ECOLOGICAL FLOW IN SOUTHERN EUROPE: IMPLEMENTATION IN TEMPORARY RIVERS

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Session HS1.1.2- Role of hydrology in policy, society and interdisciplinary collaborations: across disciplines and beyond scientists
08:45-08:50 Virtual presentation

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BACKGROUND

In the Mediterranean Region, **temporary rivers are the predominant water ways**.

Climate change and **human activities** are modifying the flow regime of rivers towards "non-perennial" conditions.

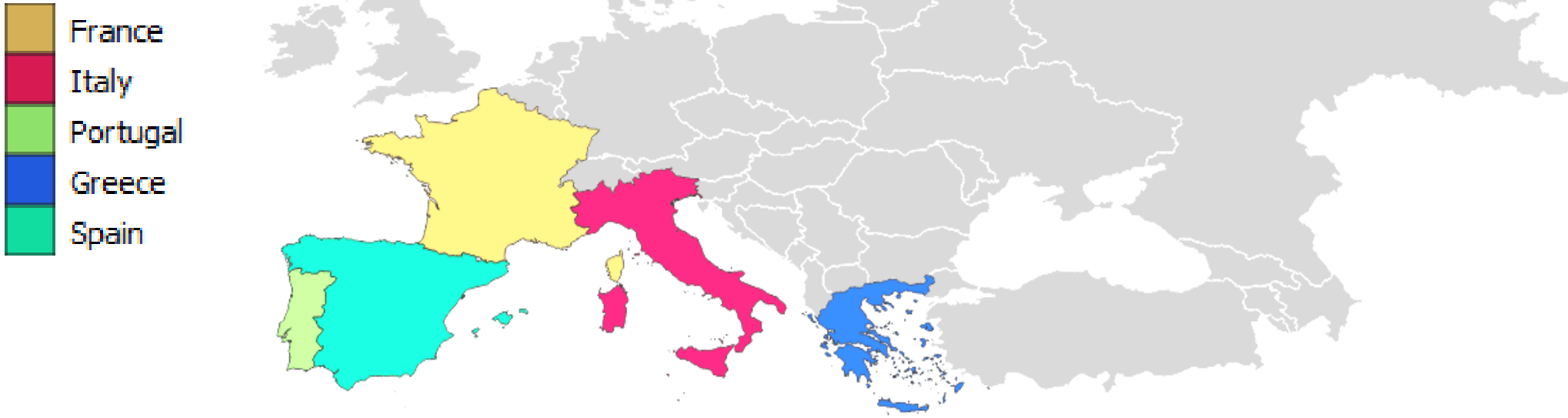
For temporary rivers, setting up the environmental flow to protect quality, redevelop rivers and aquatic ecosystems **is urgent**.

Several difficulties in setting an Environmental Flow (Eflow) in temporary rivers derived from the **limited data availability** (i.e., hydrological an ecological).

OBJECTIVES

i) to analyze the **national** and **European legislation** concerning the Eflow.

ii) to analyze the **Eflow approaches** applied in southern Europe for **temporary rivers.**



The work focuses on the European countries bordering the Mediterranean Sea: Italy, Spain, Portugal, France and Greece.

DEFINITION OF ENVRIONMENTAL FLOWS-European regulatory framework

Water Framework Directive 2000/60/EC

It is an EU directive that commits the member states of the European Union to achieve a good qualitative and quantitative status of all water bodies.
It defined the EFlow in natural surface water bodies as "***a hydrological regime consistent with the achievement of the environmental objectives of the WFD in natural surface water bodies as mentioned in Article 4***".
These environmental objectives refer to:
(i) non-deterioration of the existing status,
(ii) achievement of good ecological status in natural surface water bodies,
(iii) compliance with standards and objectives for protected areas.

Brisbane Declaration (2007)

Scientists from 57 nations, at the 10th International Riversymposium and International Environmental Flows Conference held in Brisbane, Australia, crystallized the progress and direction of environmental flows science, practice and policy.
In which, Eflow has been defined "***the quality, quantity and timing of runoffs needed to sustain ecosystems which in turn support crops, the economy, sustainable livelihoods and well-being***".

Water Blueprint Strategy EU (2012)

Officially introduces the concept of Eflow.

European Guidance Document (CIS) EU No. 31 (2015)

It has been published because of the need for more solid knowledge for the determination of EFlow and its implementation in River Basin Management Plans

ENVIRONMENTAL FLOWS METHODS

There are currently more than 200 methods for setting the EFlow (Tharme, 2003).

