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Making Sense of Interlinkages in EU Marine Environment Legislation: Unearthing Effectiveness

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Abstract

Crises such as water quality, pollution, climate change, overfishing, biodiversity, energy, waste, and carbon sequestration mean that legislation protecting the marine environment is under intense pressure to be effective and to demonstrate positive results in a vast array of public and private spheres. Thus far, scholarship of EU marine environmental law has been focused primarily on (i) interaction with international agreements (ii) spatial/jurisdictional studies (iii) analysis of new laws, plans and programmes (iv) principles (e.g. good environmental status, precautionary approach, polluter pays) (v) CJEU case analysis (vi) enforcement (vii) specific issues (plastics, litter…). However, over the years the mass constituted by the EU marine environment acquis has grown ever-larger, leading to risks of poor coordination, over-regulation in some areas and lack of regulation in others. By triangulating complementary investigatory methodologies, this study teases out systemic, diachronic and legilinguistic interlinkages—within and across key instruments as well as EU institutions, bodies and agencies. Our results provide avenues for policymakers nationally and at EU level to improve the legibility and coherence of marine environmental regulation—to the benefit of citizens and the wider body of stakeholders, and, ultimately, to benefit the marine world.

Keywords Marine environment law · Policy integration · EU law · Effectiveness

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1 Setting the Scene

1.1 The Marine Environment Crisis and Why Effective and Accessible Law is Crucial

Our seas and oceans now face a "ghoulish parade of nightmare environmental challenges" [1]. In this setting, multiple crises are the target and sometimes the result of ineffective policies and legislation on such matters as water quality, biodiversity, overfishing, pollution, waste, and somewhat more recently climate change, energy, and carbon sequestration.

Yet, "[t]he marine environment is an essential component of the global life-support system",[1] and it may never have been more urgent to protect it. This critical situation is not only a problem for politicians, as emphasised by the World Economic Forum in a report entitled "What Ocean Sustainability means for Business":

> A healthy ocean is the cornerstone of a thriving global economy. [2]

To address these crises, legislative and regulatory frameworks must be understandable, accessible, unambiguous, and precise to achieve the results, in terms of implementation and enforcement, that are so sorely needed. However, as noted by Scotford, the penetrability of environmental laws is not a given:

> For lawyers and legal scholars, legislation seems a known quantity – a relatively permanent, public expression of democratic processes in parliamentary democracies and of the rule of law. This 'knowable' character can however be misleading, particularly in the field of environmental law. [3]

A clear understanding of environmental law is a right of the public. A 2015 initiative, the Environmental Democracy Index, based on the United Nations Environment Programme's (UNEP) Bali Guidelines, evaluated 70 countries' progress in enacting national laws "to promote transparency, accountability, and citizen engagement in environmental decision making",[2] while in a joint 2016 handbook on access to justice, the European Union Agency for Fundamental Rights and the Council of Europe direct attention to European legislation on promoting environmental democracy in practice.[3]

From an extranational perspective, and even in many cases at national level, fragmentation of legislation, lack of systematisation, jurisdictional overlapping or underlapping and regulatory gaps all characterise laws of the seas and oceans [5]. Fundamentally, international cooperation between nations is flawed by competing interests, sovereignty [6], rights and responsibilities and property ownership [7, 8],

[1] https://www.unep.org/news-and-stories/story/marine-environment-essential-component-global-life-support-system-0.

[2] https://www.environmentaldemocracyindex.org/node/2728.html.

[3] Various provisions of the European Convention on Human Rights, ECtHR and CJEU case law, Regulation (EC) No 1367/2006 applying the Aarhus Convention, and several directives including Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information. [4], in particular Section 8.4.

as well as competing individual and group interests and rights, e.g., indigenous and community rights, fisheries, tourism, energy production, and shipping. The protection of the environment thus becomes one of a multiplicity of stakeholders with rival priorities—most taking a short-sighted view of the issues involved.

There are global policy-making and legislative drafting trends to improve the quality of regulation, driven by the OECD Regulatory Policy Division and regional initiatives such as the EU Better Regulation Policy. These trends are characterised by using regulatory impact assessment to ensure that the benefits of new regulations exceed the costs. Increasing importance is attached to public consultation in the formulation of policy and widespread efforts are visible to simplify administrative procedures to the extent possible. At the same time the opposite trend also exists—there has been significant growth in detailed and fine-grained regulation.

Two further factors are driving improvements in regulatory quality. First, the use of plain language.[4] Secondly, countries are paying more attention to the stock of legislation, repealing outdated laws and consolidating legal instruments that have been amended more than once.[5]

To summarise: there have been attempts at regulatory reform, then regulatory management, and now proactive regulatory policy agendas, with different countries at different stages in their journeys. This has taken place alongside changes in the socio-economic backdrop: to mitigate recession and address the challenges of globalisation and competitiveness, as well as an impetus for open government and administration simplification.

Of particular relevance to the marine environment sector is Caldwell's stance:

> Very rarely is a new legislative provision entirely free-standing ... it is part of a jigsaw puzzle ... in passing a new provision you are merely bringing one more piece and so you have to acknowledge that what you are about to do may affect some other bit of the massive statute book.[6]

1.2 Definitions of Legislative Effectiveness

"Effectiveness is now widely embraced as a measure of legislative quality by international and national lawmakers, and academic and professional drafters" [13]. At the same time, legislative effectiveness is held to be one of the vaguest terms in the legal lexicon.[7] Two overarching dimensions can be traced in its scope: first, to what extent institutions and courts create and wield the law effectively; and secondly the impact of the law in situ [16]. In other words the effectiveness of law can be measured in terms of its drafting and internal law-making procedures, and in terms of its application (reception, enforcement); or as Snyder puts it, the legal doctrine

[4] This is more visible in common law countries where drafting conventions adopt extremely precise terms, often in rigid and archaic language. It is less of a problem in civil law countries, where the convention is rather to draft using comprehensive general rules and principles.

[5] [9–11, see in particular Chapter 6].

[6] Edward Caldwell served as parliamentary draftsman in the UK for several decades. Quoted in [12].

[7] [14]. See also [15].

Fig. 1 Areas of effectiveness that are the focus of this study

of procedural or substantive effectiveness as against "implementation, enforcement, impact and compliance" [17]. Given the already broad scope of this study, we will not examine here the second dimension (application), or the principle of effectiveness as regards European Court of Justice case law, interpretation, and remedies, the authority of EU law over national law, means of enforcement, or how infringements and rights are handled [18]. Rather, we focus on effectiveness at various levels of EU policy and law-making, as illustrated by Fig. 1.

1.3 European Union Environment Legislation from 1973 Onwards

The European Union's initial approach to the environment was in response to specific issues: preserving the quality of the environment, protecting human health, and ensuring rational use of natural resources.[8] It then sought to take a more comprehensive approach, which led to the inclusion of environmental considerations in the Treaties of Maastricht and Amsterdam. However, exactly how this was to be

[8] Single European Act 1987, Article 25, *Official Journal* L 169/1.

achieved in practice was far less clear. The choice of regulatory tool has also had an influence: for example from fixing minimum standards through individual directives, to the rise of framework directives and increasing scope of legislation. In parallel to this has been enlargement with accession of new Member States, and thus the reach of the legislation in terms of numbers of countries regulated.

In a retrospective of general EU environmental policy over the last 50 years, Jordan, Gravey and Adelle [19] distinguish a number of phases in its development: (i) establishing and securing authority for the bloc, initial policy setting, and expansion; (ii) analyses of the fitness-for-purpose and impacts of the *acquis,* alongside refinements and updates; (iii) maturity alongside new packages (such as the Green Deal) aimed at a gear change, hastened by a leap in public awareness and activists' pressure.

A reminder of key milestones in EU internal environmental policy:[9]

- **1973** First Environment Action Programme adopted (subsequent Action Programmes followed in 1977, 1982, 1987, 1993, 2002, 2014, and 2021)
- **1990** European Environment Agency established
- **1993** Treaty of Maastricht makes the environment an official EU policy area
- **1999** Treaty of Amsterdam establishes a duty to integrate environmental protection into all EU sectoral policies
- **2001** First sustainable development strategy
- **2004** Environmental Liability Directive on prevention and remedying of environmental damage
- **2006** Aarhus Regulation towards access to justice in environmental matters
- **2009** Treaty of Lisbon makes combating climate change a specific goal
- **2011** First biodiversity strategy
- **2016** Communication on the integration of Sustainable Development Goals into policy
- **2020** European Green Deal.

Alongside these developments, the European bodies have, from the early days of the Communities, been committed to detailed reporting on work done and progress made. Since 1984, this includes annual reports by the European Commission on its monitoring of the application of EU law. The European Environment Agency was required, under its founding Regulation (EEC/1210/90), to "publish a report on the state of the environment every three years" (Article 2(vi)). The 1999 amendment of the Regulation extended this period to five years. To date there have been ten reports, some pre-dating the latter legislation,[10] and reference is made to following the approach adopted in OECD reports on the state of the environment, which consists of assessing each of the "components of the environment—air, water, soil,

[9] [20]. For the purposes of this study we do not delve into the EU's external role as signatory to international treaties and conventions on the marine environment.

[10] 1977, 1979, 1986, 1992, 1995, 1999, 2005, 2010, 2015, 2020.

etc.—and the agents responsible for triggering changes".[11] This somewhat siloed approach to the European Environment Agency reports can also be observed in terms of the legislation: individual directives and regulations are scattered across the various sections of the reports, and there is no analytical engagement with the environmental legislative landscape as a whole. As we will see in the following sections of this study, such compartmentalisation is a conspicuous feature of European marine environment law.

