

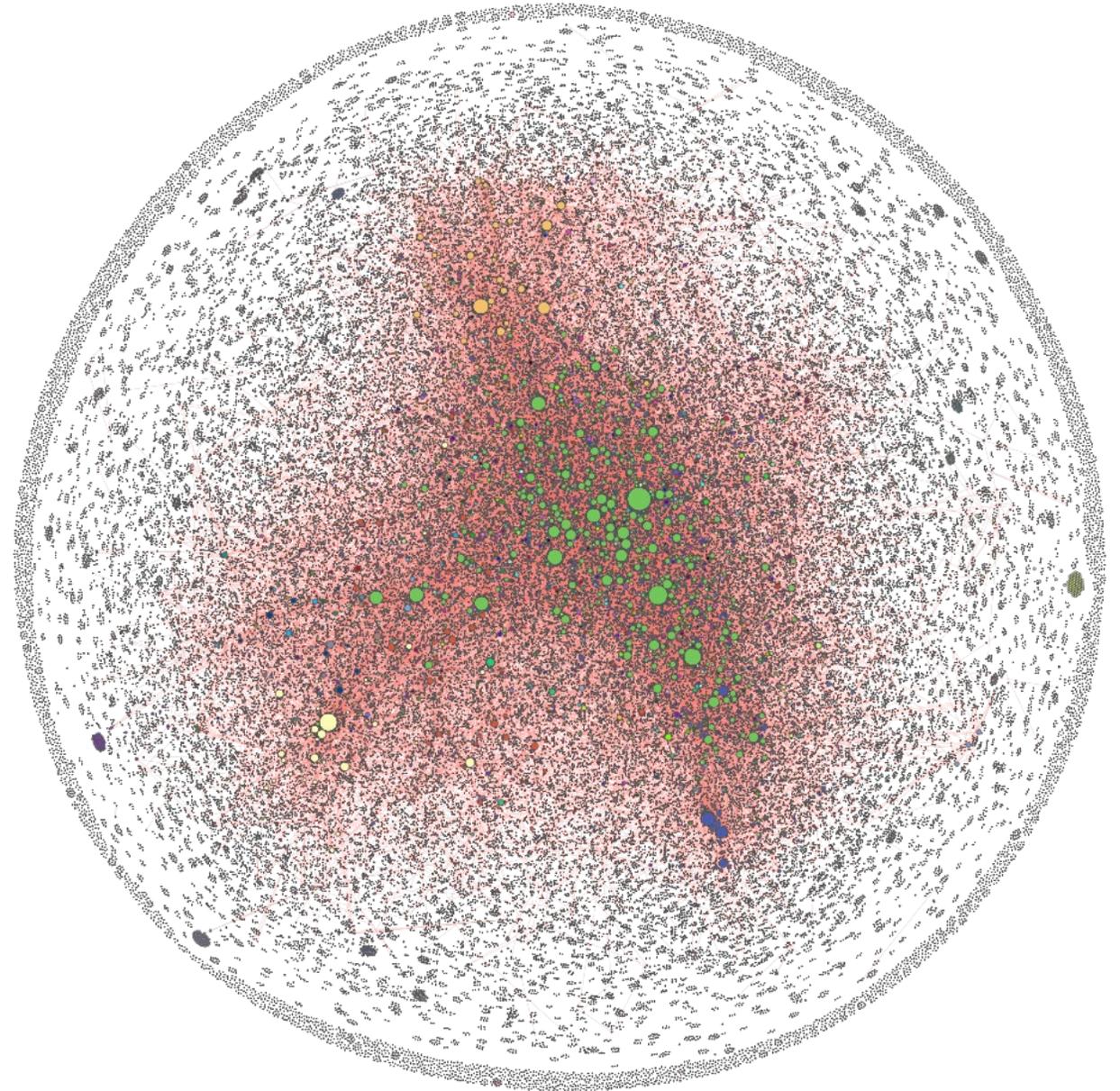
EFI scientific seminar 21.09.2023  
Novi Sad, Serbia

# Forest science in the past decades

A robust methodological approach to  
mapping the field

Niels Strange  
Carl-Emil Pless  
Mar Moure

University of Copenhagen



EUFORE is a HORIZON Research and Innovation Action  
funded by European Research Executive Agency.

# EUFORE – European Forest Research and Innovation Ecosystem

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**EUFORE** is coordinated by the European Forest Institute

Horizon Europe project funded by the European Union, running from November 2022 to October 2026

EUFORE's work creates a solid collaborative basis for a European Partnership on Forestry

One main output of EUFORE is a **strategic R&I agenda** for forestry and the forest-based sector (**SRIA**)



Funded by  
the European Union



**EUFORE**

[eufore.eu](http://eufore.eu)

# Map status and trends of forest-based research and innovation in Europe in order to provide a knowledge base for stakeholder deliberations on setting the research agenda and innovation roadmap



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Systematic literature review (lead UCPH)



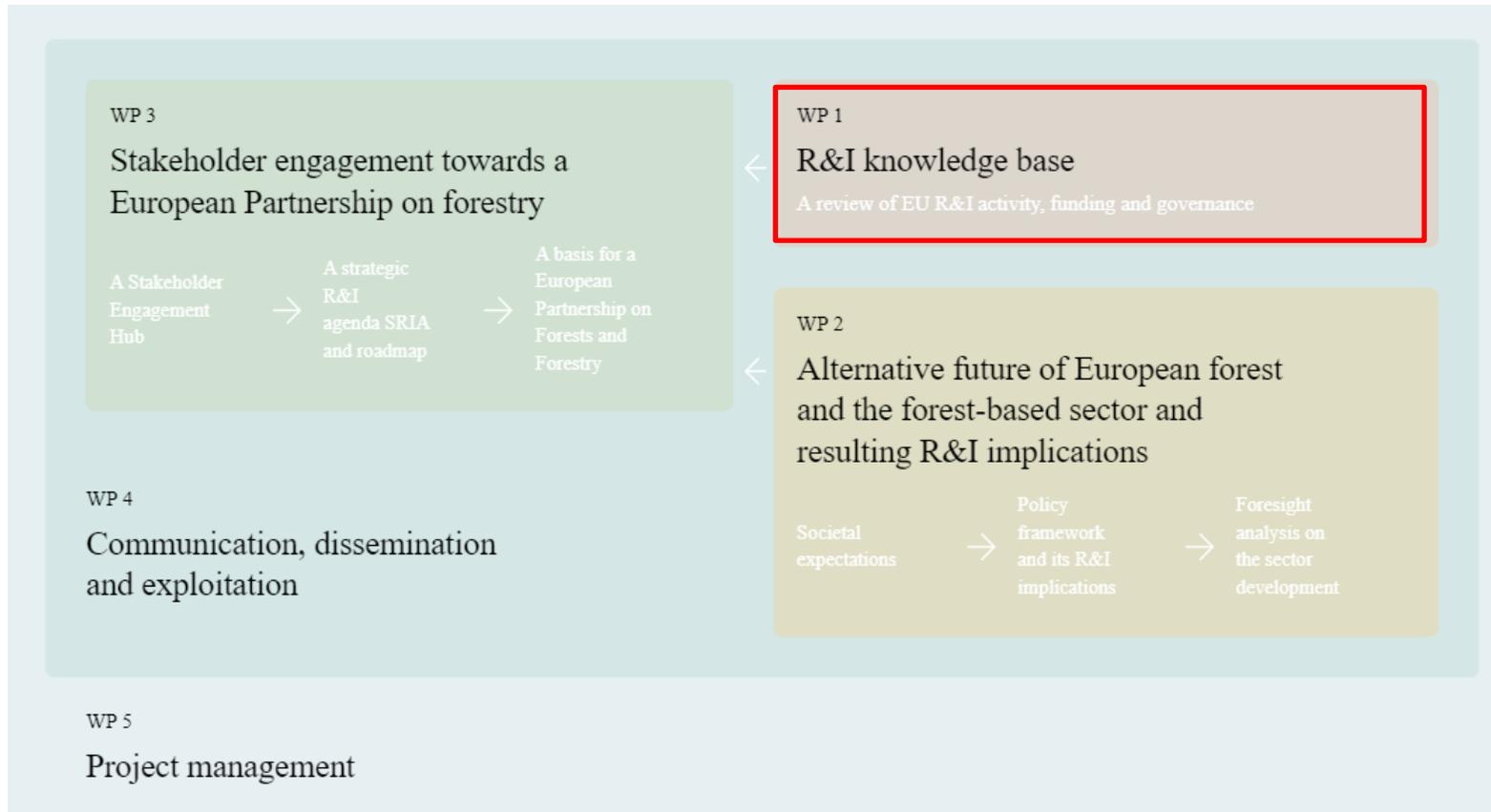
Innovation (lead BOKU)



