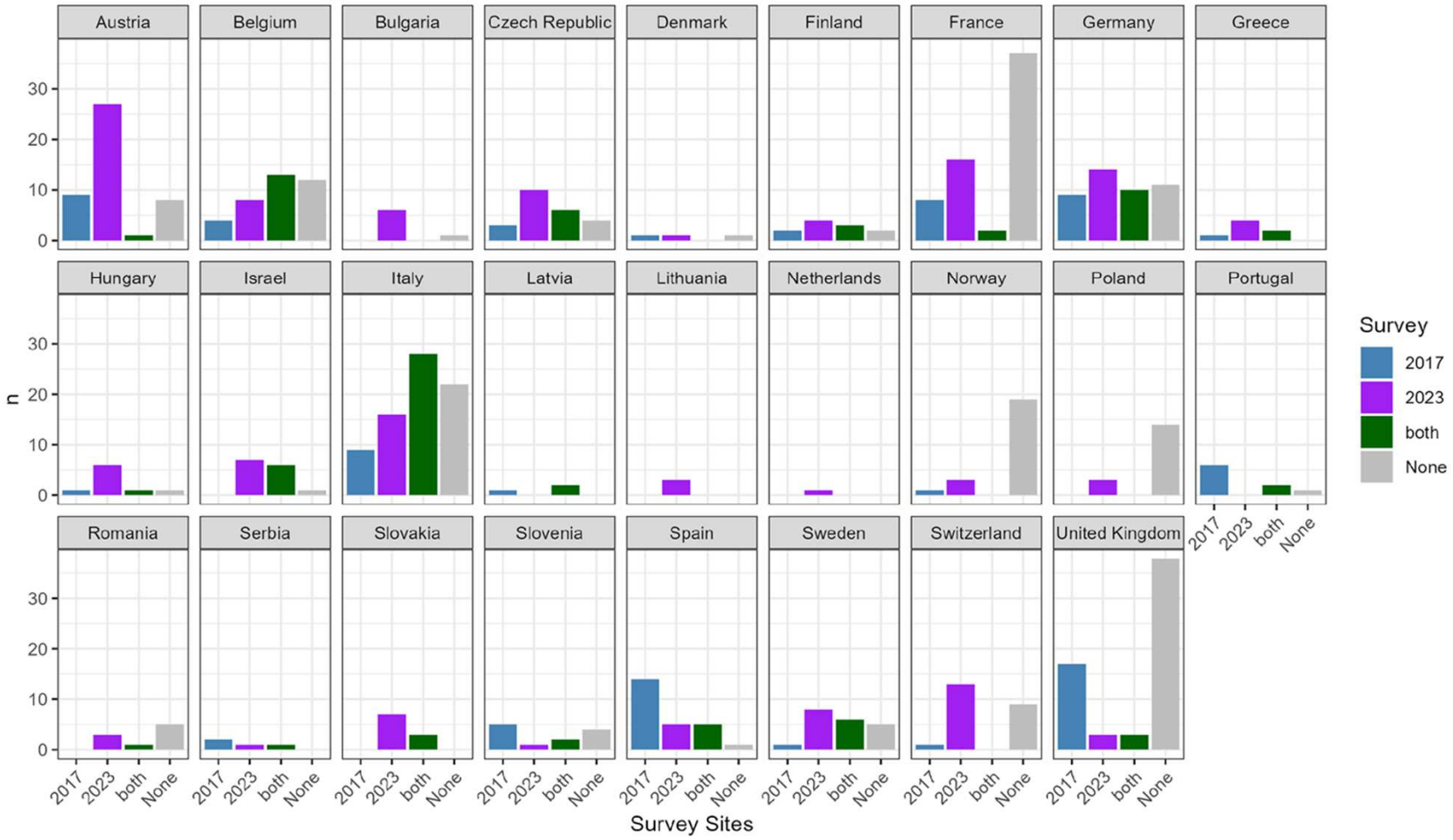
Outcomes

- 336 responses with assignment of categories from 25 countries
  - 85 Cat 1, 132 Cat 2
- Indication of focal sphere for eLTER Sites Cat1
- Identification of focal habitats





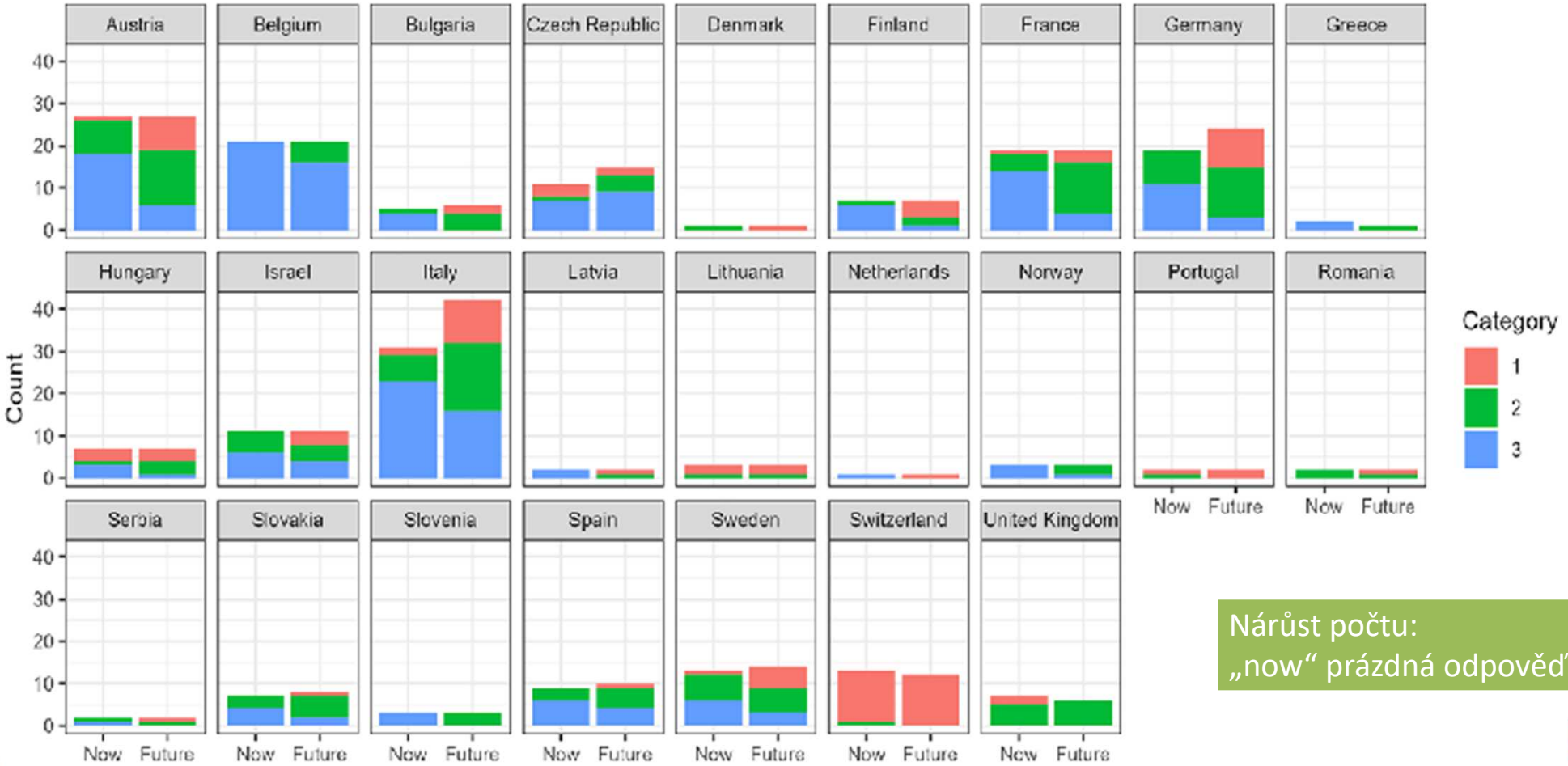
Survey Participation (sites & platforms)



Výsledky kategorizace ploch podle dotazníku eLTER RI (evropské LTER výzkumné infrastruktury), 20. 5. 2023

Jak plocha splňuje kritéria na standardizaci monitoringu?