Eflow method	Input Data
Hydrological methods	long-term data sets (>20 years) of unregulated or naturalized streamflows as input data
Hydraulic methods	flow velocity, river cross-section as input data.
Holistic methods	combination of hydrological, hydraulics, ecological, and social sciences (expert knowledge)
Habitat simulation methods	flow velocity, river cross-section, data set of fish species

METHODOLOGY- Evolution of national legislation and methodologies adopted

Scopus and websites managed by the government of each country.

1)

Environmental flows
Ecological flows
Instream flows
Minimum legal flow

«AND» **Ecosystem type rivers/streams**

Ephemeral
Intermittent
Temporary
Non-perennial

«AND» **Study area**

Mediterranean area
Semi-arid

Method

«AND»

Hydrological
Hydraulic
Holistic
Habitat simulation

Total: 132 articles

2) *First screening..*

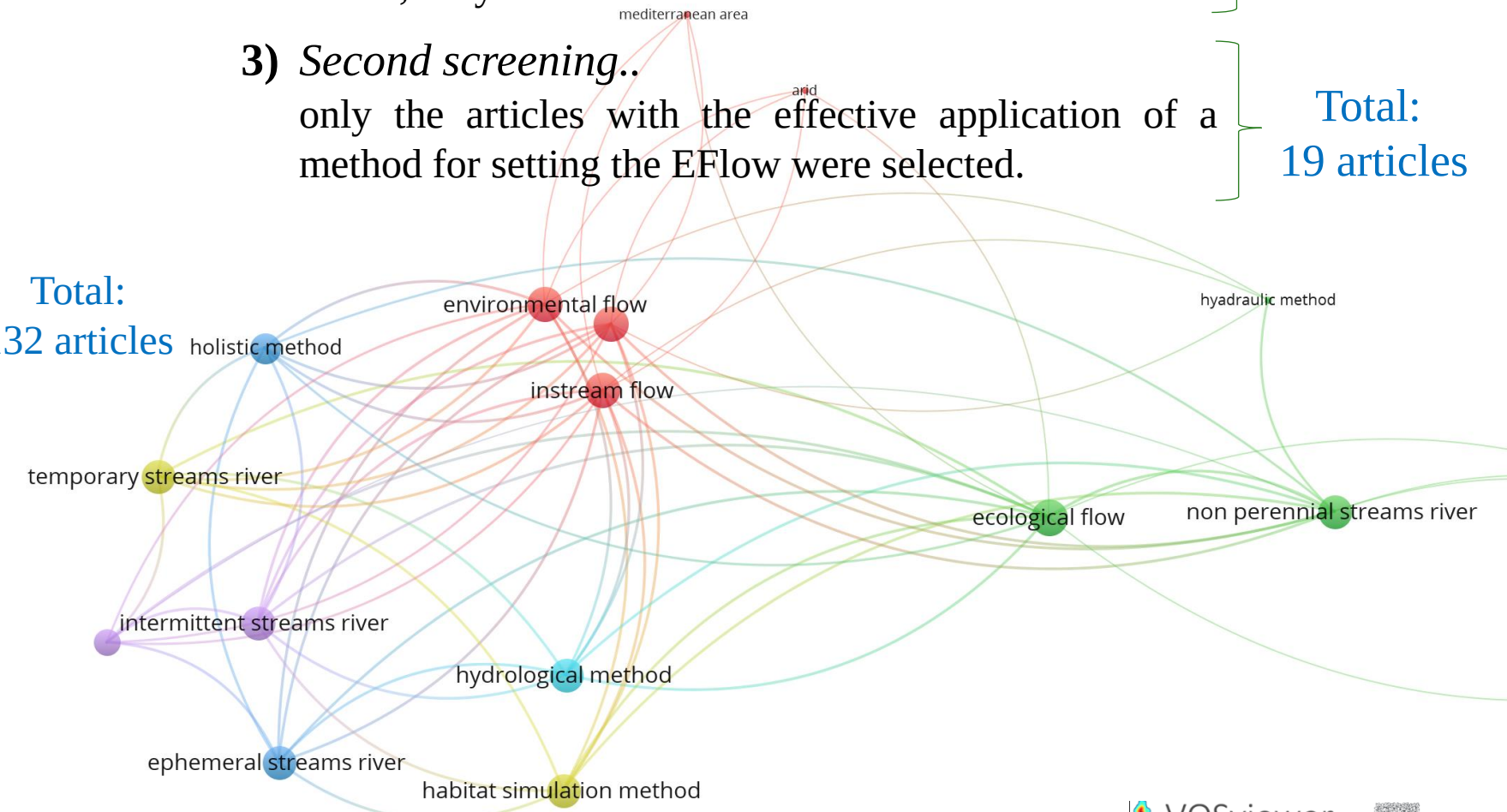
selecting only the case studies in Spain, Portugal, France, Italy and Greece.