Funding and Governance (INRAE)

|   |   |  |
|---|---|--|
| <br>EUROPEAN FOREST INSTITUTE                                    | <br>Maa- ja metsätalousministeriö<br>Jord- och skogsbruksministeriet<br>Ministry of Agriculture and Forestry | <br>FNR   |
| <br>LUKE<br>NATURAL RESOURCES INSTITUTE FINLAND                  | <br>UNIVERSITY OF COPENHAGEN   | <br>INRAE<br>science for people, life & earth                   |
| <br>BOKU   | <br>CTFC<br>SCIENCE FOR FOREST MANAGEMENT, BIODIVERSITY & BIOECONOMY   | <br>IUCN  |
| <br>NÁRODNÉ LESNÍCKÉ CENTRUM<br>NATIONAL FOREST CENTRE          | <br>INNOVAWOOD  | <br>Forest-based Sector<br>Technology Platform                 |
| <br>tecna:a<br>MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE | <br>Croatian Forest Research Institute<br>HRVATSKI ŠUMARSKI INSTITUT                                       | <br>MINISTERO DELLE POLITICHE AGRICOLE ALIMENTARI E FORESTALI |

# Work Packages



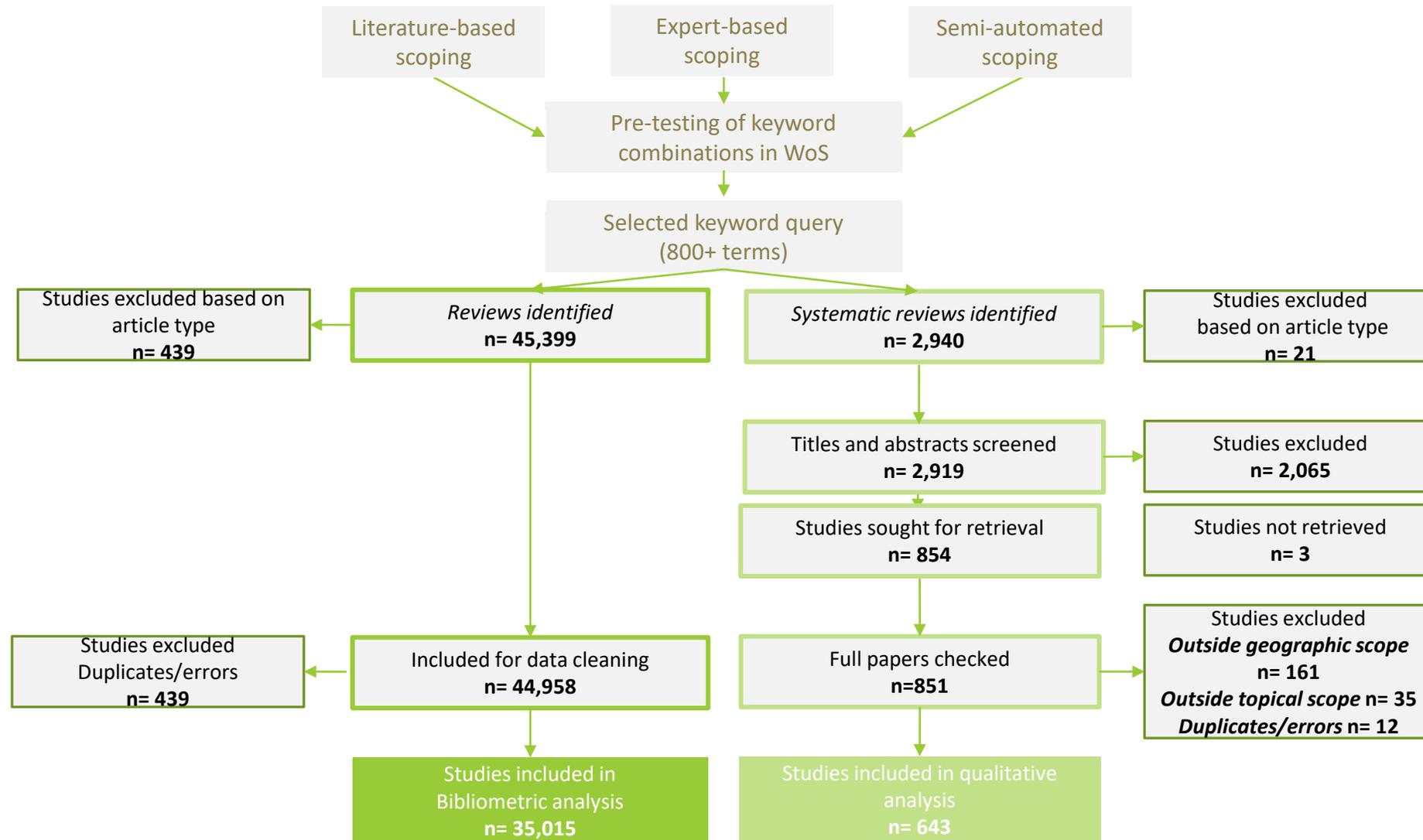
# Mapping research in forestry and forest-based sector

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- Defining Forestry and the Forest-based sector given increased complexity
- Attempt to map the extent and boundaries of the field
- Systematizing knowledge
- **Preliminary results**

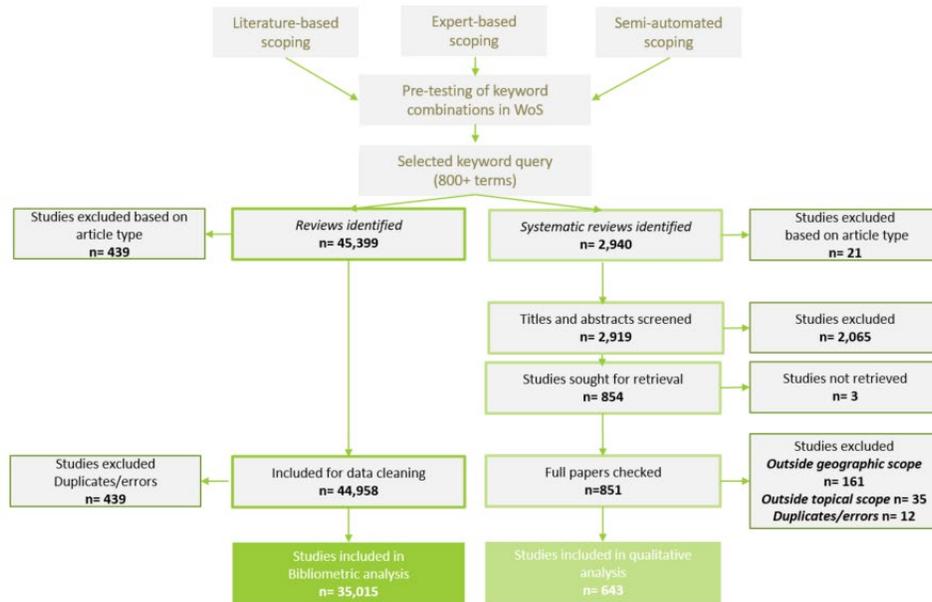
# The Review of Reviews approach

INCLUSION  
ELIGIBILITY  
SCREENING  
IDENTIFICATION  
PREPARATION



# The next steps

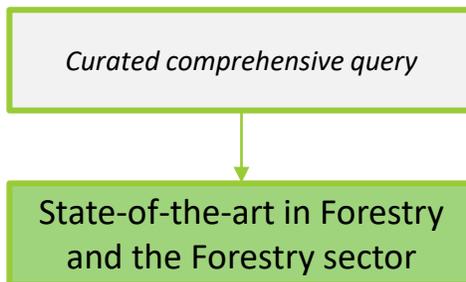
PREPARATION  
IDENTIFICATION  
SCREENING  
ELIGIBILITY  
INCLUSION



Based on reviews and systematic literature reviews

Ground-truthing  
Linking keywords to meaningful categories based on full-reads

All scientific articles (potentially over a million)