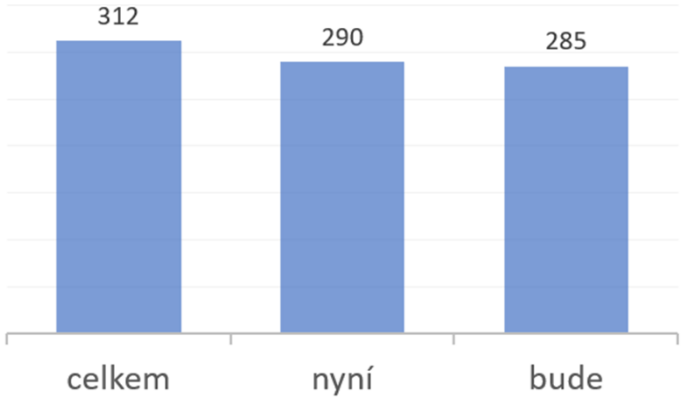
- levé sloupce: současné zařazení
- pravé sloupce: cíl do budoucna



Nárůst počtu:
„now“ prázdná odpověď

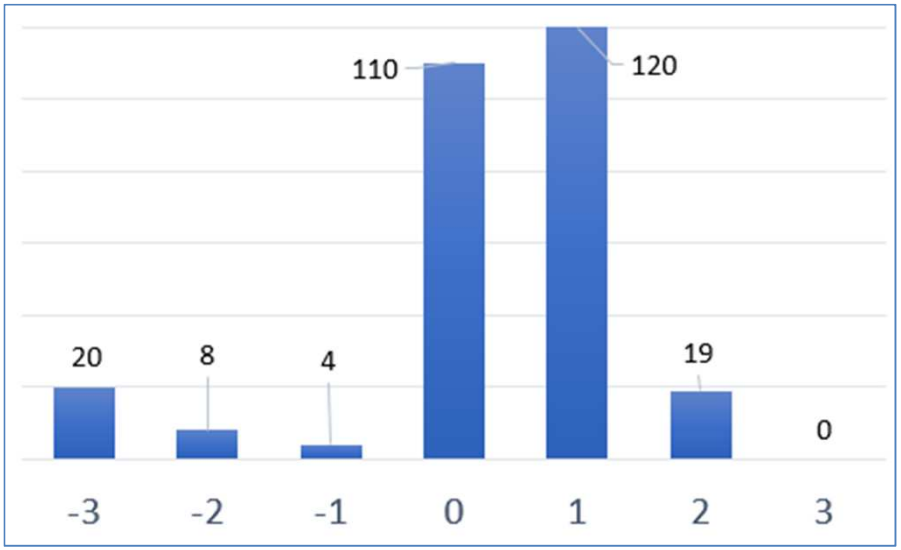
LTER

Dotazník eLTER RI: kategorizace ploch
25 států
312 ploch LTER
většinou očekávají zachování stavu nebo upgrade

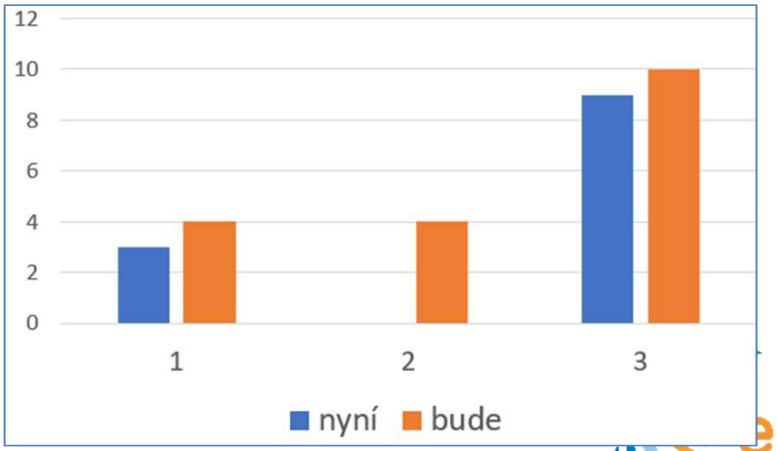


- počty ploch podle dotazníku
- kategorizace stávajících
- kategorizace očekávaných

změna v kategorizaci – všechny státy



český LTER (18 ploch z 24)



- **Emerging Network Design**

= Návrh sítě

aneb jak vytvořit síť dobře reprezentující ekosystémy Evropy

Material & background documents: DocG of Interim Council 05

eLTER Network Design

First representativity analyses based on the categories screening and derived recommendations

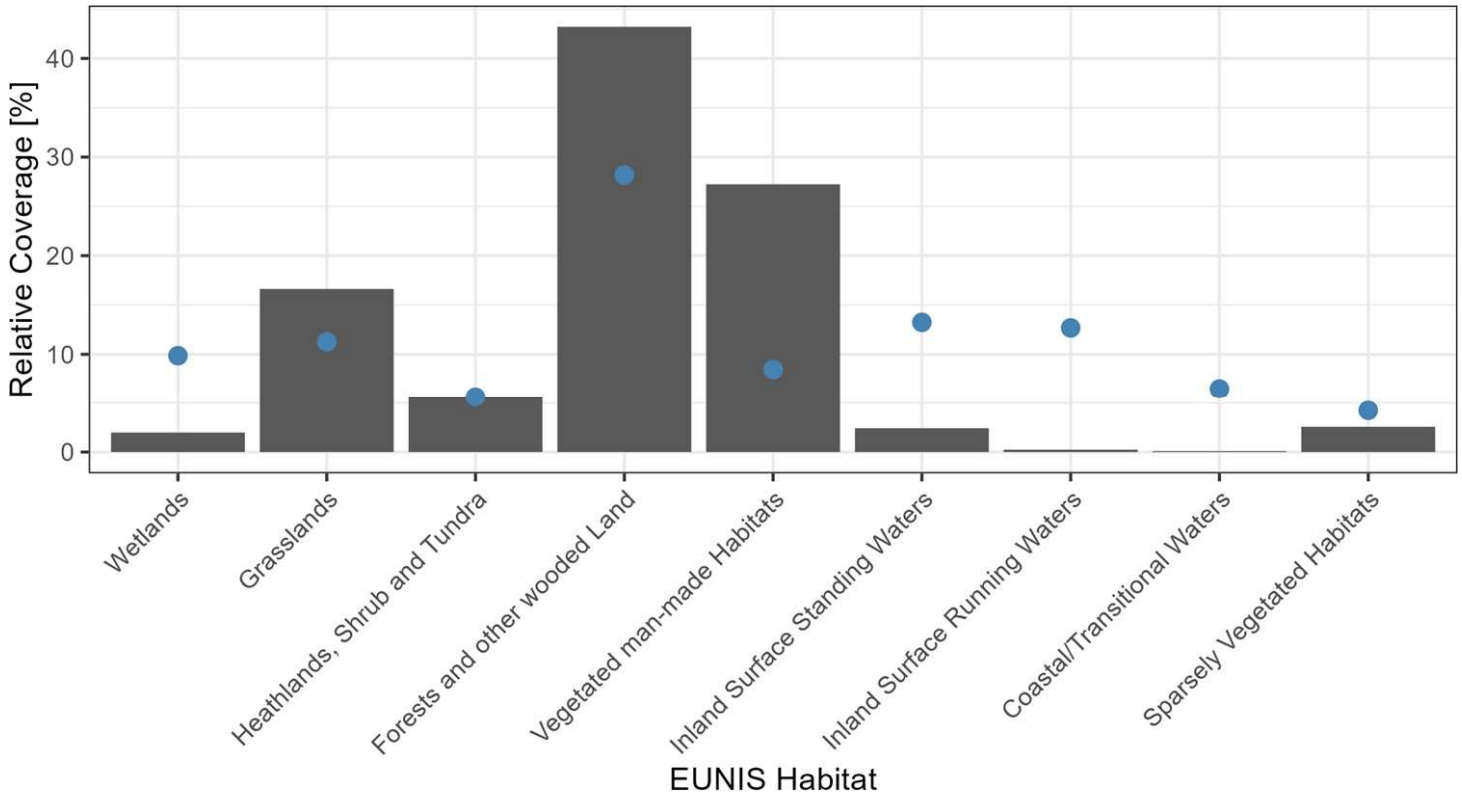
v01, 2023-04-17, M. Mirtl, S. Zacharias & T. Ohnemus