The 2022 OECD Recommendation on Reporting on the State of the Environment by member countries adds to previous advice the evaluation of the following: "policies, plans, actions and programmes that affect or are likely to affect the environment; and "environment policies themselves". The evaluation of environment policies and ensuing legislation per se has become an issue of concern at global level.[12]

1.4 The EU's Efforts to Monitor and Improve Legislative Effectiveness

"Les lois inutiles affaiblissent les lois nécessaires"[13] Montesquieu

In 2002, the European Commission embarked upon a "Better Regulation" agenda aimed at simplifying and improving EU legislation. In 2003, this was followed by the first Inter-Institutional Agreement on Better Law-Making[14] between the Commission, the Council and the Parliament. An Action Programme for "Reducing Administrative Burdens in the EU" was presented in 2007, with a "Smart Regulation" policy in 2010, when pilot evaluations, or '*fitness check*' initiatives, began in the environment policy area as part of the European Commission's 2010 Work Programme—and the specific area chosen for the pilot was freshwater policy. At the time of writing, the EU distinguishes evaluations from fitness checks as follows:

An evaluation assesses a specific EU law, policy or funding programme for:

- effectiveness (whether the EU action reached its objectives)
- efficiency (what are the costs and benefits)

[11] A Recommendation on Reporting on the State of the Environment (OECD/LEGAL/0170) was adopted by the OECD Council on 8 May 1979 on the proposal of the then Environment Committee. The Recommendation advises Adherents to improve environmental reporting, including state of the environment reports by member states. The Recommendation was abrogated on 10 June 2022 and replaced by OECD/LEGAL/0471 Recommendation of the Council on Environmental Information and Reporting.

[12] See also the United Nations Environment Programme, regarding which Handl notes as early as the Rio Declaration in 1992 a focus on "systematizing and restating existing normative expectations regarding the environment" [21, emphasis added].

[13] "useless laws weaken the necessary ones" (as translated and cited by the High Level Group on Administrative Burdens in its *Cutting Red Tape in Europe* report [22, 95].

[14] *Official Journal*, 31:12:03 (2003/C 321/01). Other more specific agreements had preceded it: Interinstitutional Agreement of 20 December 1994 Accelerated working method for official codification of legislative texts (OJ C 102 of 4.4.1996); Interinstitutional Agreement of 22 December 1998 on common guidelines for the quality of drafting of Community legislation (OJ C 73 of 17.3.1999); Interinstitutional Agreement of 28 November 2001 on a more structured use of the recasting technique for legal acts (OJ C 77 of 28.3.2002).

- relevance (whether it responds to stakeholders' needs)
- coherence (how well it works with other actions)
- EU added value (what are the benefits of acting at EU level)

> A fitness check is a type of evaluation that assesses several related actions. It focuses on identifying how different laws, policies and programmes interact, any inconsistencies or synergies, and their collective impact. (European Commission website[15])

In 2012, the Regulatory Fitness and Performance (REFIT) programme was established to "make EU law simpler and to reduce unnecessary costs of regulation while still achieving their objectives. […] All revisions of EU legislation are included under REFIT and aim to achieve burden reduction and simplification".

Although *impact assessment* has been deployed for decades to discern technical impacts on the environment,[16] more recently it has been used to inform policy-making and improve the quality of legislation. For the environment, this began as early as 2001 with Directive 2001/42/EC on "the assessment of the effects of certain plans and programmes on the environment".[17] Under the Inter-Institutional Agreement on Better Law-making of 2016,[18] the legislative quality aspect was reinforced: the "European Parliament and the Council, upon considering Commission legislative proposals, will take full account of the Commission's impact assessments", along with an undertaking to perform impact assessments before adopting any substantive amendments. Further earlier initiatives to be taken into consideration were listed in the recitals of the Resolution on the Agreement's interpretation and implementation.[19]

As of mid-2023, a Directorate for Impact Assessment and European Added Value, organised in five units, deals with various aspects of 'ex-ante or ex-post evaluation of EU legislation and policies, and scientific foresight'. A Regulatory Scrutiny Board (an independent body within the European Commission that advises the College of Commissioners) examines the quality of impact assessments, major evaluations and fitness checks.

Outside the EU institutions, bodies and agencies is the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), set up as an EU co-funded international non-profit association, which brings together environmental authorities from 37 countries and has an ongoing project to foster effective implementation and to assess legislation on practicability and enforceability.

Another external initiative, commissioned by the Dutch Ministry of Internal Affairs—the outward-facing and user-friendly Better Regulation Insight Tool

[15] https://commission.europa.eu/law/law-making-process/evaluating-and-improving-existing-laws/evaluating-laws_en.

[16] The first Environmental Impact Assessment Directive (85/337/EEC) came into force in 1985.

[17] Two key tools have been the Environmental Impact Assessment (EIA) and the Strategic Environmental Assessment (SEA).

[18] *Official Journal*, 2003/C 321/01.

[19] https://www.europarl.europa.eu/doceo/document/TA-8-2018-0225_EN.html.

(BRIGHT)[20]—takes a bottom-up approach. It is aimed at enabling stakeholders to bring EU regulatory bottlenecks to the attention of the European Commission and engage with the various structures, procedures and goals of the Better Regulation Agenda.

From a wider perspective, the emerging field of comparative legisprudence highlights another potentially productive avenue: looking *beyond* EU borders at best practice within other legal systems which could provide solutions hitherto overlooked [23].

1.5 Attempts by the EU to Address the Endemic Blight of Policy Silos and Policy Friction

In 2006, a review by the network of European Environment and Sustainable Development Advisory Councils of the application of impact assessment on Commission policies noted regarding the Directorate-Generals:

> mechanisms for cross-sectoral coordination tend to be seen as hurdles rather than opportunities [24, emphasis added]

The review went on to deplore that "[a] fundamental failing is the virtual disappearance of environmental policy integration" as an explicit objective [24].

Lack of coordination across the policy departments, the Directorate-Generals (DGs), has come to be described using the term 'policy silos'.[21] The Juncker Commission (2014–2019) sought to address this issue, to reform internal structures and improve horizontal coordination by means of cross-cutting policy areas. In a qualitative case study of these reforms manifested in a cross-DG project team in the circular economy policy area led by DG Environment, Chatzopoulou [26] examined interactions between six DGs[22] through in-depth interviews with officials. The findings showed that "the individual DGs demonstrated resistance and resilience to these reforms" [26, p. 545]. In parallel, the European Parliamentary committees and subcommittees are divided into subject areas, loosely resembling those of the DGs although not corresponding,[23] which are "responsible for preparing Parliament's positions, in particular on new legislative proposals" [27].

There do not appear to have been any institutional cross-cutting studies aimed at untangling EU marine environmental law across *all* the competence areas. A few efforts have been made focusing on a small number of specific laws. Examples of

[20] https://bright-tool.eu/.

[21] first coined by Ensor in 1988 in the context of corporate organisational structures [25].

[22] DG Environment (ENV), DG Agriculture and Rural Development (AGRI), DG Internal Market, Industry, Entrepreneurship and SMEs (GROW), DG Health and Food (SANTE), DG Regional and Urban Policy (REGIO); and DG Research and Innovation (RTD).

[23] For example, the Parliamentary committee "Environment, Public Health and Food Safety" contrasts with the Directorate-General Environment which, as at April 2023, was divided into the units named Circular Economy; Zero Pollution; Biodiversity; Compliance, Governance & Support to Member States; and Green Diplomacy & Multilateralism, as well as two administrative units.

fitness checks demonstrating a micro-level analysis of laws affecting the marine environment are listed below.

- The Fitness check of the Birds and Habitats Directives (2016),[24] under the heading "Effectiveness" notes that "[o]ther sectoral EU policies have sometimes competing objectives", and concludes that

  The evaluation has shown that the general objectives of the Directives have not yet been met and it is not possible to predict when they will be fully achieved since a very high proportion of species and habitat types protected under the Directive are still in an unfavourable conservation status, some of which are continuing to decline or remain endangered.
- The Maritime Transport Fitness Check (2018)[25] expresses specific concerns about the Reporting Formalities Directive and evokes data issues concerning the causal link between the implementation of all five directives under scrutiny and their actual impact on pollution prevention.
- The Fitness Check of the Water Framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive (2020),[26] concludes as follows:

  the main challenges for EU environment policy as: (i) a lack of ambition in the implementation of measures; (ii) a lack of targeted investment; and (iii) insufficient integration with other sectoral policies.
- Common Fisheries Policy—State of play (2023).[27] The stated aim of this so-called 'quasi fitness check'[28] is to "report on the functioning of the common fisheries policy (CFP)" and looks at "impacts of the triple environmental crisis (biodiversity loss, climate change and pollution) on fisheries and aquaculture management", acknowledges the current global triptych[29]; and "the new dynamics in fisheries management created by the withdrawal of the UK from the EU". At the time of writing it remains to be seen whether the report will address cross-sectoral integration and cooperation.

Whilst not a fitness check *stricto* sensu, an EEA report on the seas has highlighted the necessity "to coordinate implementation of the Common Fisheries Policy and Habitats Directive with other activities such as aggregate extraction or offshore wind farms" [28].

Further reporting is provided by the European Court of Auditors under TFEU Art. 287(4). In 2014 it carried out an audit to answer the question "Have the EU's

[24] SWD (2016) 472 final, dated 16.12.2016.

[25] Legislation on flag State responsibilities, accident investigation, port State control, the vessel traffic monitoring and information system and, the reporting formalities for ships arriving in and/or departing from ports of Member States.

[26] SWD (2019) 439 final, publication date 2 April 2020.

[27] SWD (2023) 103 final/2.

[28] https://agenceurope.eu/en/bulletin/article/13075/7.

[29] Impacts of the COVID-19 pandemic, high energy prices of energy, and disruptions in trade flows due to the geopolitical context.

water policy objectives been successfully integrated into the CAP?", where 'water policy' includes river basins, water courses, water bodies, ground waters, coastal waters and seas, in particular relating to nutrient and pollutant run-off. At the time the audit found that integration was only partial, "due to a mismatch between the ambition of the policy objectives and the instruments used to effect change" [29].

In 2020, the European Court of Auditors reported on whether the EU framework addressing the main pressures on marine biodiversity and habitats was well designed and applied in practice, and also examined the use of EU funds. The audit was entitled "*Marine environment: EU protection is wide but not deep*" [30]. The concise and clear findings presented are telling, and include:

- Regulatory tools linking the EU's marine biodiversity policy with its CFP did not work well in practice
- EU protection rules have not led to the recovery of significant marine ecosystems and habitats
- Numerous EU actions have not reduced overfishing in the Mediterranean
- The EU tools for tackling fishing overcapacity are not closely aligned with regional needs and environmental impacts
- EU marine protected areas provide limited protection in practice
- A small share of EU funding is used to support marine conservation.