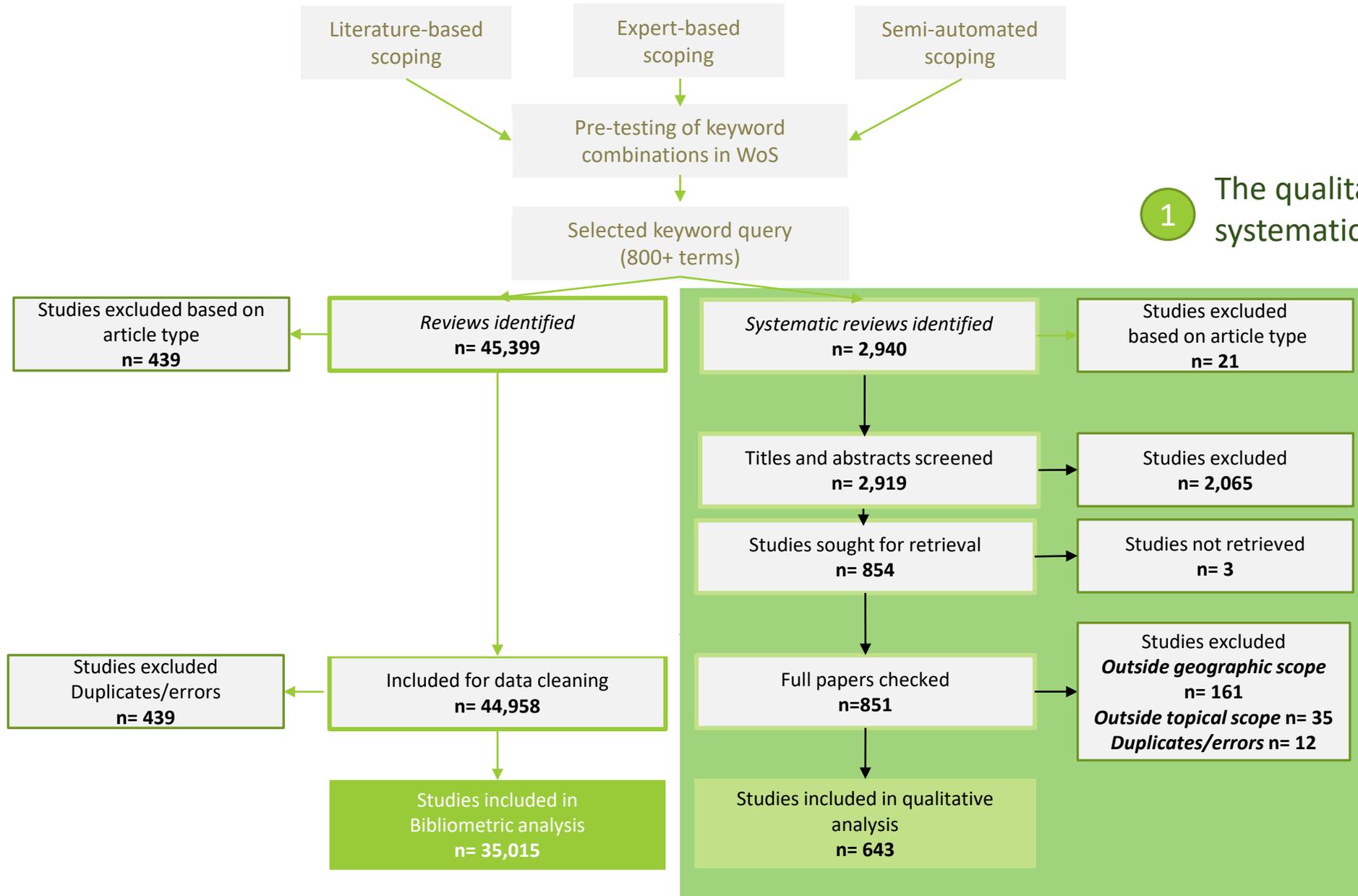
PREPARATION

IDENTIFICATION

SCREENING

ELIGIBILITY

INCLUSION



1 The qualitative review of systematic reviews

# Main results

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→ Systematic literature reviews remain rare in F&FS, and we found no previous attempts to map the whole sector

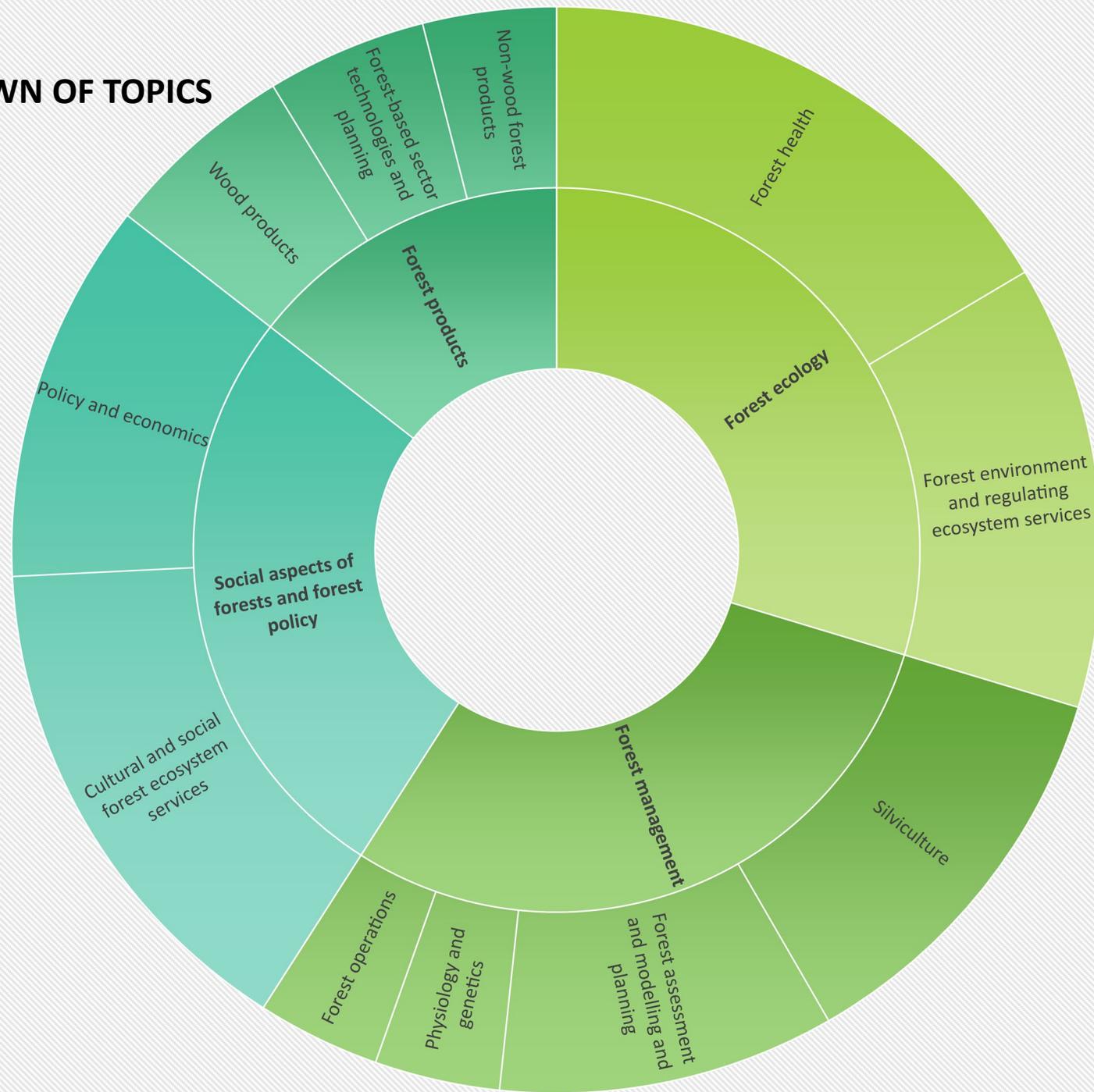
(systematic literature reviews are less than 2% of all reviews)

→ Uneven production across topics: Ecology/ecosystem services and human health related fields represent the largest share. Potential knowledge gaps in certain areas