Table of contents

PDF eLTER IC_05 DocG Network Design.pdf

EUNIS Habitat Coverage

Comparison of LTER Coverage and European Domain



Modře: eLTER (cat. 1 a 2)

Šedě: EUNIS Habitaty

Representativity Analysis

Methodology

Thomas Ohnemus

Ecological Indicators 127 (2021) 107785

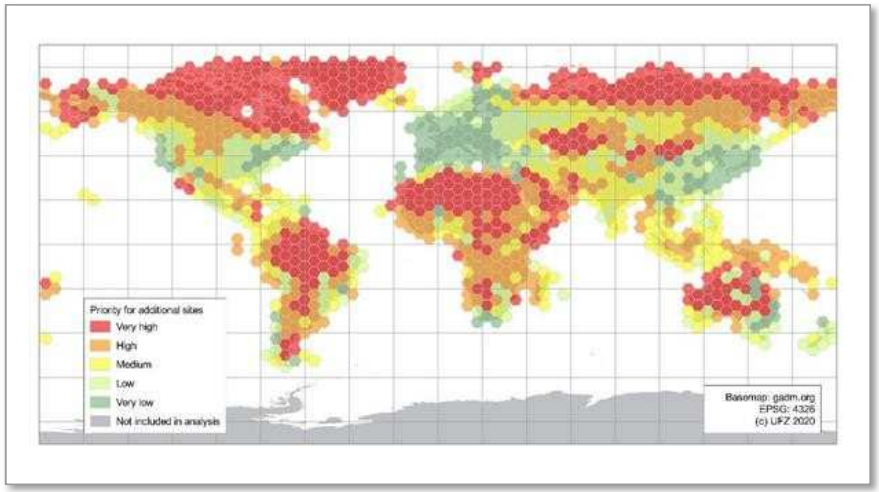
Contents lists available at ScienceDirect

Ecological Indicators

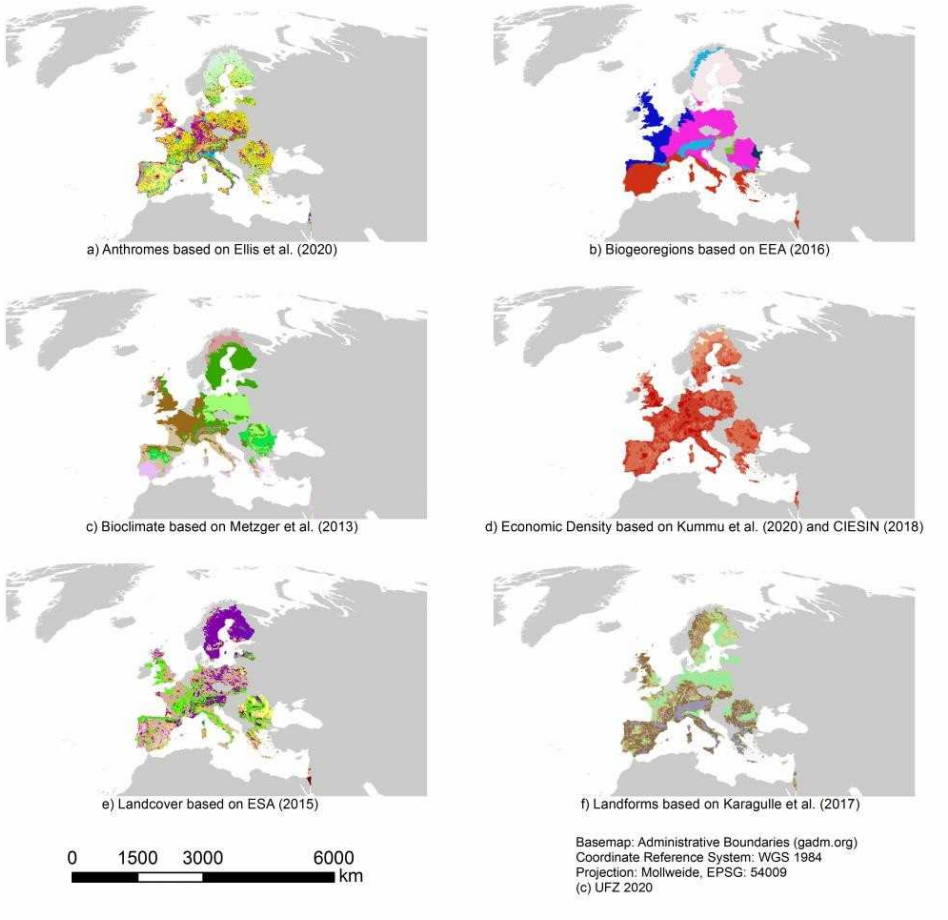
journal homepage: www.elsevier.com/locate/ecolind

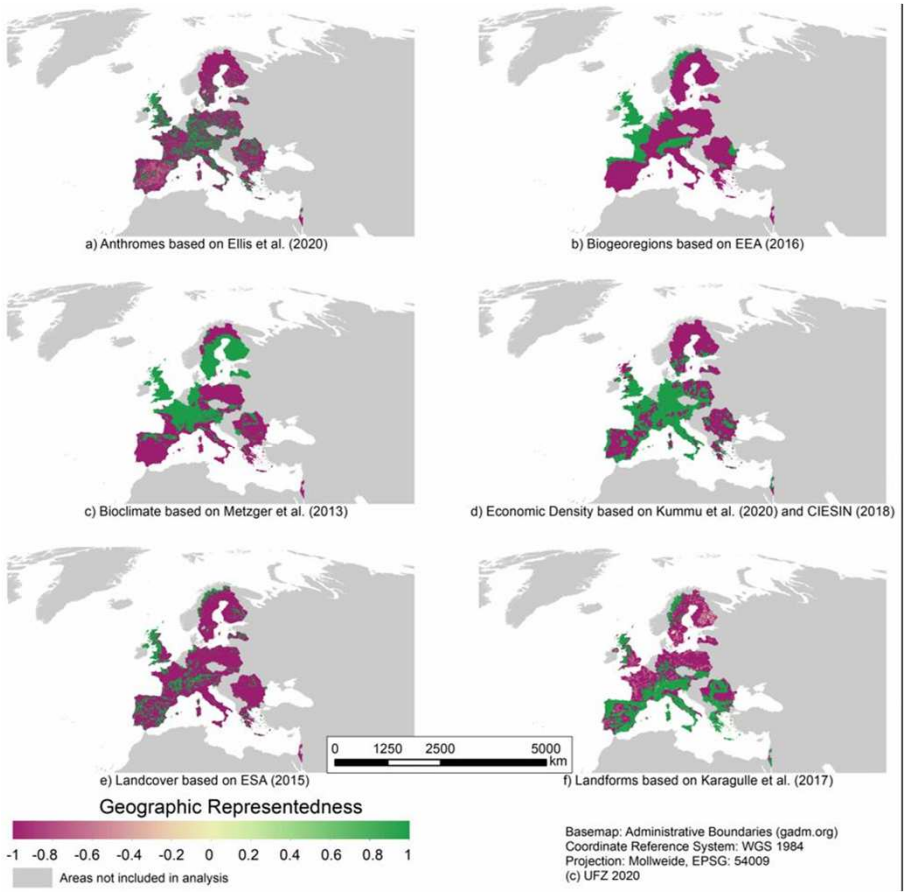
Assessing the biogeographical and socio-ecological representativeness of the ILTER site network