On a more positive note, a 2022 report outside the fitness check framework, in the form of a European Commission Communication,[30] outlines progress made in implementing the Maritime Spatial Planning Directive, establishing national maritime spatial plans, and progress made in implementing an ecosystem-based approach. Unlike many of the micro-level reports listed above, the Communication seems to make real efforts to interlink its findings regarding the Directive with other EU initiatives. These include the Integrated Maritime Policy, the European Green Deal, the INSPIRE Directive, and a Sustainable Blue Economy. Examples of best practice in various Member States are provided, referring to links with integrated coastal management, strategic environmental assessment, the Marine Strategy Framework Directive, the Water Framework Directive, Nitrates legislation, renewable energies, and fisheries, as well as funded projects from research and innovation (e.g. Horizon 2020), higher education (Erasmus+), regional cooperation (e.g. Interreg), capacity development, cross-border cooperation (European Maritime and Fisheries Fund) and cooperation with non-EU countries.

A high-level hearing of the European Economic and Social Committee on 27th February 2023 entitled 'Time for a Blue Deal' was held to address its view that "the current EU policy framework [on water] is not fit for purpose", and that the objectives of EU "legal frameworks for the protection and management of our freshwater and marine resources" […] "have not been reached, largely due to insufficient

[30] Report from the Commission to the European Parliament and the Council outlining the progress made in implementing Directive 2014/89/EU establishing a framework for maritime spatial planning (COM/2022/185 final).

funding, slow implementation and lack of integration of environmental objectives in sectoral policies" [31].

One of the clearest and most comprehensive policy and legislative overviews, at once cross-sectoral and sector-specific, has been provided at the behest of five European "multilateral financial institutions[31] which launched an initiative entitled "European Principles for the Environment" (EPE) with the aim of applying EU principles, practices and standards on the environment to all projects financed by the signatory institutions, and promoting "best EU practice in the fields of environmental management, transparency, public consultation and reporting". The "Sourcebook on EU Environmental Law" [32] covers a wide body of legislation on key themes:

- Environmental Impact Assessment
- Disclosure of Environmental Information and Public Participation
- Environmental Liability
- Integrated Pollution Prevention and Control—Permitting Requirements
- Industrial Risk Prevention and Management; Environmental Management Systems
- Management of Chemicals
- Waste Prevention and Management
- Noise Prevention and Management
- Energy Efficiency
- Air Quality and Climate Change
- Surface Water Quality
- Soil and Groundwater Protection
- Nature Protection.

The Sourcebook examines obligations and requirements under the various legislative instruments for the following economic sectors: energy; metals production and processing; chemicals, waste management, extractives, agriculture, food processing, infrastructure, and healthcare. It is regrettable that such an approach, cross-referencing environmental and sectoral themes, has not been taken internally by the bodies of the EU to cataloguing and systematising policy instruments, for all stakeholders.

1.6 The Scholarly Perspective: Limited Investigation of Policy Integration and Coherence

In the last few decades, the literature on EU marine environmental law, a burgeoning academic discipline, may be grouped into several main themes:

[31] Council of Europe Bank, European Bank for Reconstruction and Development, European Investment Bank, Nordic Environment Finance Corporation, and Nordic Investment Bank.

- **interaction with international conventions and laws**, such as UNCLOS, MARPOL, Convention on Biological Diversity, Bern Convention, OSPAR, Kyoto Protocol, UN Sustainable Development Goals
- **spatio-geographical** and **jurisdictional** studies
- the analysis of **new laws, policies, plans and programmes** as they are adopted (e.g. specific directives and regulations, action plans, funding and research programmes)
- **principles** (e.g., good environmental status, precautionary approach, polluter pays)
- **European Court of Justice case analysis**[32]
- **enforcement** (e.g., cooperation, conflict of jurisdictions, specific crimes)
- **specific issues/threats** e.g., marine litter [34], phosphorus [35], plastics, seabed integrity, individual species, deep-sea mining, energy production.

Alongside the above thematic studies, scholars have studied interactions between marine environment-related laws and policies, in a body of work that is large but bounded within limited combinations of laws. The following provide an illustration only. At the behest of the Irish Environmental Protection Agency, Sheate and Bennett examined, in the context of river basins in Ireland, interlinkages between the Water Framework Directive and the Environmental Impact Assessment Directive, the Strategic Environmental Assessment Directive, the Public Participation Directive, the Birds Directive and the Habitats Directive [36]. Again from a marine spatial planning perspective, the tensions and weak links between environmental legislation, legislation on marine renewable energy, fisheries regulations and the Integrated Maritime Policy were examined by Qiu and Jones [37]. In 2019, Appleby and Harrison examined the tensions between the Common Fisheries Policy and the Habitats Directive, in the context of Brexit [38].

In sum, as noted in previous sections for institutional initiatives, micro-level analysis prevails, and cross-cutting approaches are in the minority. In order to focus on the need for effectiveness requiring highly integrated laws and policies, we turn to the literature on "policy coherence" (how policies relate to one another), also referred as "consistency".[33] This may be horizontal (different policy areas), vertical (EU/Member States) or internal (within a single policy domain). Thus far, the weight of scholarly studies on policy coherence bears upon the policy areas of development and foreign/external relations, and few studies take a cross-domain view. Indeed the "operationalization and measurement of policy coherence and consistency is understudied at best and highly controversial at worst" [39, 40].

[32] See also [33].

[33] See in particular the consistency assessments evoked in Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'). *OJ* L 243, 9.7.2021, pp. 1–17. On the interchangeability of the terms "policy coherence" and "policy consistency" see https://www.ecologic.eu/sites/default/files/publication/2023/50095-Policy-consistency-EUCL-implementation-web.pdf.

1.7 Why Mapping of EU Marine Environment Legislation is Essential

As we have seen in the foregoing sections, EU marine environment legislation has been built up over the last 50 years principally by a number of rather separate and siloed policy departments—the Directorate-Generals. We posit that the body of legislation, like the multiple environmental emergencies it seeks to tackle, even fits the description of a 'wicked problem':

> inter-related dilemmas, issues, and other problems at multiple levels [of] society, economy, and governance. These interconnections—systems of systems—make Wicked Problems so resilient to analysis and to resolution.[34]

To recap, features of the body of legislation are (i) difficult to penetrate and discern interlinkages, fragmented, not systematised; (ii) competing jurisdictions, policy departments, interests, rights and responsibilities; (iii) interaction with external legislation and measures.[35]

Moreover, as framed by Ackoff, "no problem ever exists in complete isolation. Every problem interacts with other problems and is therefore part of a set of interrelated problems, a system of problems… I choose to call such a system a mess".[36]

European efforts at marine management have been described by Cavallo et al. as "Bottlenecks, showstoppers and train-wrecks", referring, in the particular case of the Marine Strategy Framework Directive,[37] "to the resistance of 20 countries to collaborate and to the inability to integrate the work already carried out under 21 other pieces of legislation" [45]. The latter scenario is a familiar one to commentators on the effectiveness of EU law, and all the more so marine law.[38]

Whilst acknowledging moves in the last two decades towards more holistic legislative efforts, Boyes and Elliott deprecate a lack of coordination in the plethora of laws:

> "more than 200 pieces of legislation that have direct repercussions for marine environmental policy and management. Over five decades, measures have aimed to protect the marine environment by tackling the impact of human activities, but maritime affairs have been dealt with by separate sectoral policies without fully integrating all relevant sectors" [48].

This is echoed by Carvalho et al.: "[t]he need for better policy integration is not new but achieving this has clearly been problematic", and these authors further discuss

[34] Wicked problems, as first coined in [41]: readers unfamiliar with the concept of a 'wicked problem' should note that the definition does not refer to 'evil' but rather to malignance, or "'vicious' (like a circle)", "tricky" or "aggressive", and also difficult to 'tame'. In the same vein, on governance issues as a Gordian knot see [42].
http://www.strategykinetics.com/files/New_Tools_For_Resolving_Wicked_Problems.pdf.

[35] e.g. such as OECD recommendations, United Nations measures (UNEP, COP, SDGs, UNCLOS), International Maritime Organization, International Energy Agency, etc.

[36] [43]. See also [44].

[37] Directive 2008/56/EC, *Official Journal* L 164/19.

[38] e.g. [46, 47].

the "challenges, gaps and opportunities for monitoring and assessment, management measures and policy and governance" which require a "long-term perspective" [49].

Enhanced coordination between governance bodies is advocated by Calado et al. [50], looking at marine sustainability policy in the North Atlantic, who point out "numerous agencies having competencies for different issues"; and evoke "varied and non-comprehensive or limited mandates"; mismatches in "political and jurisdictional borders and delineations" ill-adapted to maritime activities and ecosystems; considerable differences in the national environmental governance systems of countries bordering the same marine region; as well as temporal mismatches between "authorities, countries, institutions, and organisations".[39]

Lastly, mapping of policy and legislation has a value well beyond scholarly study. Penetrability, legibility, understandability, and transparency are essential for the multiplicity of stakeholders engaging in conservation and protection of the marine environment: the general public, coastal and river basin communities, fishers, anglers, farmers, shipping, aquaculture, tourism operators, the military, renewable energy promoters… not mention institutions themselves.

2 Mapping Interlinkages: Triangulation of Approaches

The European legislative and regulatory landscape is a shifting mosaic. Any analysis is complex and quickly outdated. One of our aims in this study, therefore, is to offer a set of methodological tools which may serve in the future to analyse a body of potentially interlinked laws in a given area, and which could equally be used to examine other policy areas and/or other geopolitical arenas.

Given the tangled and at the same time fragmented nature of the marine environment *acquis*, triangulation of multiple qualitative methods is one way of adding rigour, richness and depth [54–56] to our quest to discern interlinkages and hunt for effectiveness. Despite sceptics of methodological pluralism adopting certain epistemological stances, or pointing to its labour-intensive nature, or to discordance where 'one' 'right' answer is required, [57] we consider, simply put, that several lenses can shine light on dark corners. In particular, we do not place methods in competition and rather seek to reap dividends from their complementarity. In short, we envisage our approach as the diffident leveraging of several lines of enquiry to gain insights into a complex and dense kernel.