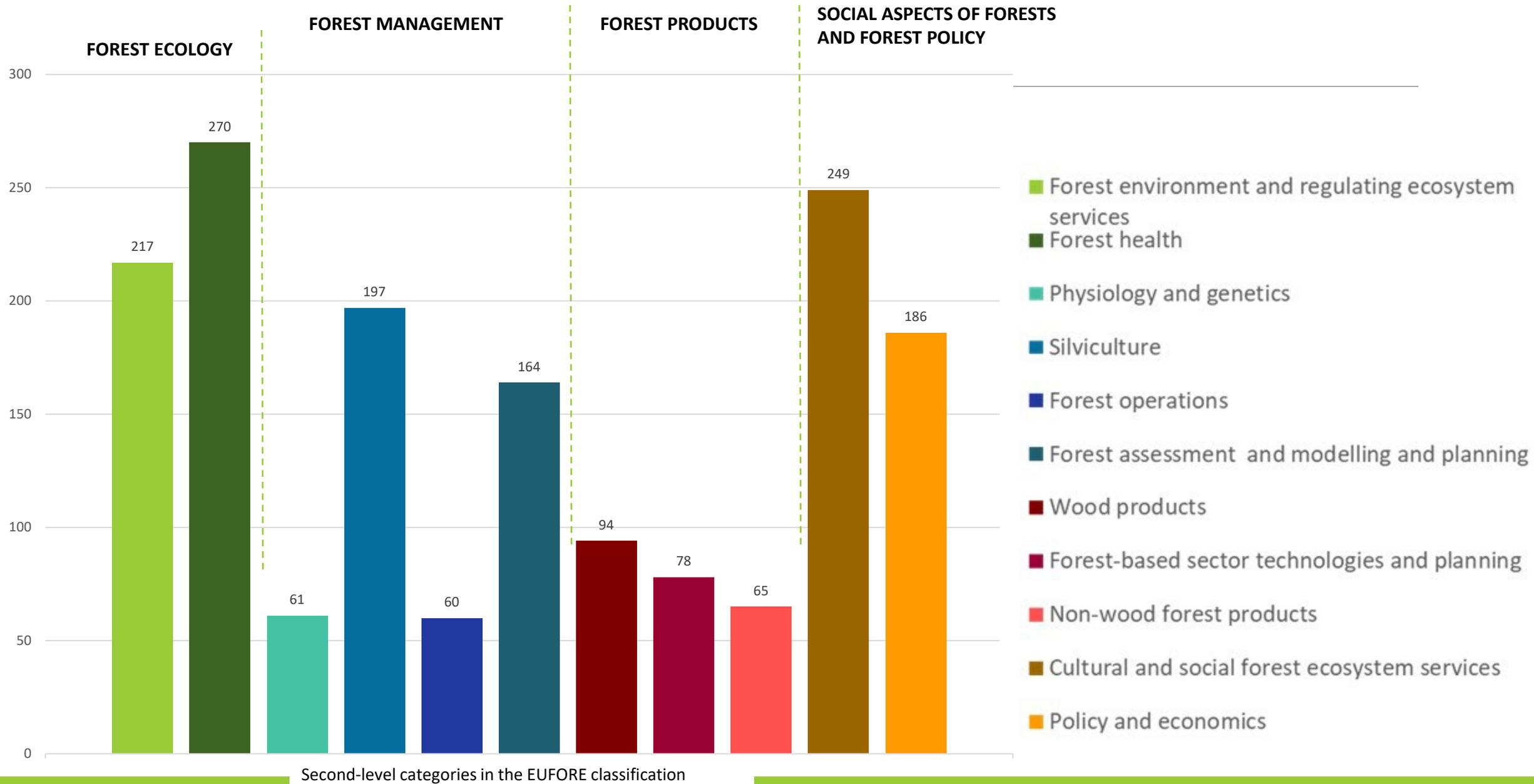
→ Uneven geographic representation within Europe