Christoph Wohner [a,b,1,*], Thomas Ohnemus [c,1,2], Steffen Zacharias [c,3], Hannes Mollenhauer [c,4], Erle C. Ellis [d], Hermann Klug [b,5], Hideaki Shibata [e], Michael Mirtl [a,c,6]

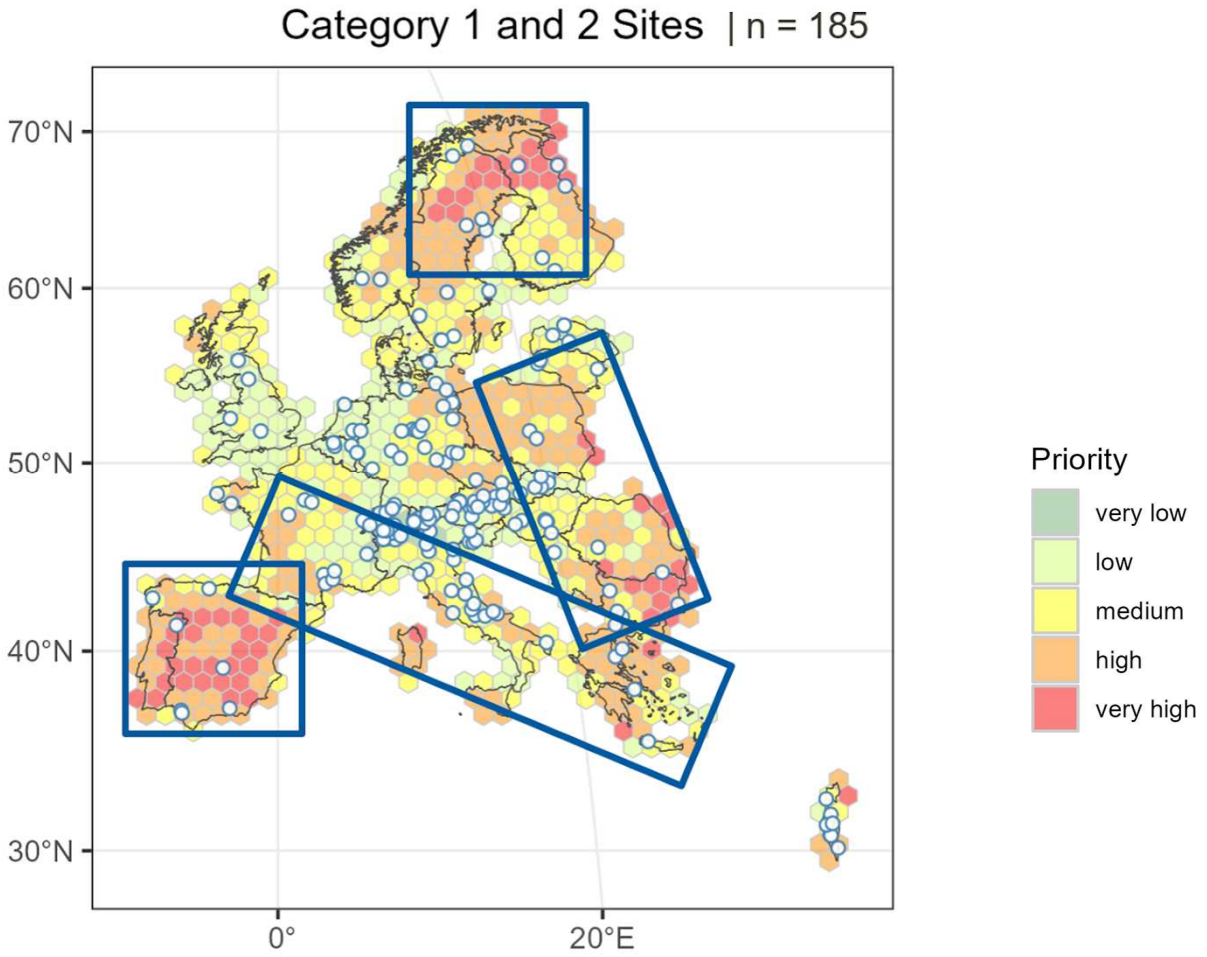


Analysis of geographic representedness



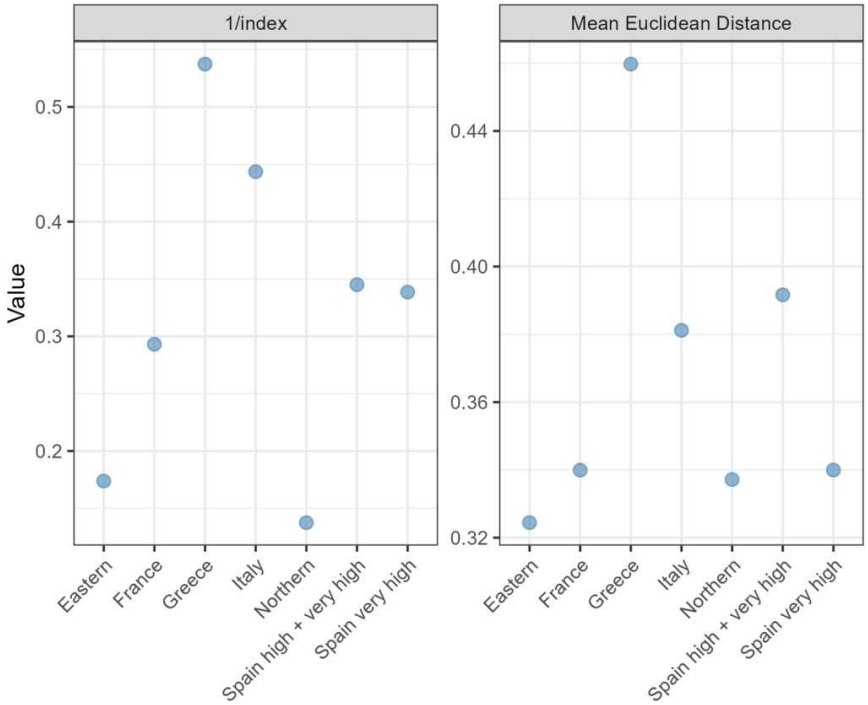


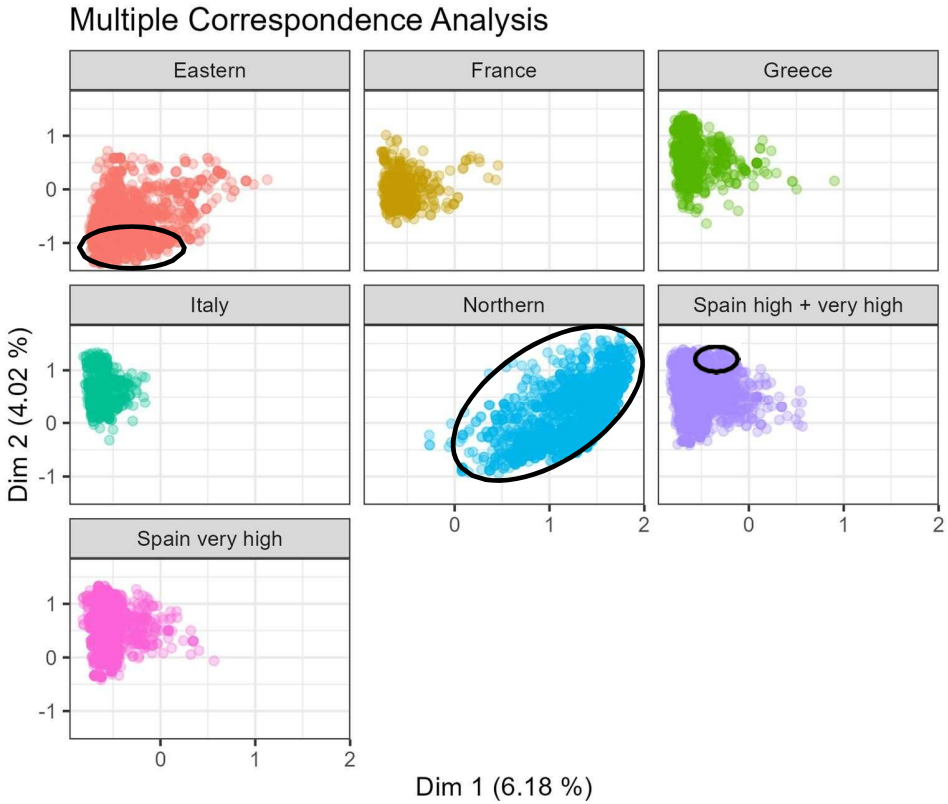
Gap Analysis



What forces underrepresentation?
How to challenge gaps?

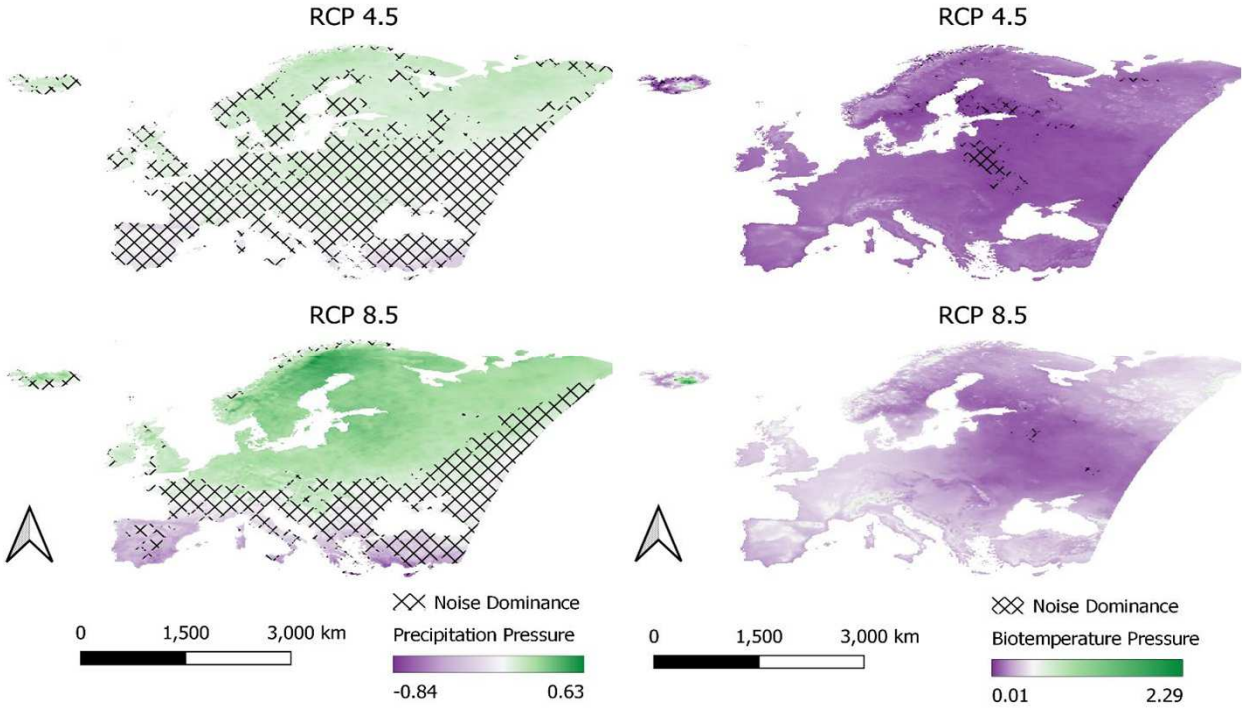
Heterogeneity/Homogeneity of Gaps: Some gaps can only be closed in the area, where the gap occurs



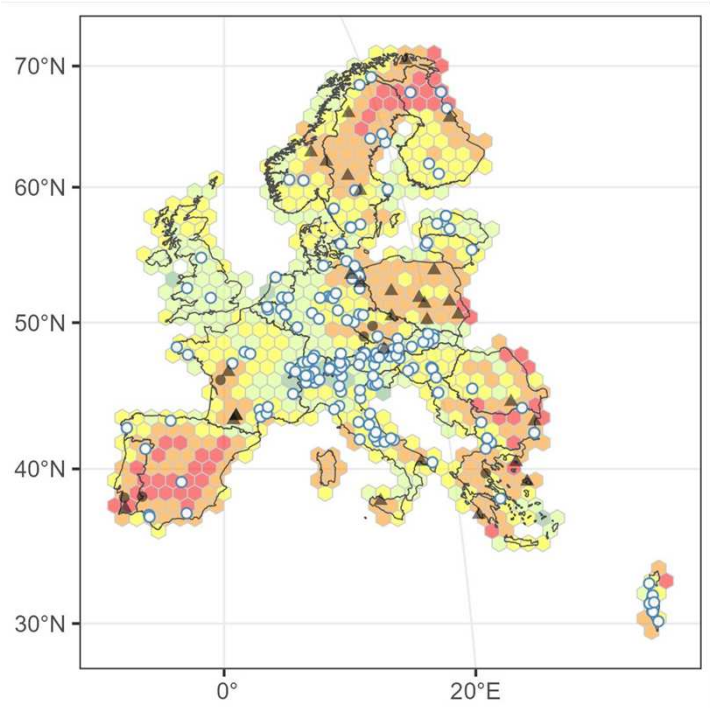


Outlook

Climate Hot Spots



Optimized Gap Filling



Recommendations by country matrix

Gap/topic	Issue/detail	AT	BG	CH	CZ	DE	ES	FI	FR	GR	IL	IT	LV	PT	RO	SI	SK	SE	UK	PL	SR	BE	DK	HU	LT	NL	NO
Status		IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	IC	(IC)	(IC)	LTER	LTER	LTER	LTER	LTER	LTER
General																											
General	Very low econ. dens.		1				1	1	1	1		1	1		1			1	1	1	1						1
General	Mediterranean						3		1	2		3		1													
General	Agro/croplands		1	1	1	1	2	1			1	1	1		1	1	1	1	1	2	2			1	1	1	1
General	Urban areas	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
General	Geographic balance	-3		-1			2					-1			2				1	3	1		2	3			2
General	RI-landscape						2																				
Nordic	x							1										1									1
Spanish	x						2							1													
West-East-Belt	x								1	1		1															
Eastern	x		1												2					3	1						
Research challenges	x																										
Climate Change	x																										
xxx	x																										
Tot		-2	4	1	2	2	13	4	3	5	2	6	3	3	7	2	2	4	4	10	6	1	3	5	2	2	6
		AT	BG	CH	CZ	DE	ES	FI	FR	GR	IL	IT	LV	PT	RO	SI	SK	SE	UK	PL	SR	BE	DK	HU	LT	NL	NO

Legend	Country action
1	helpful
2	important
3	critical

Next steps

- Clarification of fundamental questions (urban areas, croplands): IC_05 if possible (or IC_06)

Croplands: The situation concerning croplands is currently quite heterogeneous. Only a few countries (e.g. France) cover them to some extent. For some countries not having reported any agricultural sites it would be difficult to close the gap.