We have thus elected to triangulate several approaches as a way of teasing out potential gaps and linkages. Five have been determined, to be discussed in the following sections:

- the taxonomical approach adopted by the EU itself to assess sustainable initiatives[40] (2.2)

[39] See also [51–53].

[40] Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment.

Instrument	Instrument in force	Type of instrument	Acronym if any	Date of latest in force
Biodiversity Strategy	COM/2020/380	NBLI (COM)		2020
Birds Directive	2009/147/EC	D		2009
CMO Regulation	1379/2013	R		2013
Common Fisheries Policy	1380/2013	R	CFP	2013
Environmental Impact Assessment Directive	2014/52/EU	D	EIA	2014
Environmental Liability Directive	2004/35/CE	D		2004
European Maritime and Fisheries Fund Regulation	508/2014	R	EMFF	2014
European Maritime Fisheries and Aquaculture Fund Regulation	2021/1139	R	EMFAF	2021
Fisheries Control Regulation	1224/2009	R		2009
Floods Directive	2007/60/EC	D		2007
Habitats Directive	92/43/EEC	D		1992
Industrial Emissions Directive (recast IPCC)	2010/75/EU	D	IED	2010
Integrated Coastal Zone Management Recommendation	2002/413/EC	NBLI (REC)	ICZM	2002
Integrated Maritime Policy	COM(2007)574	NBLI (COM)	IMP	2007
Invasive Alien Species Regulation	1143/2014	R		2014
Marine Spatial Planning Directive	2014/89/EU	D	MSP	2014
Marine Strategy Framework Directive	2008/56/EC	D	MSFD	2008
Offshore Renewable Energy Strategy	COM/2020/741	NBLI (COM)		2020
Offshore Safety Directive	2013/30/EU	D	OSD	2013
Port Reception Facilities (Waste from Ships) Directive	2019/883	D		2019
Registration, Evaluation, Authorization, and Restriction of Chemicals Regulation	1907/2006	R	REACH	2006
Renewable Energy Directive	2018/2001	D		2018
Seveso III Directive	2012/18/EU	D	SEVESO	2012
Ship Recycling Regulation	1257/2013	R		2013
Single-Use Plastics Directive	2019/904	R		2019
Strategic Environmental Assessment Directive	2001/42/EC	D	SEA	2001
Urban Wastewater Treatment Directive (under revision)	91/271/EEC	D		1991
Vessel Traffic Monitoring & Information System Directive	2002/59/EC	D	VTMIS	2002
Water Framework Directive	2000/60/EC	D	WFD	2000

Fig. 2 EU instruments included in our marine environment corpus

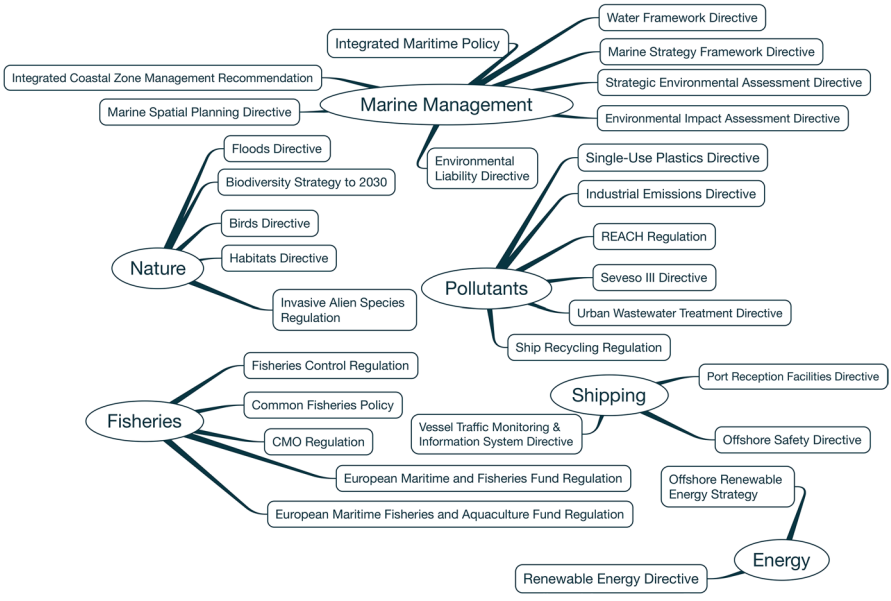


Fig. 3 Interlinkages between themes of the corpus

- a systems-based approach focused on interactions and siloing (2.3)
- a diachronic approach focused on process monitoring (2.4)
- governance of and at sub-EU levels (2.5)
- a legilinguistic enquiry to ascertain whether certain key terms are effectively/consistently employed (2.6).

2.1 Legal Instruments Selected as Object of Study

To provide a basis for comparison, we apply the five approaches to the same cross-section of legislation and policy instruments, chosen by the authors as a representation, at the time of writing, of the key regulations, directives, policies and strategies that influence the marine environment.[41] It is important to emphasise once again, however, that seas, oceans and estuaries are affected by legislation in a very wide range of areas, some of which are not always perceived to be directly connected (e.g., product packaging, pharmaceuticals, noise, etc.). Moreover, the cross-section is a snapshot at one point in time, and does not seek to be exhaustive. We offer a high-level tranche, and thus have not included related/derived legislation on, for example, implementation, enforcement or transposition. Lastly, the instruments have been chosen by the authors as a result of extensive participation in the management of marine activities and arise from a form of participatory action research [58].

Figure 2 lists the 29 instruments included in alphabetical order, using a short form of titles in their English language version. In the remainder of the study, we will refer to our cross section of instruments as a 'corpus' (a body of texts). We treat the sample, a subset of EU law in a specific domain, as a source of empirical data to which our five lenses can be applied.

Figure 3 shows the same instruments as a thematic map, through which we performed a cross-check regarding coverage by the corpus of the key pillars of marine environment policy.

2.2 A Preliminary Overview: How Sustainable are EU Marine Environment Instruments? Assessing Legislative Sustainability Using Taxonomy Regulation Criteria

To establish criteria for assessing whether activities qualify as environmentally sustainable, the so-called "Taxonomy Regulation"[42] was enacted in 2020. Six criteria ("environmental objectives") were laid down: (a) climate change mitigation[43]; (b) climate change adaptation[44]; (c) the sustainable use and protection of water and marine

[41] The latter is defined by the European Environment Agency's glossary as comprising "estuaries, coastal marine and nearshore zones, and open-ocean-deep-sea regions" (https://www.eea.europa.eu/help/glossary/eea-glossary/marine-environment.

[42] Regulation (EU) 2020/852, *Official Journal* L 198/13. See also https://ec.europa.eu/sustainable-finance-taxonomy/home.

[43] https://www.eea.europa.eu/help/faq/what-is-the-difference-between.

[44] https://www.eea.europa.eu/help/faq/what-is-the-difference-between.

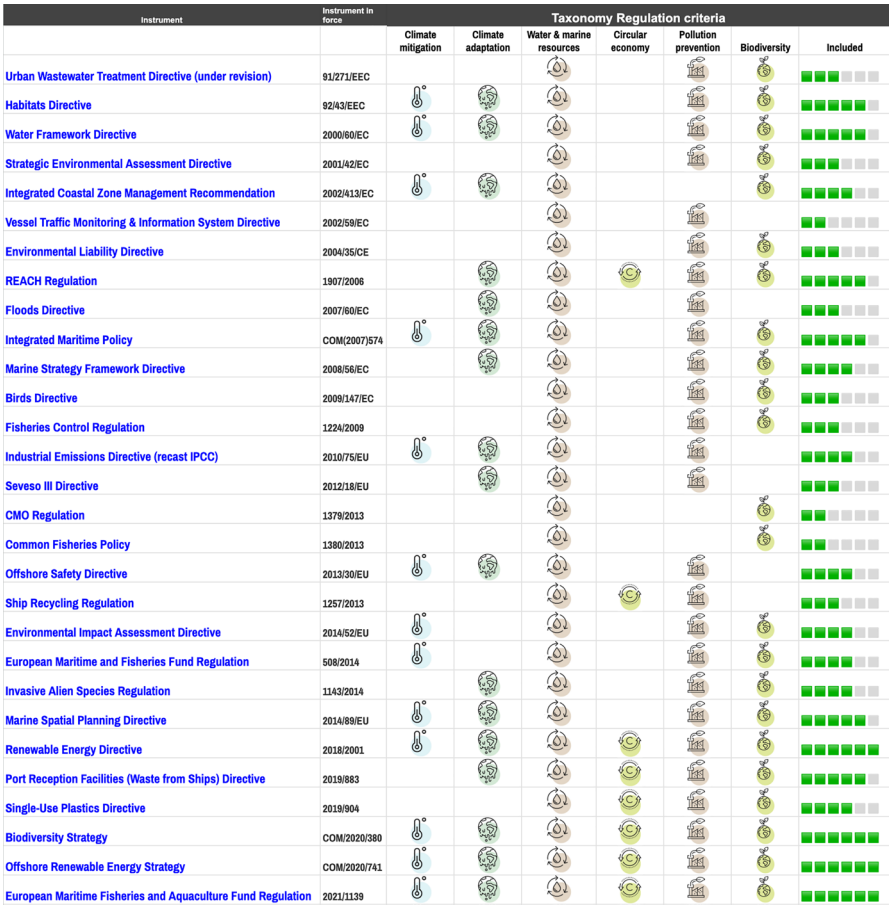


Fig. 4 Using the environmental sustainability Taxonomy to assess the corpus of marine environment instruments

resources; (d) the transition to a circular economy; (e) pollution prevention and control; (f) the protection and restoration of biodiversity and ecosystems. In addition, the Taxonomy Regulation sets out overarching conditions that an economic activity must meet: make a substantial contribution to at least one environmental objective; do no significant harm to any of the other five environmental objectives; comply with minimum safeguards; and comply with certain technical screening criteria.