Total: 59 articles

3) *Second screening..*

only the articles with the effective application of a method for setting the EFlow were selected.

Total: 19 articles



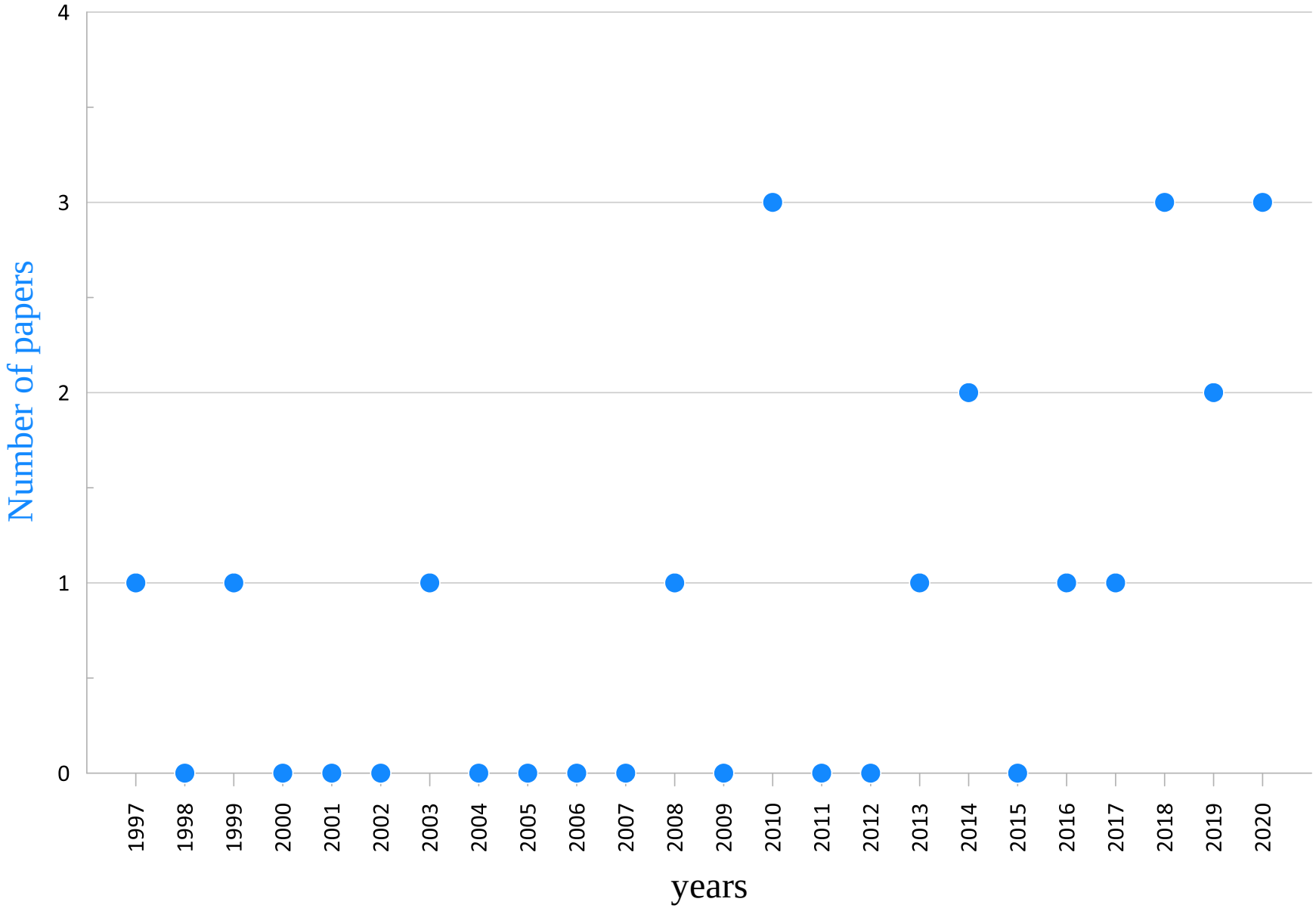
VOSviewer Visualizing scientific landscapes