→ Considering the relevance of food security and sustainable agriculture we recommend to maintain the ambition of increasing coverage, but not with high priority.

Urban areas: The coverage of urban areas is currently marginal. Moreover, even the unlabelled sites are largely not urban.

→ We therefore recommend to drop the target of covering urban areas.

- Consultation with priority countries: till IC_06
- Statistical analyses, with which existing (but not yet nominated) in-situ facilities the gaps could be filled most cost-efficiently and with the most suited sites considering the adopted site criteria

Cat-1 & Cat-2 Sites: Customizable characteristics - SIZE

In general: size has to “be **appropriate for...**”

Needs to be **explicit and scientifically justified** (? review)

Collect **for each compartments information that is representative of the site** (the chosen geographical boundary).

The spatial extent also **determines the required effort** for the measurements (# replications, co-location etc.).

Consider the **required size for possible RIs co-location**

Space needed to accomodate the amount of observations incl. needed **replicates and reference points**, - plus some **reserve** in case of catastrophic events.

A minimum of 0,75 km2 was discussed, but finally dropped as “hard criterion”.

Mandatory reviewed justification

Cat-1 & Cat-2 Sites: Customizable characteristics – SPATIAL DESIGN

Closely linked to the question of the size

Can be

- a compact spatial unit
- **a cluster of sub-units**

Possible need for specific terrain characteristic/property for certain topics

- e.g.: “(sub-)catchments” for hydrological studies, where the absolute size of the catchment is of subordinate importance
- In such cases the spatial design might form part of the methodology to measure a given variable (SOs specification).

Mandatory reviewed justification

plocha	rozloha	lokalit	ekosystémů		
Arkto-alpinská tundra	3511	2	4		
Bílý Kříž	5	1	1	4x pralesy (VÚKOZ)	
Čertoryje - Vojšické louky	850	1	4	3x povodí GEOMON (ČGS)	
Důlní jezera	1055	3	1	2x MaB (Mendelu)	
Horské povodí Modrého potoka	262	1	3	2x NP Šumava	
Jihomoravské lužní pralesy	33	2	1	2x údolní nádrže (HBÚ)	
Lednice - Horní les	4	1	1		
Ledovcová jezera	74	8	2		
Mokré louky u Třeboně	1	1	1		
Načetín - lesní plochy	2	1	2		
Povodí Lysina a Pluhův bor	49	2	2		
Povodí Uhlířská	187	1	1		
Pralesy Novohradských hor	74	2	2		
Pralesy západních Karpat	53	3	3		
Rájec - Němčice	12	1	1		
Rašeliniště	6000	4	3		
Řeka Labe	371 km	1	?		
Římov - údolní nádrž	206	1	1		
Slapy - údolní nádrž	1160	1	1		
Sokolovské výsypky	10000	1	3		
Šumavské horské smrčiny	?	?	3		
Šumavské pralesy	72	3	3		
Teplomilné lesy	7945	16	5		
Wanang, Papua New Guinea	10000	1	1		

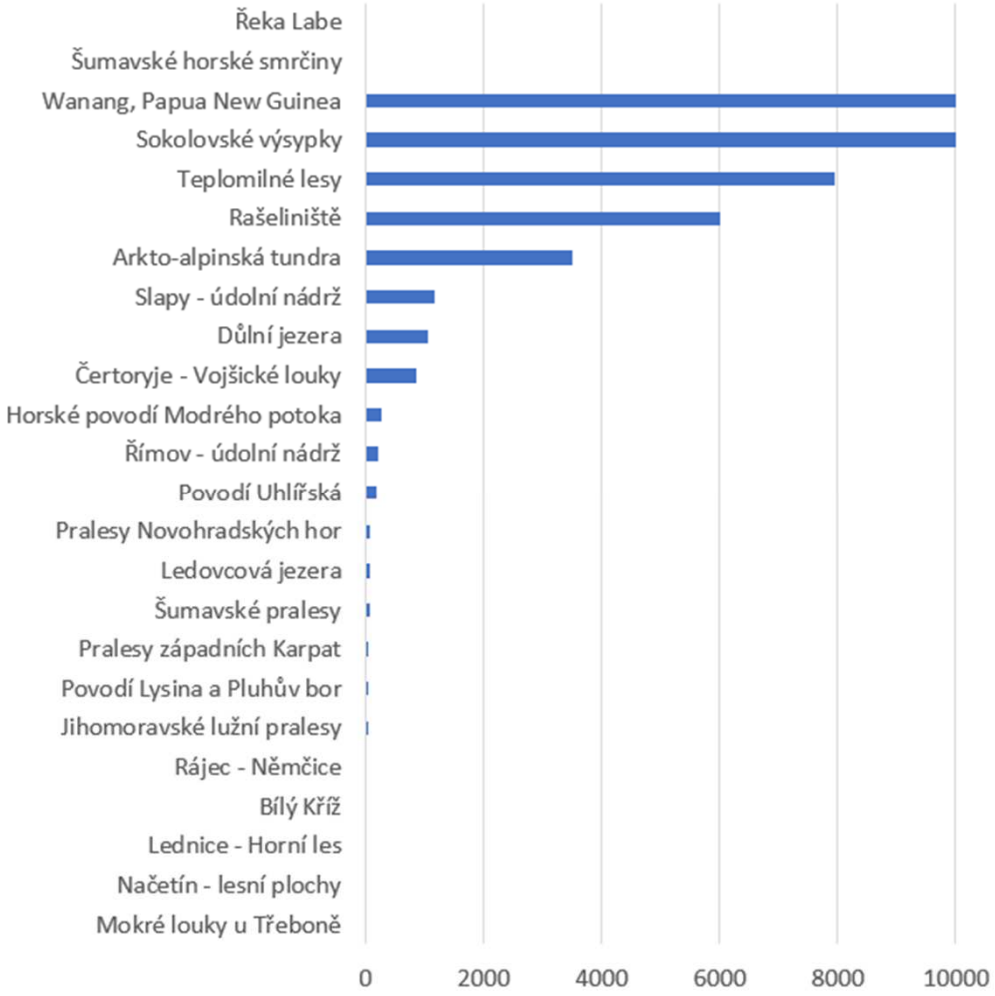
Český LTER (stav 2023)