Whereas the initial application of the Taxonomy has been the financial sector, we propose to adopt this framework as a helpful broad-brush tool for a preliminary assessment of the sustainability of our corpus of marine environment legislation. Two aims of the taxonomy tool seem particularly relevant: to assist with fragmentation of the legislative landscape; and to shift effort to where it is most needed [59].

Our investigative method for this overview, given that the textual data is held in electronic form, involved both close and distant reading [60]. Figure 4 shows which

criteria the various instruments cite. The right-hand column summarises the extent to which all criteria are addressed in each piece of legislation. It is important to point out that our assessment relates to the *objectives* of laws and policies, and not to levels of achievement of those objectives. We include only objectives specifically cited, directly to be inferred,[45] or subsequently interpreted by CJEU case law. The instruments are arranged in chronological order, and it can be seen from this overview that certain environmental concerns have come to the fore over time (especially the circular economy), and that broadly speaking more of the criteria are being cited in recent years. However, it also transpires that several of the older instruments have been targeting multiple criteria for some considerable time, and that the legislator's efforts with regard to the whole suite of sustainability criteria may be more long-standing than is generally perceived.

2.3 Systems Approach: Interlinkages Within the EU Institutions

From a systems perspective regarding the marine environment, the European Union is highly complex and interconnected [61] in terms of governance structures: vis-à-vis supranational entities [62]; with and between a now considerable number of Member States [63]; with and between European institutions, bodies and agencies; through public–private partnerships; and, lest we forget, with its citizens.[46] Added to this complexity is the management of the geophysical and oceanographic features of the marine environment—ecosystems that do not heed bureaucratic or political boundaries [47]. Many of the relationships across these various systems and subsystems are governed by laws. The extent to which these interlinkages are effective (with the overarching aim of marine environment protection) at one of these levels—that of the European institutions—is the subject of this section.

2.3.1 Limited Interactions of Parliamentary Committees

The Legislative Observatory database was created in 1994 "as a tool to monitor the EU's institutional decision-making process", and its stated focus is "the European Parliament's role".[47] In particular, the database includes "procedure files" with information about key players (Parliamentary committees, Council configurations, Directorate-Generals, Council of the European Union, European Economic and Social Committee), and key events in chronological order (proposals, debates, readings, decisions, publication of acts, etc.). Interestingly, a survey carried out in 2013 showed that of the 30,000 monthly visitors, only 3% were academics, and only 3% from NGOs.[48] The majority of users were within the European institutions themselves.

[45] Where relevant, we have used non-institutional sources to verify such inferences—such as academic work and judicial resources—as well as EU institutions' explanatory notes.

[46] A new Horizon Europe project consortium, 'PERMAGOV' aims to improve the performance of EU marine governance: https://www.permagov.eu/.

[47] https://oeil.secure.europarl.europa.eu/oeil/home/home.do.

[48] https://oeil.secure.europarl.europa.eu/oeil/extdoc.do?id=1&l=en.

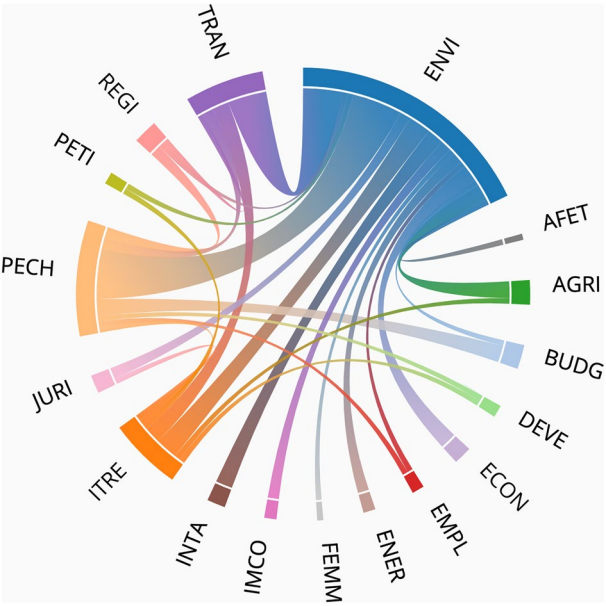


Fig. 5 Interlinkages between Parliamentary Committees for our corpus of legislation

Building upon the sub-system involvement findings in Candel and Biesbrock 2018, we used the Legislative Observatory to examine to what extent the Parliamentary committees had interacted with each other, for all of the instruments in our corpus. The "lead committees" in the parliamentary process for the corpus were ENVI (Environment, Public Health and Food Safety) for 15 instruments, PECH (Fisheries) for 5 instruments, TRAN (Transport and Tourism) for 4 instruments, and ITRE (Industry, Research and Energy) for 3 instruments.

The results are presented in Fig. 5 using a chord diagram[49] to enable interlinkages to be highlighted. It indicates a relative lack of interactions between the committees.[50] Moreover, the "key players" section of the database records numerous occasions on which several committees "decided not to give an opinion". This was the case for 20 out of the 29 instruments in our corpus, and on many occasions, between two and five committees contacted to give an opinion declined to do so.

[49] http://www.datasmith.org/2018/06/02/a-bold-chord-diagram-generator/, ©Copyright 2023 Ben Peterson. See also [64].

[50] The committees LIBE (Civil Liberties, Justice and Home Affairs) and CULT (Culture and Education) were not involved in the procedures for our corpus of instruments at all.

List of European Parliament Committees (official titles and acronyms, as at 7 November 2023, ordered as per the European Parliament website): AFET (Foreign Affairs), DROI (Human Rights), SEDE (Security and Defence), DEVE (Development), INTA (International Trade), BUDG (Budgets), CONT (Budgetary Control), ECON (Economic and Monetary Affairs), FISC (Tax Matters), EMPL (Employment and Social Affairs), ENVI (Environment, Public Health and Food Safety), SANT (Public Health), ITRE (Industry, Research and Energy), IMCO (Internal Market and Consumer Protection), TRAN (Transport and Tourism).

The Registration, Evaluation, Authorization, and Restriction of Chemicals Regulation stands out by contrast, with nine Parliamentary committees giving opinions and none declining.

2.3.2 Siloing at the Directorate-Generals

As discussed in Sect. 1.5, a lack of interaction between the Directorate-Generals (DGs)—seen in the present discussion as subsystems—has been identified as an important issue and addressed by European Commission reforms, albeit meeting with some resistance [26]. The failure of DGs to interact effectively towards cross-cutting goals has been described as 'siloing' and even as 'turf wars' [65]. It is worth noting that despite a large body of EU institutional reports and scholarly literature on siloing, an interesting complementary perspective has been put forward by Vantaggiato et al., who maintain that a focus should be placed on individuals within DGs rather than on the units themselves: "individuals interact, not entire departments" [66]; and a further parameter we offer that may destabilise silos is the restructuring of DGs over time (e.g. DG GROW, DG MOVE, DG RTD, DG INTPA). Siloed behaviour is not restricted to the marine space. Inspired by an overview of DG policy areas relating to the sea offered by Ounanian et al. [46], we present below an updated mapping of DGs and policy ambits, focusing particularly on potential interactions. With regard to Sect. 2.3.1, it is worth pointing out the fact that the remits of DGs do not map on to those of the Parliamentary Committees.

Collectively, in 2018, the Directorate-Generals (DGs)[51] reported monitoring around 5600 laws of which approximately a quarter were directives, a third regulations and the rest other legal acts [67]. The DGs *separately* monitor aspects of the marine environment, the potential intersections of which the reader will readily grasp: DG ENV (high-level environmental protection and preserving EU citizens' quality of life); DG AGRI (agriculture and rural development, as well as all aspects of the common agricultural policy, where we can take as an example run-off into watercourses and seas), DG CLIM (effects of climate change, including rising sea levels), DG MARE (maritime affairs and fisheries, including sustainable use of ocean resources, stimulating a sustainable blue economy and fostering coastal communities), DG ENER (energy, including a clean energy transition for more than 2200 inhabited European islands), DG MOVE (mobility and transport, including maritime transport emissions), and DG REGIO (sustainable development).

[51] List of Directorate-Generals (official titles and acronyms, as at 28 April 2024, ordered as per the European Commission website, excluding executive agencies and internal support services): AGRI (Agriculture and Rural Development), BUDG (Budget), CLIMA (Climate Action), COMM (Communication), Connect (Communications Networks, Content and Technology), COMP (Competition), DEFIS (Defence Industry and Space), DIGIT (Digital Services), ECFIN (Economic and Financial Affairs), EAC (Education, Youth, Sport and Culture), EMPL (Employment, Social Affairs and Inclusion), ENER (Energy), ENV (Environment), ECHO (European Civil Protection and Humanitarian Aid Operations), SANTE (Health and Food Safety), GROW (Internal Market, Industry, Entrepreneurship and SMEs), JUST (Justice and Consumers), MARE (Maritime Affairs and Fisheries), MOVE (Mobility and Transport), REGIO (Regional and Urban Policy), RTD (Research and Innovation), TAXUD (Taxation and Customs Union), TRADE (Trade).

Fig. 6 Representation of marine-related policy ambits of European Commission Directorate-Generals

Notwithstanding the preceding list, when considering which European policy areas are relevant to the marine environment, and given the latter's vital and all-encompassing nature, we might be better inspired to ask which policy areas are not! Fig. 6 above depicts the DG policy areas (silos) and key relevant responsibilities, where the DGs whose responsibilities align most closely with the seas and oceans are closest to the centre of the diagram, and those whose responsibilities are less closely aligned are shown further from the centre.

The implicit difficulty with siloisation is that some form of seniority develops between the silos; attempts at inter-DG working almost inevitably lead to a particular DG being in ultimate control of a given task. This is exacerbated in areas where a DG has exclusive competence, resulting in anomalies, such as the application to environmental regulation across member states but with very weak adoption into the DG MARE's Common Fisheries Policy. Similarly, to advise on "matters pertaining to the conservation and management of living marine resources, including biological, economic, environmental, social and technical considerations", the Common Fisheries Policy creates its own advisory committee, STECF, whereas all these skills are more closely associated with other DGs. Ultimately this leads to a silo within a silo in the crucial area of technical advice.