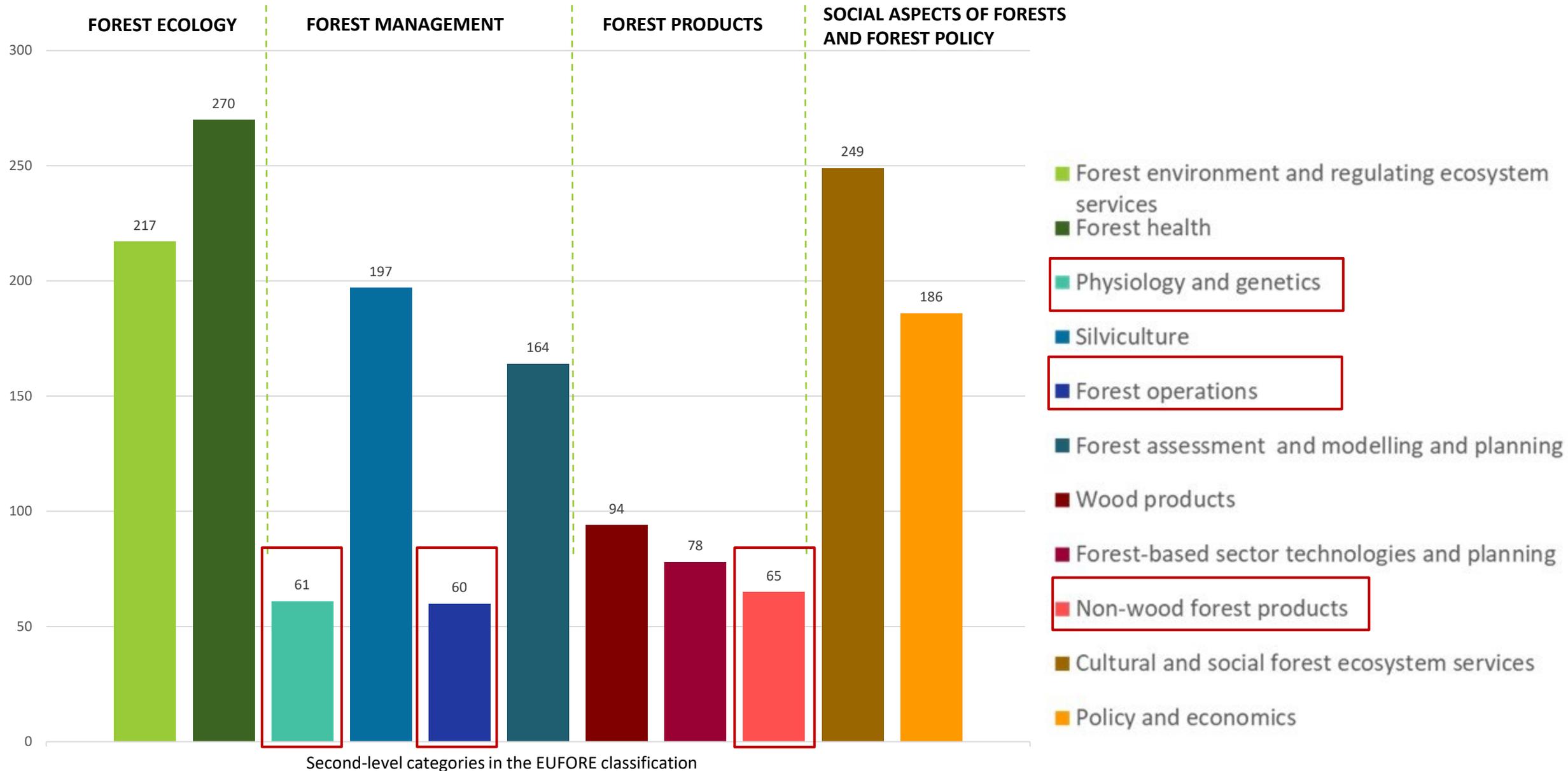
# BREAKDOWN OF TOPICS

N= 643

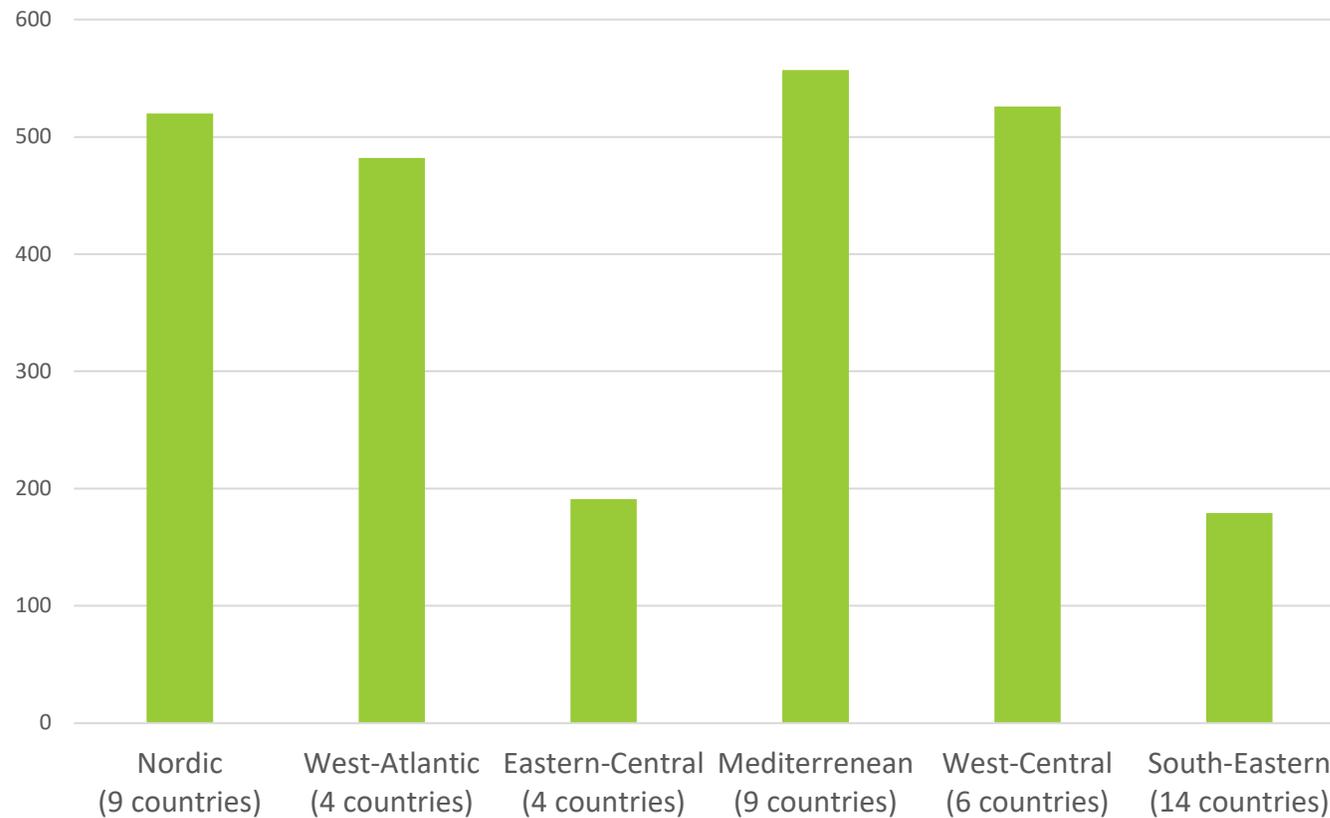


- Forest ecology
- Forest management
- Forest products
- Social aspects of forests and forest policy





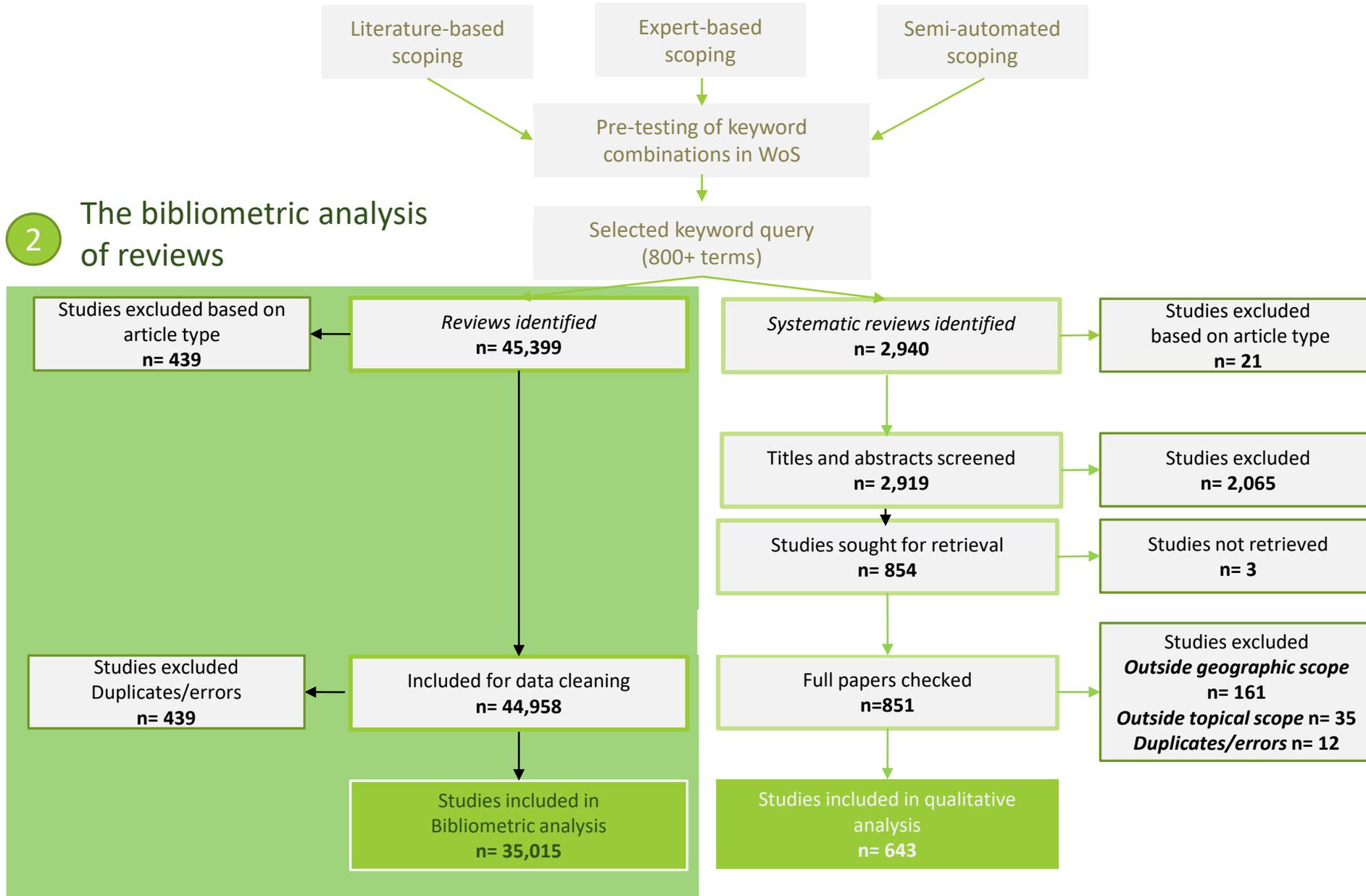
# Geographical distribution of studies in Europe



## Top 10 countries

1. UK (n=211)
2. Germany (n=198)
3. Spain (n=196)
4. Italy (n=162)
5. Sweden (n=152)
6. France (n=139)
7. Finland (n=125)
8. Netherlands (n=106)
9. Portugal (n=92)
10. Poland (n=83)