- 24 Ploch
- 58 lokalit
- různá rozloha

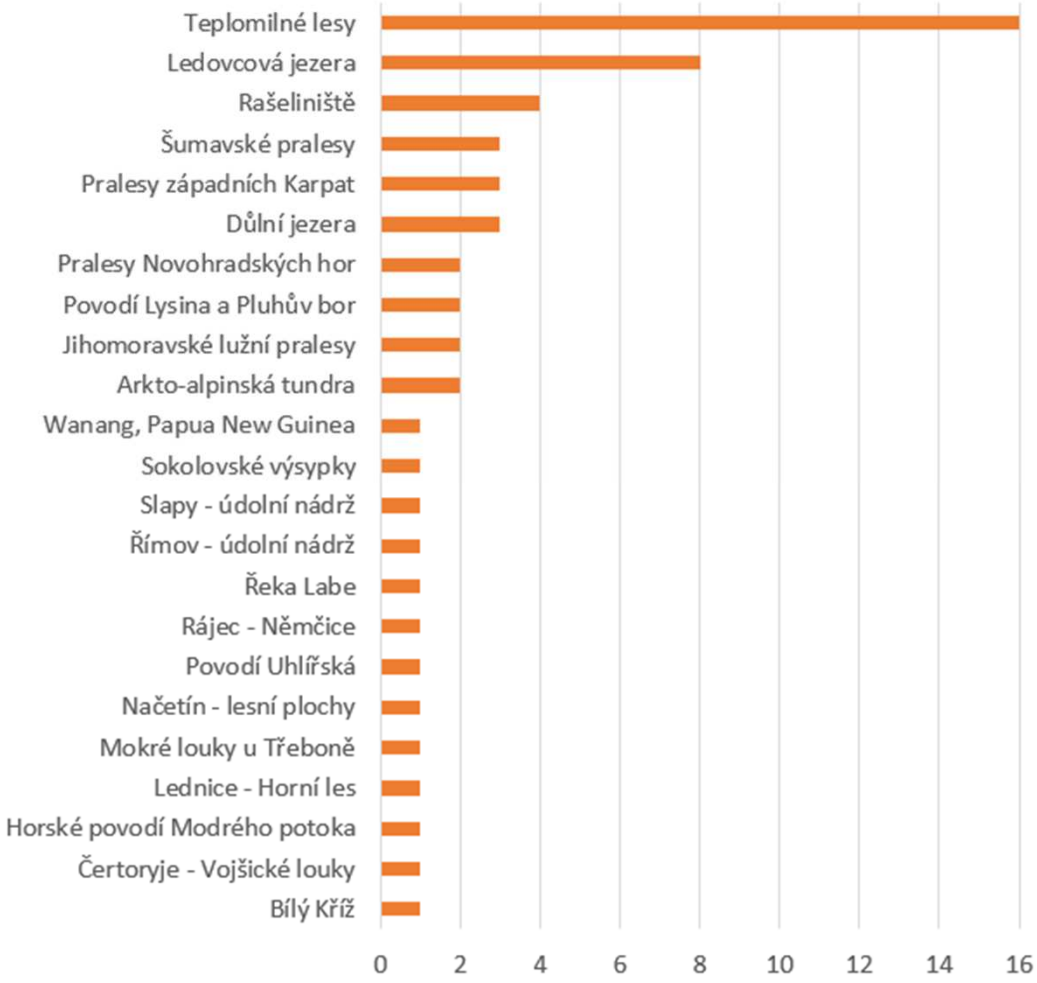
Data:
http://lter.cz
https://deims.org/

eLTER

LTER plochy podle rozlohy (ha)



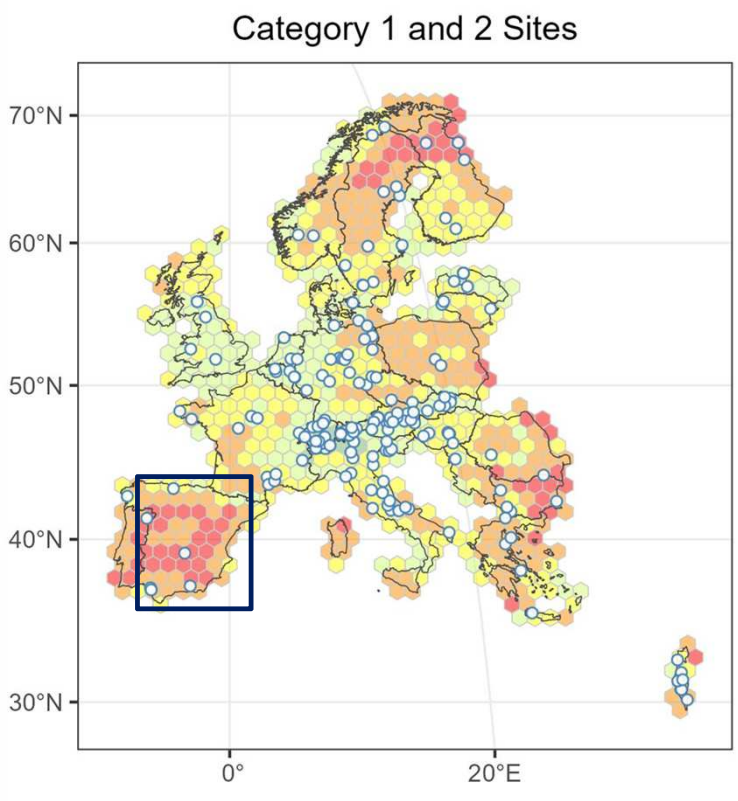
LTER plochy podle počtu lokalit

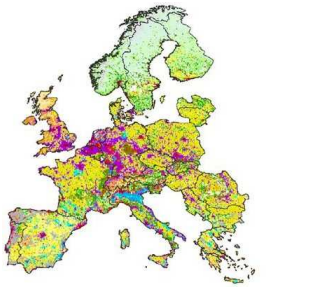


End

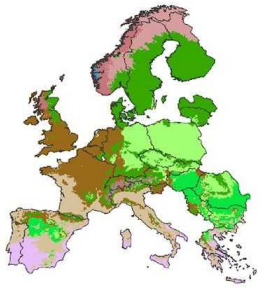
Gap Analysis

Spain/ Iberian Peninsula

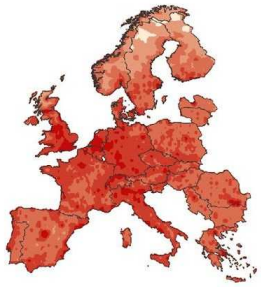




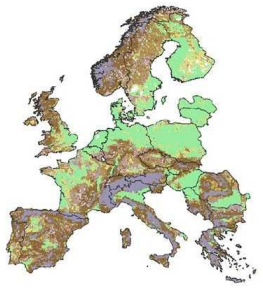
Anthromes based on Ellis et al. (2008)



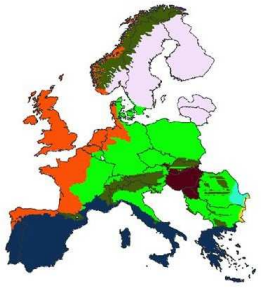
Bioclimate based on Metzger et al. (2013)



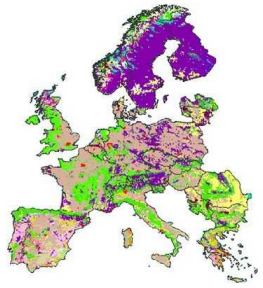
Economic Density based on Kummu et al. (2020) and CIESIN (2018)



Landforms based on Karagulle et al. (2017)



Biogeoregions based on EEA (2017)



Landcover based on ESA (2015)

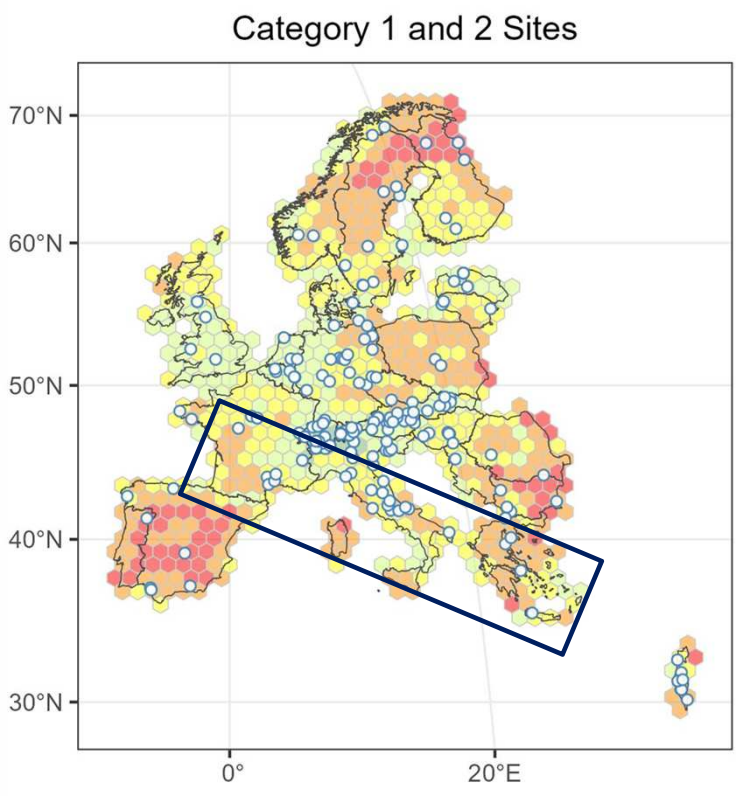
Gap Analysis

Spain/ Iberian Peninsula

- Mediterranean region is generally underrepresented
- Croplands with different levels of intensity
- Lower economic density
- Mesic/xeric bioclimates