2.3.3 Leveraging Technologies to Locate Interlinkages Between Legal Instruments

In the field of legislation, there is a growing focus on the need to improve interoperability (better exchange and use of information) and cooperation, and the need to

enhance transparency, in particular by leveraging digital solutions. Such approaches fall within the realm described by the umbrella terms 'e-government and 'e-governance' [68]. Legal interoperability has been defined in the European Interoperability Framework (EIF)[52] and aims to ensure that organisations operating under different legal frameworks, policies and strategies are able to work together, including across jurisdictions. Enhanced transparency, on the other hand, could improve access to and legibility of the interlinkages that are the object of this study.

The European Legislation Identifier (ELI) initiative, taken jointly by EU countries and institutions,[53] is a system to make legislation available online in a standardised format, so that it can be accessed, exchanged and reused across borders, meeting interoperability criteria and promoting transparency. In particular, ELI is aimed at "better-quality, more reliable legislation data", designed to "improve the quality and reliability of legal information online through the use of persistent identifiers and structured metadata", and a common ontology.[54] Semantic web technologies link and express legislation data in such a way that separate pieces of information attain contextual meaning and have logical relationships (which can be inherently complex) understandable by computers and humans.

ELI practices now underpin EUR-Lex, the official online gateway to EU law (available in all of the EU's 24 official languages, updated daily) and the entry point to the *Official Journal*.[55] Under the current configuration of the portal, legal instruments are available individually by browsing themes or direct searches. Once an individual instrument has been reached, there are links to other language versions of the same instrument (in table format) and where existing to consolidated/previous versions that have been repealed (using textual hyperlinks). Three experimental features for EUR-Lex are being deployed at the time of writing, and one of these is the visualisation of document relationships. It displays a dynamic graph with relations between the act and related documents. It is currently only available for legal acts. A screenshot is shown in Fig. 7, although the static nature of the figure does not reflect the responsive behaviour of the actual electronic tool which adjusts as the user hovers over different nodes.

The visualisation seems promising to enable deeper penetration by all stakeholders into the body of legislation and reveal interlinkages between legal basis, proposals, consolidated versions and recasts, cited legislation and CJEU case law, as well as amending, modifying and correcting acts. However, the tool would be considerably

[52] https://ec.europa.eu/isa2/sites/default/files/eif_brochure_final.pdf; see also the Joinup project (https://joinup.ec.europa.eu/collection/joinup/about).

[53] Council Conclusions of 6 November 2017 on the European Legislation Identifier (2017/C 441/05).

[54] https://eur-lex.europa.eu/eli-register/about.html See as best practices of ELI implementation the electronic Irish Statute Book (eISB) https://www.irishstatutebook.ie/; Serbian official gazettes http://www.pravno-informacioni-sistem.rs/; Luxembourg official gazette *Legilux* https://legilux.public.lu/ and https://eur-lex.europa.eu/content/eli-register/success_story2.html.

[55] The EUR-Lex portal is run by the Publications Office of the European Union, and has around 4 million visitors each month, with over 168 million pages viewed over 10 months in 2023 As at October 2023, source https://eur-lex.europa.eu/statistics/usage.html Since October 2023, acts have been published individually and daily, as opposed to being grouped into collections as *Official Journal* editions—a legacy of print publishing.

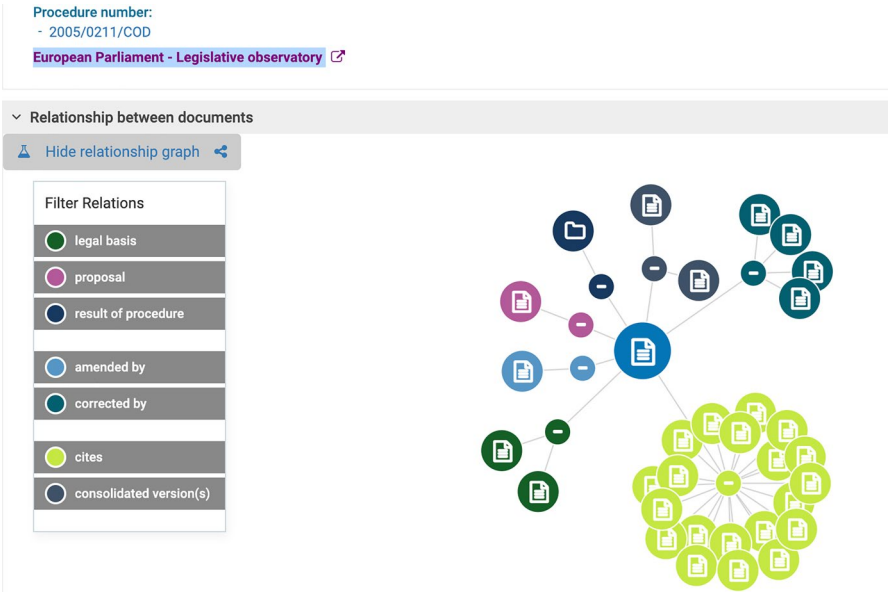


Fig. 7 Screenshot of a beta visualisation feature of EUR-Lex

improved by showing succinct names/labels for documents and folders—at present, the user has to click on and open an item to ascertain what it is.

The above beta feature (Fig. 7) is a manifestation of a 'Legal Knowledge Graph'[56]—a graphic representation of connected pieces of legislation (as nodes). Legal Knowledge Graphs bring together structured and unstructured data—and one of their key benefits is to dismantle data silos. They can optimise the discoverability of data. The EU project Lynx (Legal Knowledge Graph for Multilingual Compliance Services),[57] embraced directives, regulations, national legislation, legal terms, legal entities, case law, industry standards, and different public and private publishers, in different jurisdictions and different languages. Whilst being a pilot limited in scope, the Lynx project concluded with positive prospects—notably the interlinking of legislation. Depending on needs, Legal Knowledge Graphs can allow users to consult a body of legislation with a wide variety of focuses: such as on a claimant/defendant, a court, a locality, or a date, as well as relationships within legislation such as citation, implementing or derogating laws, corrigenda and repealed versions of existing laws [69–71]. In addition to consultation, bespoke extractions (such as terminology in a branch of law) from a corpus of legislation are possible, and the

[56] Knowledge Graphs are one of the main development thrusts behind Google's search technology (https://www.youtube.com/watch?v=mmQl6VGvX-c&t=164s-) and behind artificial intelligence applications (https://www.infoworld.com/article/3707814/how-knowledge-graphs-improve-generative-ai.html). Their importance is hard to overstate: https://www.forbes.com/sites/forbestechcouncil/2021/09/20/you-need-to-be-thinking-in-knowledge-graphs/?sh=41b35bfe7abf.

[57] https://lynx-project.eu/.

Legal Knowledge Graph principle can powerfully enable legal document management (e.g. cross-organisational contract management or court filings, in real time).

2.4 Time and Pace: Diachronic Insights into EU Marine Environment Instruments

Given the extent of the EU *acquis* in the domain of the marine environment, and the time over which it has developed—more than 50 years—the adoption of a diachronic[58] approach to our corpus seemed appropriate. The diachronic approach to law focuses in particular on changes over time within and beyond the forum, the impacts of time on law and its effectiveness, the pace of the legislative process, as well as legilinguistic evolutions.

Many theories of statutory interpretation assume the law forms a "consistent, coherent and complete whole" [73] but do not take into account the dynamic nature of legislative and judicial activity over time. When carrying out a diachronic analysis of a field of law, we need to accommodate the dynamism of law in which lawmakers change tack, revise and refresh their output based on several factors: changes in priorities/urgencies, new knowledge, new issues, changes in society, attempts at clarification or simplification, or obsolescence—and, in the case of the European Union, based on ongoing evaluations and fitness checks, now set out in the form of the '*Better Regulation Toolbox*' [74]. As noted by Borghetto and Giuliani, the "pace" of law-making may be valued by policymakers and citizens, and perceived temporal effectiveness or lack thereof may even be politicised [75].

2.4.1 From Proposal to Published Act: The Slowing Influence of Dissension?

To realise a diachronic analysis of the law-making process for our corpus, we used the European Parliament's Legislative Observatory database (see also 2.1), and collected temporal data from the procedure file for each text.[59] Figure 8 positions each instrument[60] (acronyms as per Fig. 2) according to its year of enactment on a timeline from 2000 to 2023 (x-axis). The size of the bubble (y-axis, expressed in number of days) indicates the time spent on the legislative process. The periods required to pass the Water Framework Directive (WFD) (4 years, 9 months and 19 days) and the Strategic Environmental Assessment Directive (4 years, 7 months and 18 days) are particularly significant. The main bones of contention as regards the WFD were listed by the Conciliation Committee as (i) legal enforceability, (ii) hazardous substances, (iii) protection of groundwater, (iv) water pricing. For the

[58] By diachronic (δια-/dia/through, χρόνος/chronic/time) we refer to the Saussurean definition of "the two available temporal axes for the analysis of language" (and by extension legal language), synchronic and diachronic, which Buchanan asserts "can logically be extended to encompass virtually all forms of human activity" [72].

[59] Full details of the process, including summaries of conciliation committees where applicable, debates in Council (with all associated documents), plenary readings, debates in Parliament (and associated documents) voting, details of amendments, etc., can be consulted within the Legislative Observatory tool.

[60] The Birds Directive (1979) and the Habitats Directive (1992) were excluded because no information is available regarding the duration of the Parliamentary procedure at that time.