## 2 The bibliometric analysis of reviews

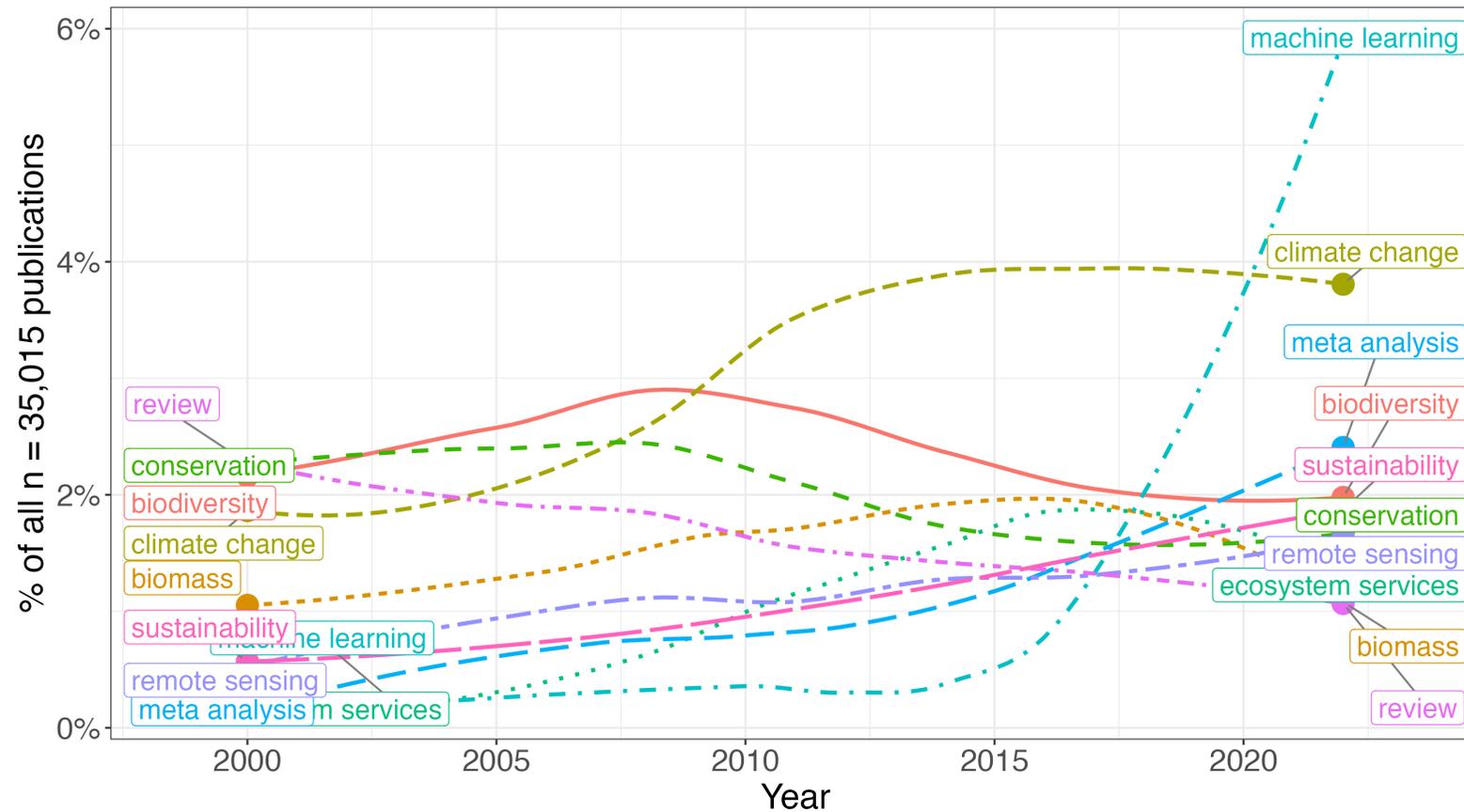


# Descriptive statistics (n= 35,013)

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| Main information about data        |             |
|------------------------------------|-------------|
| Timespan                           | 1986 : 2023 |
| Sources (Journals, Books, etc)     | 8,255       |
| Documents                          | 35,013      |
| Annual Growth Rate %               | 16.24       |
| Document Average Age               | 8.46        |
| Average citations per doc          | 48.21       |
| Average citations per year per doc | 4.592       |
| References                         | 2,131,854   |

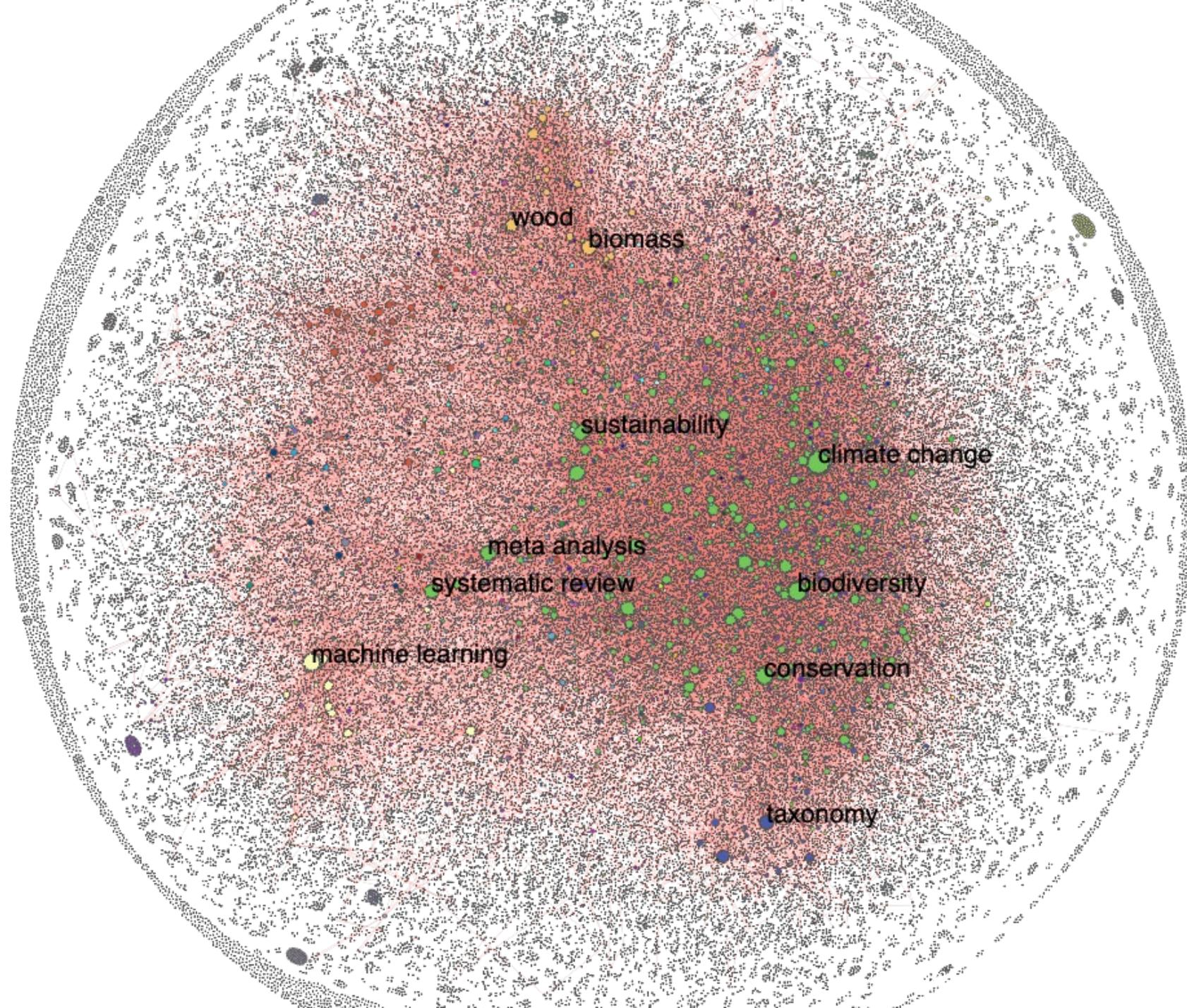
# Trends in keywords (2000-2022)

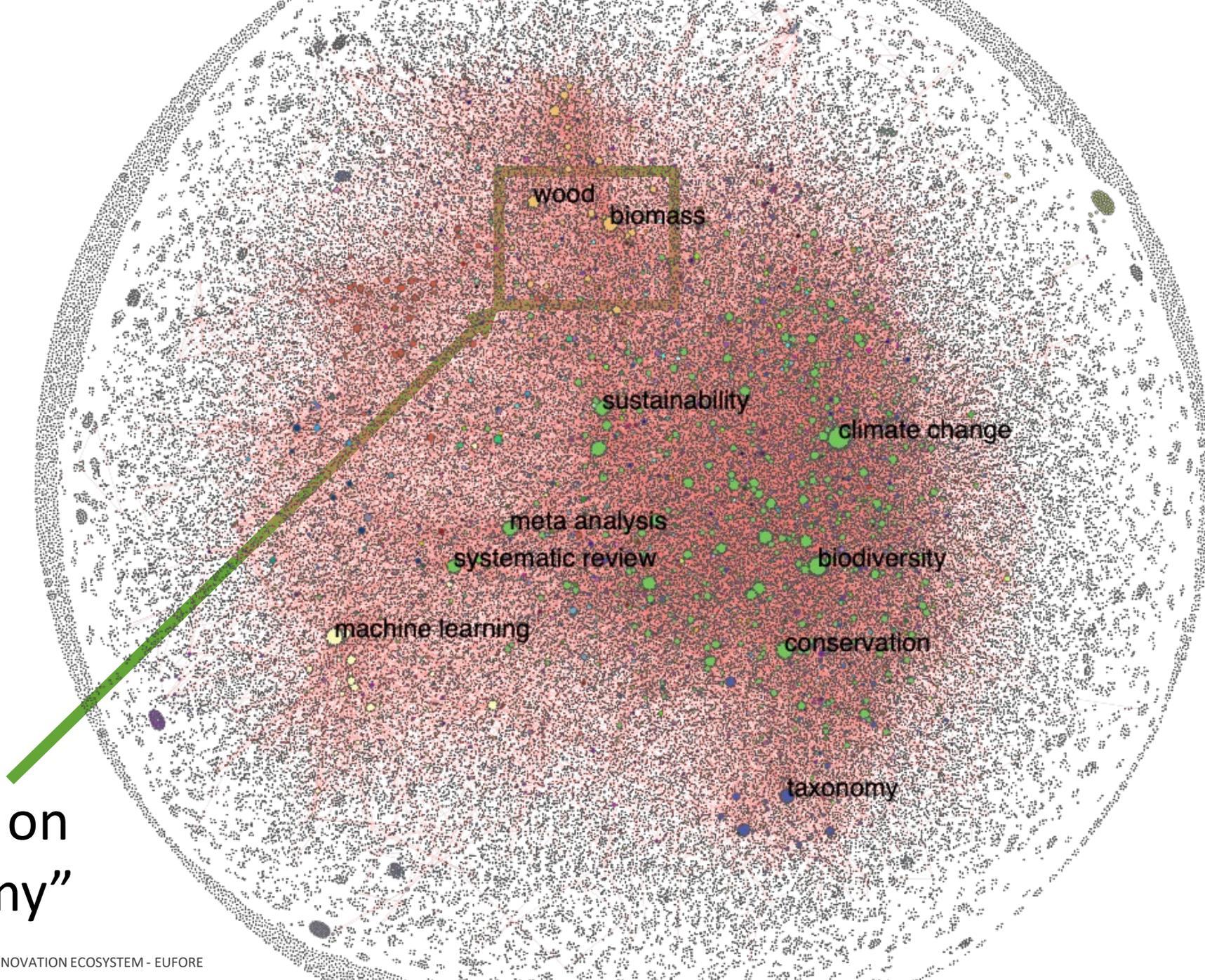


- **10** most frequently used author keywords from 2000 to 2022
- Scaled according to the number of publications in a given year
- We identify papers that synthesize evidence -> systematic reviews, meta-analyses, and narrative reviews are inherently **overrepresented**