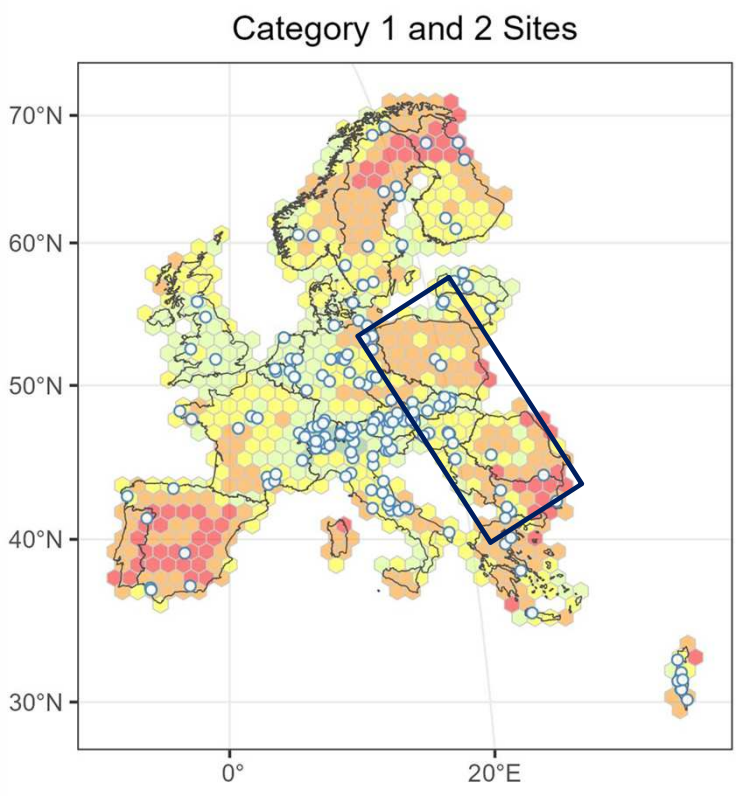
Gap Analysis

West-East-Belt



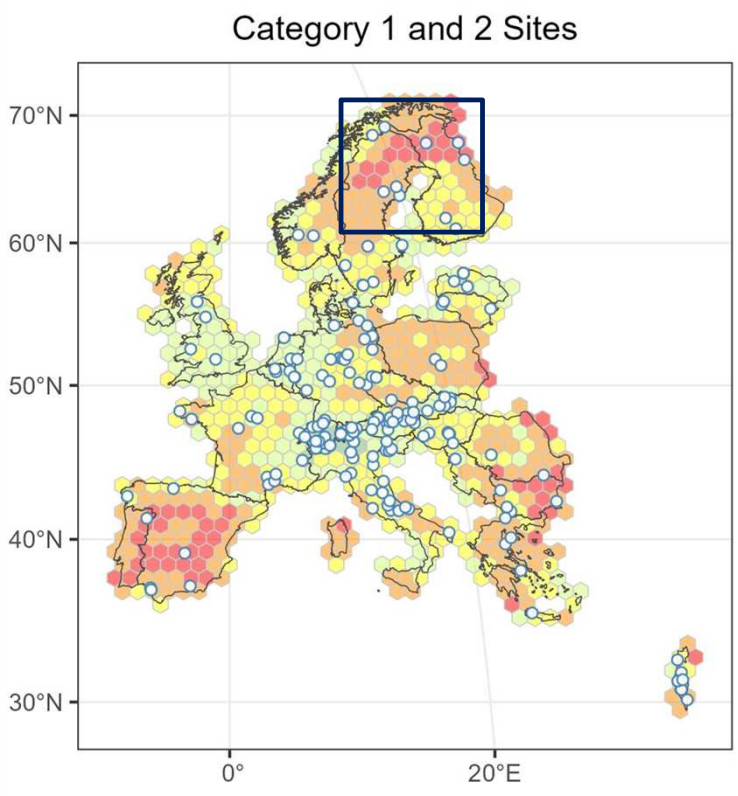
- General:
  - Croplands
  - Lower economic density (mainly in Greece)
  - Mesic/xeric bioclimates
- Specific for affected countries:
  - Mediterranean region is generally underrepresented (applies to Greece and Italy)
  - In France underrepresentation of the Atlantic region

Gap Analysis
Eastern Europe



- Dry & xeric bioclimates
- Croplands/agriculture
- Low economic density
- Flatlands

Gap Analysis
Northern Europe



- High remoteness
- Bioclimate: extremely cold and mesic underrepresented
- Low and very low Economic Density
- Boreal Biogeoregion
- Needleleaved Treecover

Considerations concerning the „power“ in gap filling

- Through strategic interactions targeted at selected countries
  - Take measures to strengthen the engagement of involved countries
  - Put emphasis on associating and including entire new countries

- Through iterative consultation with individual country networks
  - Countries might need to set priorities anyhow
  - Certain gap filling might not have happened, because there was not strong/objective voice from outside up to now
  - In case of limited resources and equal options important roles „from a European perspective“ might be of interest for both shareholders and site operating institutions

Name of the site/platform	Count	T	Site and Platform	*To be answered by sites only* - W	*To be answered*	*To be answered*
Lysina and Pluhuv Bor catchments	Czech Repub		Pavel Kram	Forests and other wooded land, Inland	Category 1	Category 1
Nacetin forest research plots	Czech Repub		Filip Oulehle	Forests and other wooded land	Category 1	Category 2
Petr Znachor	Czech Repub		Petr Znachor	Inland surface standing waters	Category 1	
Elbe River	Czech Repub		Anna Koubová	Inland surface running waters	Category 2	Category 1
Sokolov post-mining ecosystems	Czech Repub		Jan Frouz	Grasslands and lands dominated by fo	Category 3	Category 1
Post-mining lakes	Czech Re	50.1	Jiří Peterka	Inland surface standing waters	Category 3	Category 2
Thermophilous woods	Czech Repub		Radim Hédl, Dušan	Forests and other wooded land	Category 3	Category 2
Certoryje - Vojsicke Louky	Czech Repub		Karel Fajmon	Grasslands and lands dominated by fo	Category 3	Category 3
Glacial Lakes	Czech republi		Jiří Kaňa	Forests and other wooded land, Inland	Category 3	Category 3
Rajec-Nemcice	Czech Repub		Lubos Purchart	Forests and other wooded land	Category 3	Category 3
Bily Kriz	Czech Repub		Ladislav Šigut	Forests and other wooded land	Category 3	Category 3
Arctic-alpine tundra	Czech Repub		Irena Kholová	Wetlands (mires, bogs, fens), Grassla	Category 3	Category 3
Třeboň wet meadows	Czech Repub		Jiří Dušek	Wetlands (mires, bogs, fens), Inland s	None of them	Category 2
Lednice - Horni Les	Czech Repub		Lubos Purchart	Forests and other wooded land	None of them	Category 3
Zofin natural forests	Czech Repub		Dušan Adam	Forests and other wooded land	None of them	Category 3
Sumava natural forests	Czech Repub		Dušan Adam	Forests and other wooded land	None of them	Category 3
South-Moravian floodplain forest	Czech Repub		Dušan Adam	Forests and other wooded land	None of them	Category 3
Beskydy natural forests	Czech Repub		Dušan Adam	Forests and other wooded land	None of them	Category 3