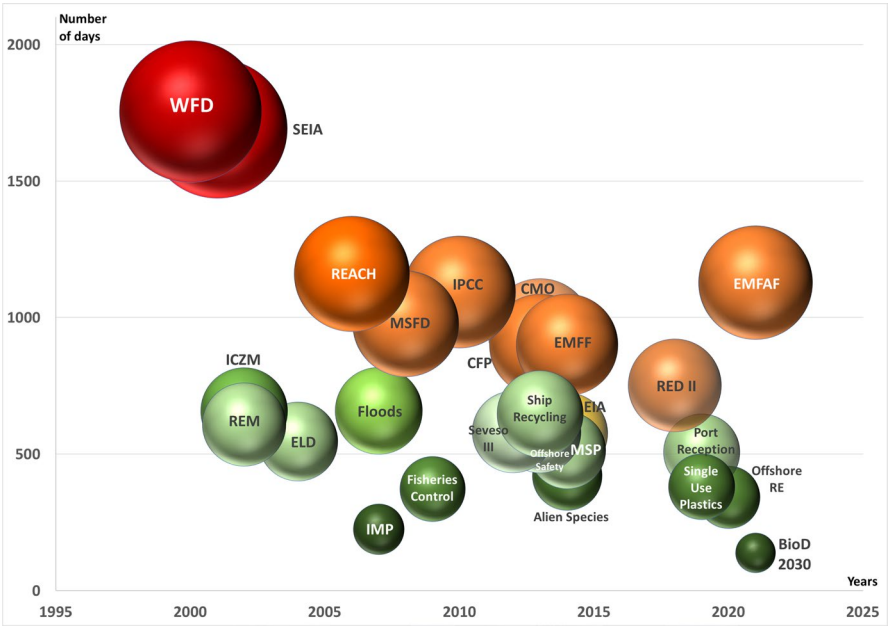


Fig. 8 Time spent on the legislative process for each instrument

Strategic Environmental Assessment Directive, the Conciliation Committee noted that key points in reaching agreement were: (i) monitoring adverse effects and remedial action; (ii) Structural Funds; (iii) transboundary exchanges with third countries; (iv) public consultation including NGOs. The conciliation procedure is opened if the Council cannot accept all the amendments adopted by Parliament at second reading. It consists of negotiations between the two co-legislators (Council and Parliament) in the framework of the Conciliation Committee, which must be convened within a maximum of two months of the Council's second reading. The Conciliation Committee has then another six to eight weeks to reach an overall agreement in the form of a joint text.[61]

At the other end of the time spectrum are the Biodiversity Strategy 2030 at only 4 months and 17 days from Committee referral in 2021 to the end of the procedure in Parliament, and the Fisheries Control Regulation in 1 year and 7 days. Strategies and policies in our corpus are mainly to be found at the shorter end of the time spectrum, at less than one year, apart from the Common Fisheries Policy (CFP) which took two and a half years, and it is debatable whether it achieved substantive change.[62] Interestingly there seems to be no discernible difference in our corpus between the amount of time required in the parliamentary process for regulations as

[61] https://www.europarl.europa.eu/olp/en/conciliation/overview

[62] [76], and [77] which finds "EU decision-making remains siloed" and "Opaque decision-making hampers progress" as two of eight implementation issues with the 2013 CFP.

opposed to directives, despite regulations being perceived by some (e.g. sovereigntists) to be more contentious [78].

We can hypothesise several reasons for the trend of reduction in parliamentary time frames visible in Fig. 8: (i) the effects of the Regulatory Fitness and Performance (REFIT) programme, along with other 'better law-making' initiatives; (ii) the most significant measures having now been passed and become part of the *acquis* (e.g., CFP, WFD, Habitats & Birds Directives, MSFD); (iii) it is less palatable nowadays to voice disagreement publicly on the importance of the marine environment and there may thus be a tendency to put forward fewer obstacles (or even compete to outperform other States on ocean conservation); (iv) the removal of a relatively significant source of dissension following Brexit; (v) increased use of strategies and policies to pave the way for legislation and address dissension earlier in the process; (vi) many issues with existing legislation have been settled or clarified by the European Court of Justice. Set against these are factors that could increase time frames, such as enlargement (more parties to the debates); political/diplomatic pressures (current examples of which have been renewable energy goals, ESG reporting, the Nature Restoration Law, and carbon market reforms). A larger dataset would enable wider and more quantitative conclusions to be drawn.

2.4.2 Keeping EU Marine Environment Law Fresh: Consolidations, Codification and Recasts

In this section we have tracked back, using the EUR-Lex platform, to compare the number and frequency (if any) of consolidations, codifications and recasts.[63] As noted by Donelan, an international expert advisor in legislative assessment and management, in legal systems "[r]enovation is as important as innovation", and he further emphasises the importance of "managing the stock of legislation" to achieve credibility, coherence and effectiveness for the benefit of all citizens and stakeholders [80, also 9–11].

As a reminder, the following definitions have been extracted and summarised (with our emphasis) from the website of the European Commission's Legal Service[64]:

> *Consolidation* means combining in a single text the provisions of a basic instrument and all subsequent amendments. Consolidation corresponds to a purely declaratory, unofficial simplification of the legislation. This is a purely clarification-oriented exercise.
> *Codification* brings together a legislative act and all its amendments in a single new act. The new act replaces the acts being codified.

[63] Corrigenda have been excluded for our purposes here, and we do not include specific language consolidations outside the main working languages. In order to remain within the scope of this study, given the intricacy of the task, we have also excluded acts related to those in our corpus in terms of their thrust. For an understanding of such intricacy even as regards a single Directive, see [79].

[64] https://ec.europa.eu/dgs/legal_service/consolida_en.htm; https://ec.europa.eu/dgs/legal_service/codifica_en.htm; https://ec.europa.eu/dgs/legal_service/recasting_en.htm.

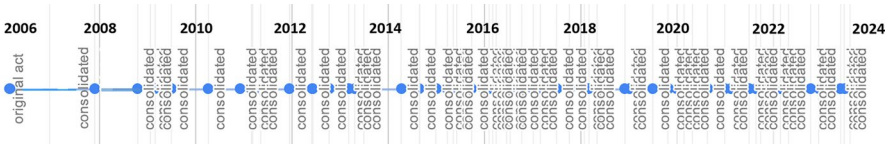


Fig. 9 Frequency and pace of REACH Regulation consolidations 2006–2024

> *Recasting* brings together in a single new act a legislative act and all the amendments made to it. Unlike codification, recasting involves new substantive changes, as amendments are made to the original act during preparation of the recast text.

Let us focus first on the frequency and pace of consolidation for our corpus of instruments.[65] As can be seen in Fig. 9, the REACH Regulation has been the subject of many consolidations (60 in all, at the time of writing). REACH has been described as "one of the most controversial pieces of legislation in EU history" and "a perfect storm" [81] and was also significant in terms of time spent at the Parliamentary stage (see 3.1).

At the other end of the spectrum are: the Floods Directive, Strategic Environment Assessment Directive, Marine Spatial Planning Directive and Single-Use Plastics Directive with *no* consolidations to date, and the Marine Strategy Framework Directive, Ship Recycling Directive, Offshore Safety Directive, and Invasive Alien Species Directive with only one consolidation. With from three to seven consolidations are: the Water Framework Directive, Habitats Directive, Vessel Traffic Monitoring Directive, Environmental Liability Directive, Fisheries Control Regulation, and the CMO Regulation. It is important to note that consolidation can cover both substantive amendments and the application of blanket legislation—in the case of the Water Framework Directive, for example, the former relate to monitoring, injections/discharges into water and priority substances, and the latter to Mayotte's status as an outermost region.

We note here that codification, consolidation and recasting of legislation can overlook intrinsic dysfunctions to the legislation itself. For instance the various iterations of the Common Fisheries Policy have failed consistently to grasp problems associated with 'relative stability' and the poor faith around fishing on the UK's and Ireland's accession.[66] The Birds and Habitats Directives, on the other hand, fail to embrace widely advocated 'whole site' approaches to marine protected areas, and are instead based on annexes of specific features and species [83]. Another example is the Water Framework Directive which falls short on the persistent and "wicked"

[65] We have excluded from this consolidation analysis those directives which form part of a 'chain' (Seveso, renewable energy, environmental impact assessment), or 'pair' (recast or other form of update) with a previous legislative instrument(s) (e.g., industrial emissions, maritime fisheries fund, waste from ships). As elsewhere in this study, we also exclude corrigenda and different language versions.

[66] See [82]. The primary failings of the Common Fisheries Policy can even be considered as a cause for Brexit, as the EU's management of fisheries was used extensively by the 'Leave' campaign.

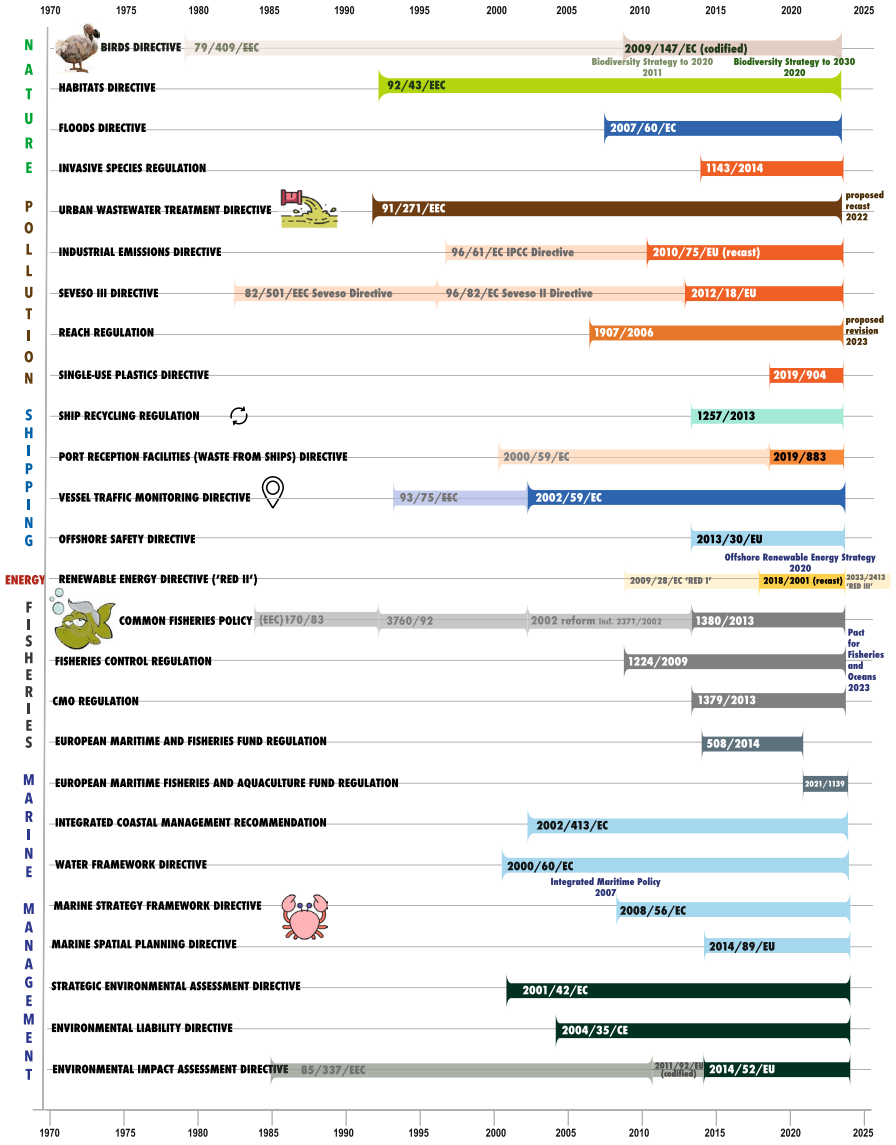


Fig. 10 Thematic view of our corpus of legislation over time

problem of diffuse pollution [84]. With older legislation, failures to revisit base assumptions come at some cost.