Scopus

RESULTS

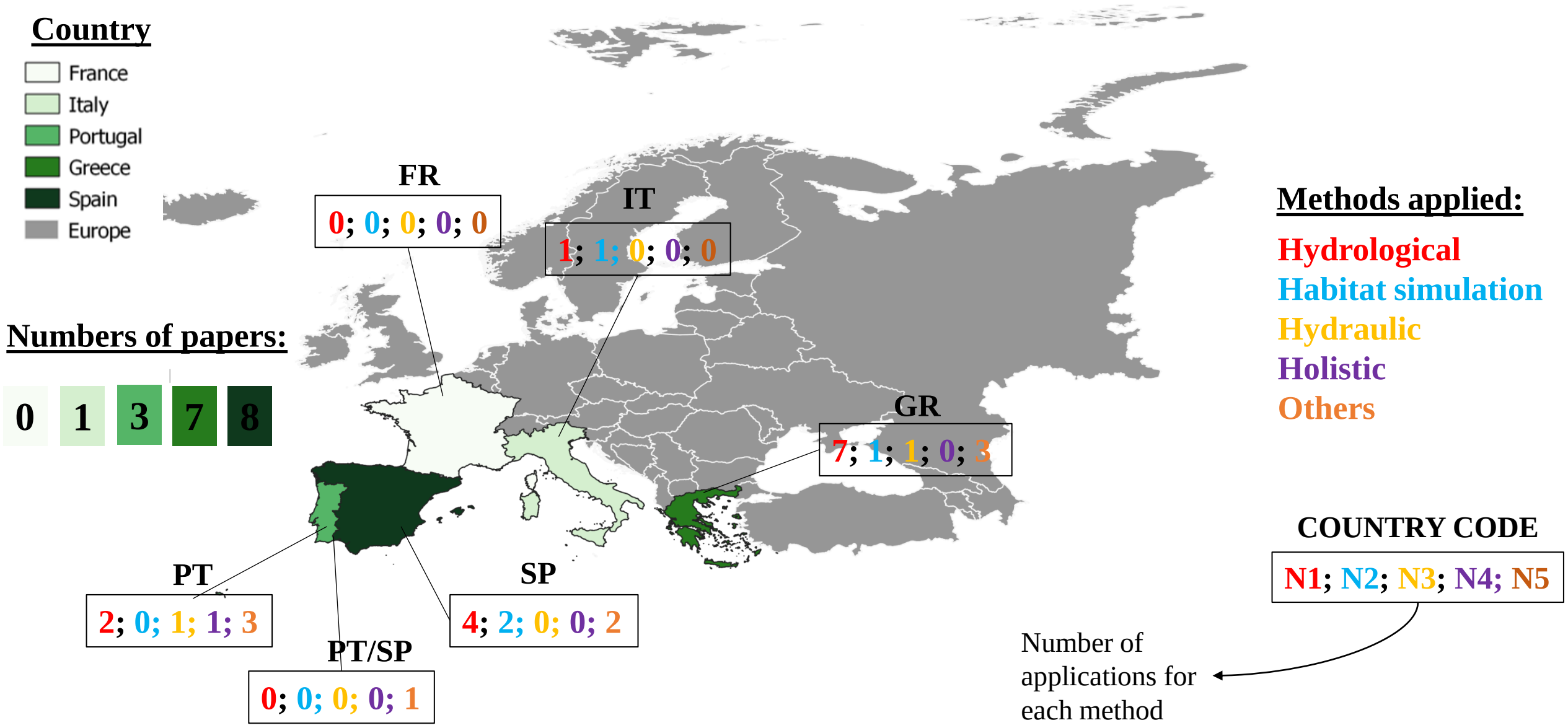
- Neither the WFD nor the CIS have differentiated **temporary rivers from perennial ones**.
- The CIS underlined the current **linguistic inhomogeneity** of the legislation of the Member States which refers to EF as "ecological flow" or "ecological minimum flow", "minimum accetable flow", "ecologically accetable flow", "common low flow", " minimum allowable flow "," minimum residual flow "," minimum balance discharge ".
- The CIS does **not define a standard protocol** for setting up an EFlow but it provides some recommendations.
- Most EU Member States have adopted EF methods based on statistical hydrological assessments (generally a minimum flow rate) **without considering runoff-ecology and runoff-morphology correlations** (Water Blueprint Strategy).
- The **national legislation** of all countries **has undergone changes** in line with the WFD.

TEMPORAL DISTRIBUTION - Number of papers and methods applied



The bibliographic search was carried out without a time limit. The first article found dates back to 1997. A greater number of papers occur in the first decade of 2000-2020.

GEOGRAPHICAL DISTRIBUTION- Number of papers and methods applied



RESULTS and FINAL CONCLUSIONS

- Increasing awareness concerning the Environmental Flows in EU Mediterranean countries.
- Evolution regarding Eflow in national legislations, *moving away from the more simplistic idea of a constant flow* that **does not include the ecological and biological** aspects connected to EFlows.
- Most of the national legislations **do not identified specific methods** for setting an Eflow in **temporary systems.**
- Several methods have been adopted according to **data availability**.
- In the Mediterranean environment with limited data availability (e.g. flow, hydraulic and ecological), **hydrological methods are the predominant approaches.**
- **A specific methodology to set the EFlow in temporary rivers is needed.**

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