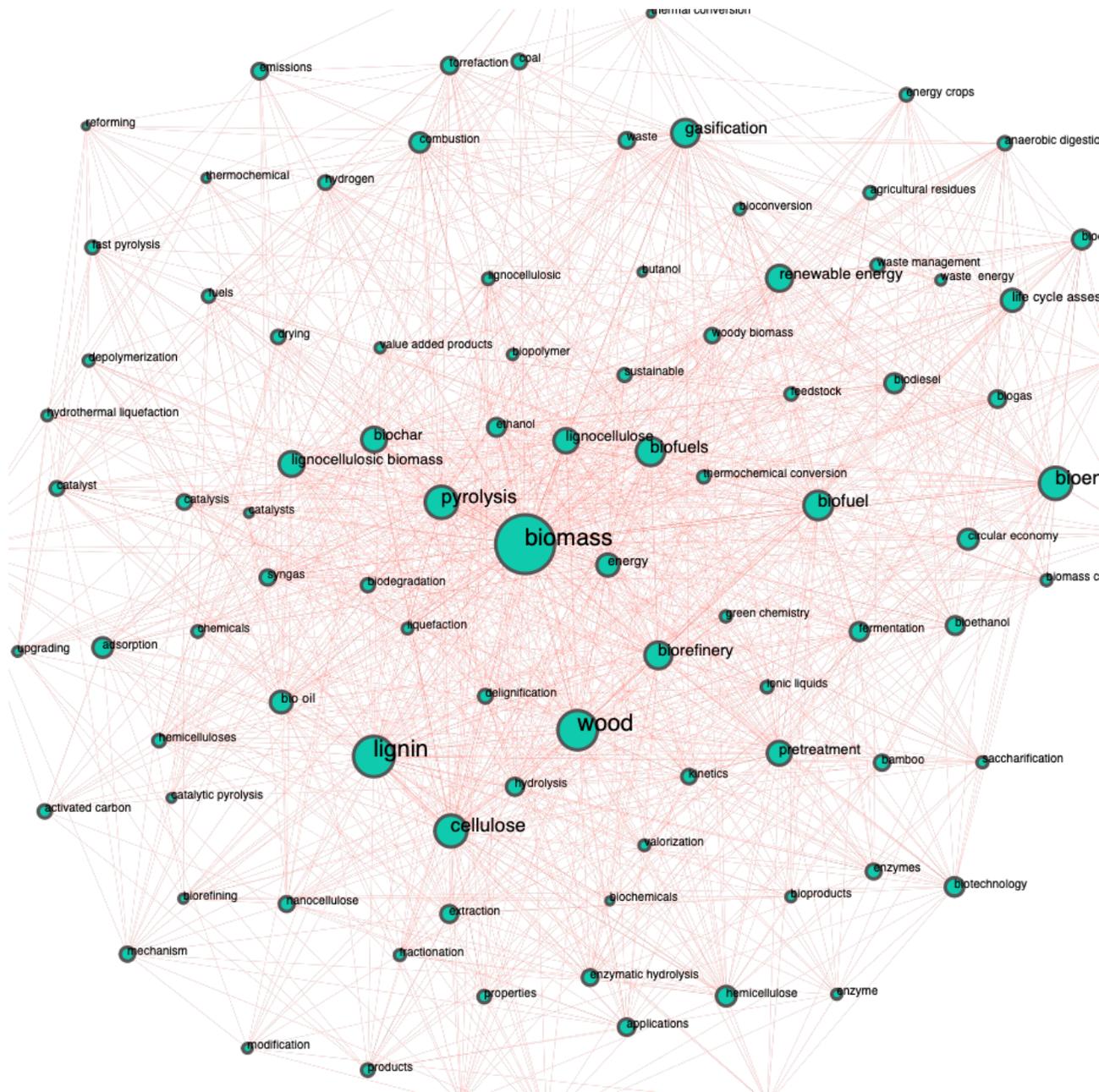
# Mapping a field

- Using the “co-occurrences” of author stated keywords we can investigate the underlying **community structure**
- 609 512 connections between 86 941 nodes (keywords), 19 318 communities
- Each community is determined based on the frequency with which it co-occurs with other keywords, to the same extent as it doesn't co-occur with others
- We are identifying few (very) large communities, and many small communities



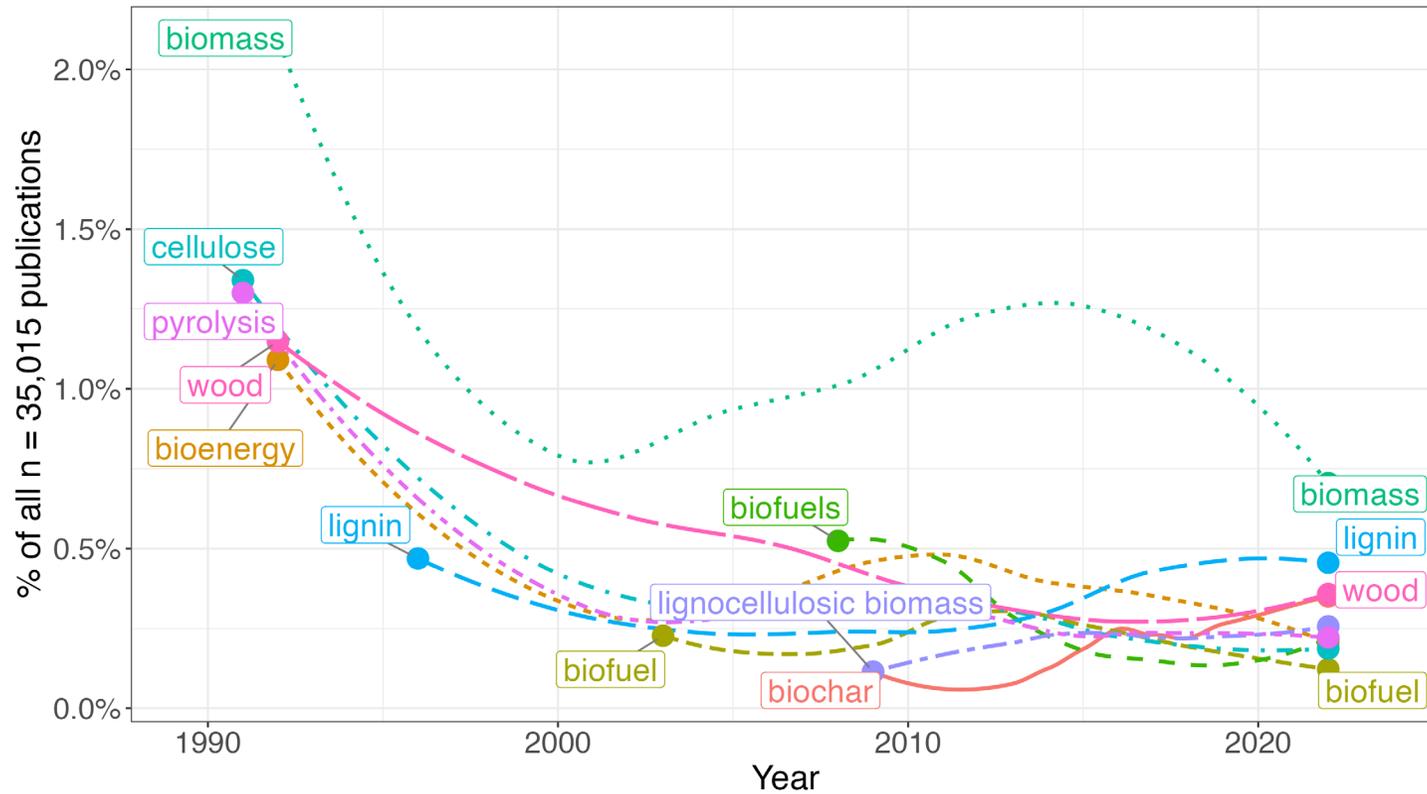


Zooming in on  
“bioeconomy”

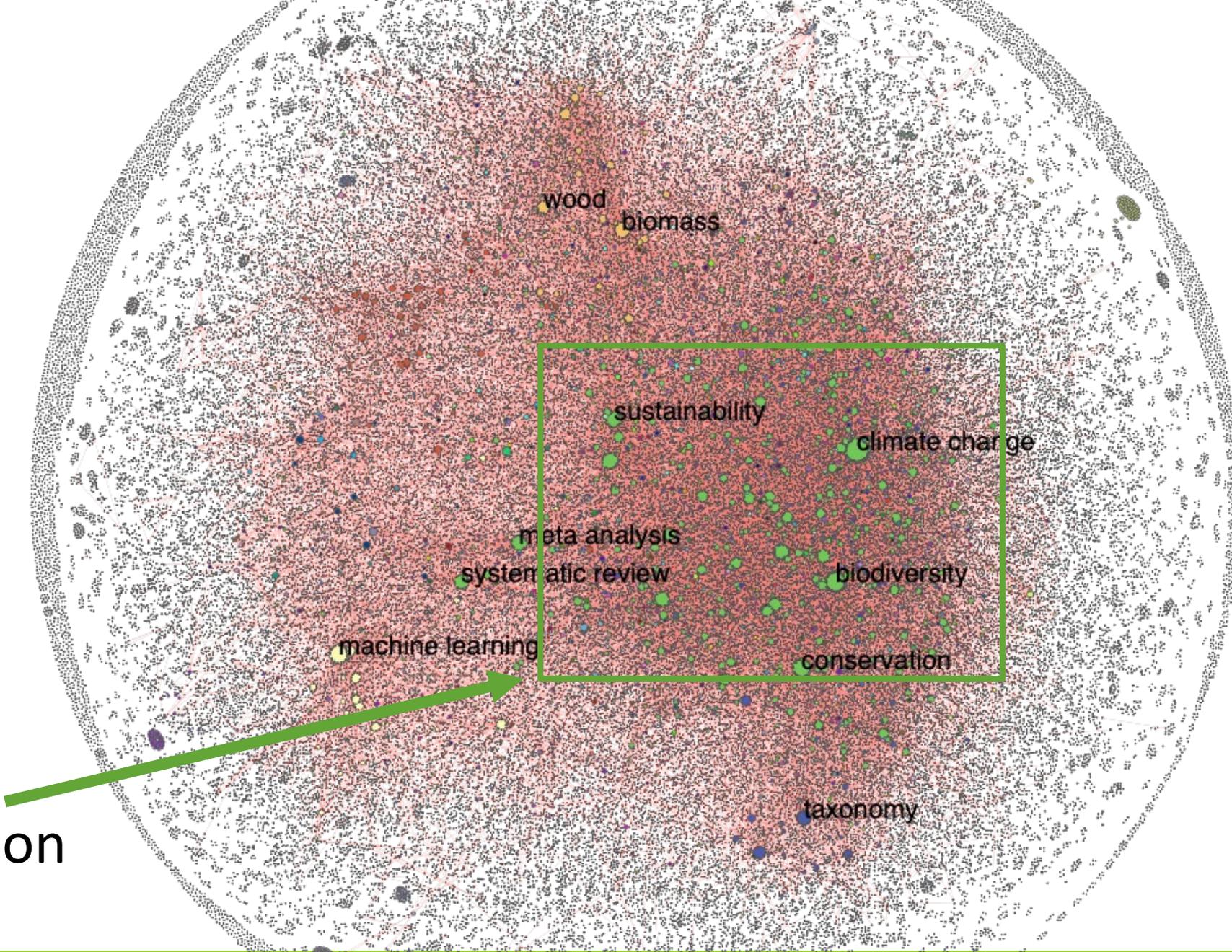


# Zooming in on “bioeconomy”

- A “subgraph” that only contains keywords associated with “bioeconomy”
- This area is relatively less dense (connected) than other parts of the larger network
- This community of keywords are used in a way that makes them distinct from other parts of the network
- Means that examining the underlying trends may be interesting...



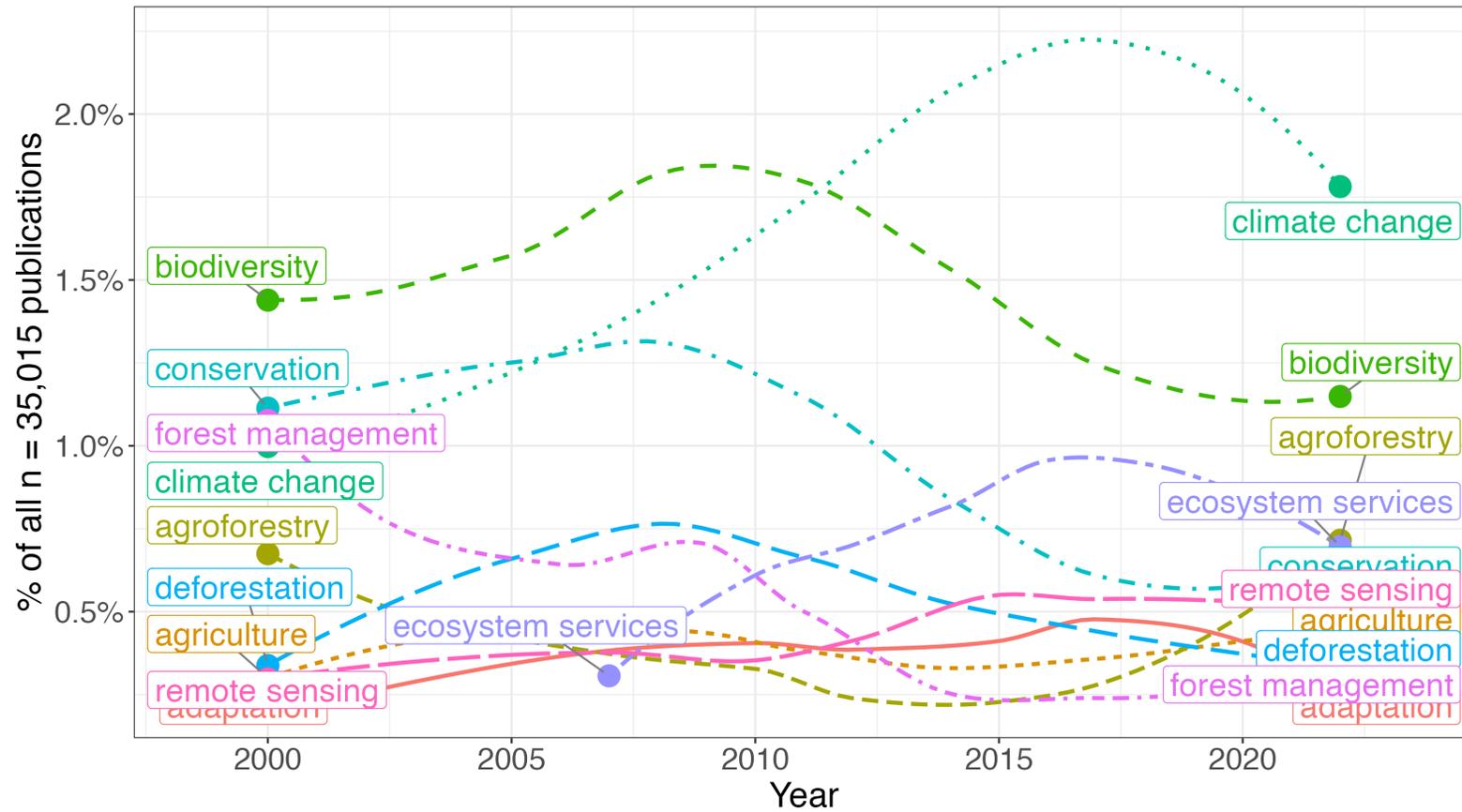
# Trends within the bioeconomy cluster



Zooming in on  
"resilience"



# Trends within the resilience cluster



# Forward

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- Database / library on search terms is available upon request

## **Next steps**

- Mapping of knowledge base related to institutions and countries
- Mapping of collaborations
- Expanding from ~ 35,000 reviews to including > million scientific articles
- Ongoing investigation of Innovation in European forestry and the forest-based sector
- Ongoing investigation of European funding and governance structures