In Fig. 10 we provide a thematic overview of our corpus of legislation and developments over time, including recasts and codifications of directives and regulations, together with policy and strategy instruments. Earlier, closely related instruments are shown in fainter colour and type on a given timeline. The furthest date to the left is that of the original act. Dates used are those of the act as published in the *Official*

Journal, and not its entry into force. Among those sets of instruments stretching over the longest period, it can be seen that several have been the subject of multiple updates (Birds Directive, Seveso Directives, Commons Fisheries Policy, Environment Impact Assessment Directives) whereas the Urban Wastewater Treatment Directive (dating from 1991) is currently the subject of a proposed recast. Only the Habitats Directive has not been recast or codified since adoption in 1992.

The Renewable Energy Directives have been updated in relatively close succession, which may be explained by the hastening public and political interest in this field, as well as rapid technological developments. For example, one of the aims of the latest version 'RED III', in addition to new and more ambitious sustainability targets, is to tackle urgently the biodiversity impacts and forestry loss caused by damaging use of biomass energy.

Several of the instruments in our corpus are likely to be affected by the Pact for Fisheries and Oceans 2023, a package of measures[67] covering, *inter alia*, the energy transition of fisheries and aquaculture, restoration of marine ecosystems, fisheries control, and the future common fisheries policy. It is worth clarifying that despite its name, the Pact focuses on fisheries and has only passing references to marine management rather than being an ocean policy per se. It will also be interesting to see what impact the proposed Blue Deal may have, particularly with regard to its expressed aim to tackle the "lack of integration of environmental objectives in sectoral policies" [31].

2.4.3 Increasing Transparency of Legislative Process and Effectiveness Monitoring for Forthcoming Initiatives

To improve transparency with a diachronic focus (how easy or difficult it is to see how the many laws enacted over time are interconnected) and thereby effectiveness, technology can provide previously unattainable solutions. As noted in an in-depth study of how legislation operates in practice, carried out by an appeal court judge, drafter of legislation and treaties, and policy adviser, the aim of which is to "improve the quality and effectiveness of legislation":

> All too often, the policy is lost sight of as we scramble through the complex maze of interlocking (and overlapping) provisions.
> We have barely begun to tap the potential for technology to improve access to information about legislation, and to make it easier (faster, simpler, cheaper – all things that technology is good at) for the relevant audiences for a law to understand that law and comply with it, or benefit from it. And also, of course, for agencies to implement that law effectively, efficiently and in a way that is consistent with the law's policy goals [85].

[67] Presented in February 2023: A Communication on the Energy Transition of the EU Fisheries and Aquaculture sector; an Action Plan to protect and restore marine ecosystems for sustainable and resilient fisheries; a Communication on the common fisheries policy today and tomorrow and a Report on the Common Market Organisation for fishery and aquaculture products. https://ec.europa.eu/commission/presscorner/detail/en/ip_23_828.

In 2016, the European Commission (EC) launched a digital visualisation tool called the 'Legislative Train Schedule', which provides the public with a process overview, "using trains, carriages and railways as a metaphor".[68] The tool is relatively user-friendly, with pop-up explanations, and includes a wealth of linked information. Carriages represent the chronological progress of each measure, with 'signal' colours to highlight hold-ups and blockages, and trains represent EC Priorities (such as the Green Deal), European Parliament (EP) Committees (such as Fisheries), and (Sub-)Packages (such as Waste). Screenshots are provided at the end of this section as Fig. 11a, b.

The tool makes it possible for interlinkages to be unearthed. Entering a term into the Legislative Train Schedule search box returns a list of legislative (and non-legislative) measures across different Priorities and Committees.[69] In the case of "marine", at the time of writing 34 results were returned, filterable into eight European Commission Priorities:

from the current Commission.

i. Green Deal;
ii. Europe for the Digital Age;
iii. Stronger Europe in the World;
iv. Promoting our European Way of Life;

and, from the previous Commission

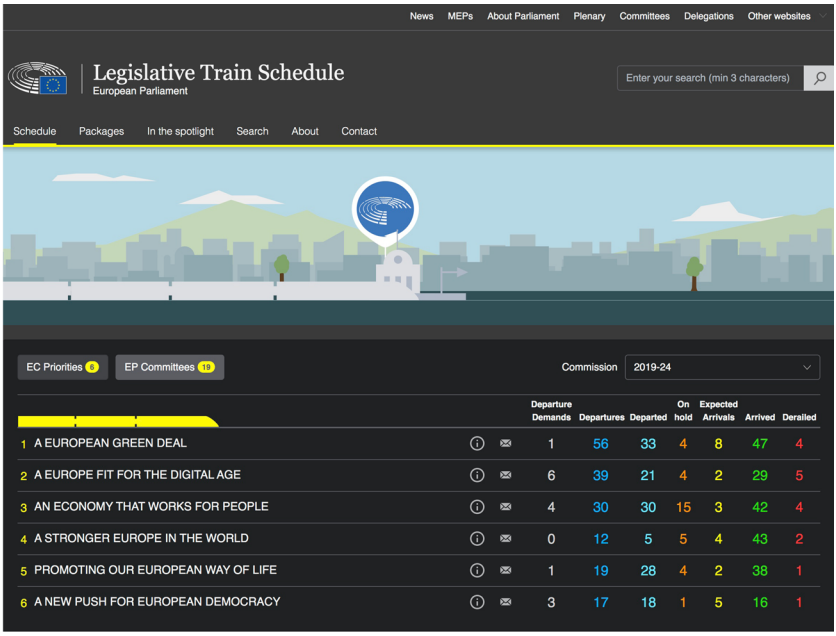
xxii. New Boost for Jobs, Growth and Investment;
xxiii. Resilient Energy Union with a Climate Change Policy;
xxiv. Justice and Fundamental Rights; and
xxv. European as a stronger global actor.

The five Parliamentary Committees behind the same results were: PECH, ENVI, TRAN, ITRE, and DEVE. The term "maritime" on the other hand returned 66 results, led by 12 Committees (in descending order of numbers of results): TRAN, PECH, ENVI, REGI, ITRE, AFET, INTA, BUDG, ECON, DEVE, CONT, LIBE; relating to 13 Priorities. In addition to Committees and Priorities, searches can also be filtered by status (announced, tabled, blocked, close to adoption, adopted/completed, withdrawn) and by package of measures.

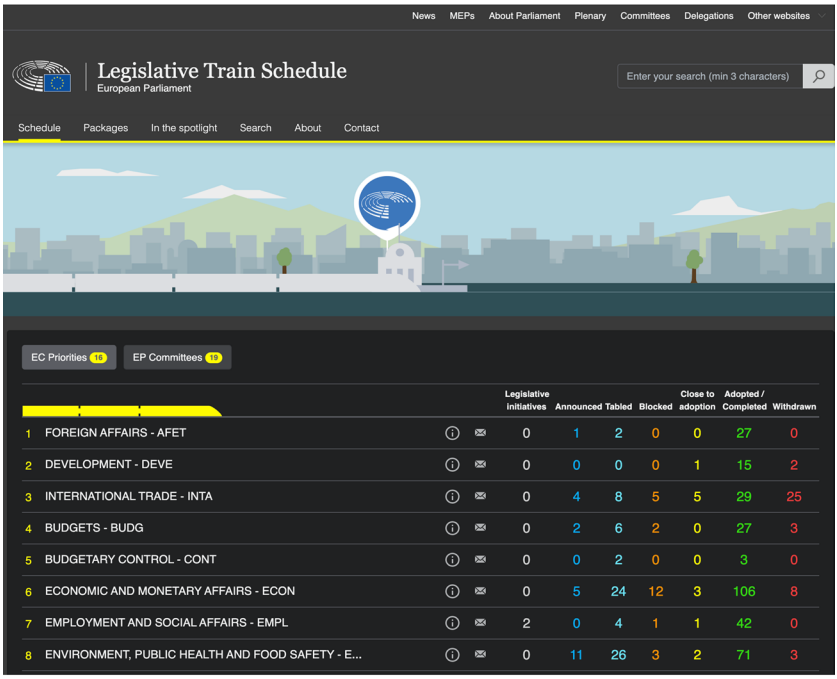
Given the complexity of the interlinkages under discussion in this study, the tool offers complementary insights and ways of exploring legislation. However, to

[68] https://www.europarl.europa.eu/legislative-train/ Two legislative periods are available at time of writing: 2014–2019, and 2019–2024.

[69] List of European Parliament Committees (official titles and acronyms, as at 7 November 2023, ordered as per the European Parliament website): AFET (Foreign Affairs), DROI (Human Rights), SEDE (Security and Defence), DEVE (Development), INTA (International Trade), BUDG (Budgets), CONT (Budgetary Control), ECON (Economic and Monetary Affairs), FISC (Tax Matters), EMPL (Employment and Social Affairs), ENVI (Environment, Public Health and Food Safety), SANT (Public Health), ITRE (Industry, Research and Energy), IMCO (Internal Market and Consumer Protection), TRAN (Transport and Tourism).



a - European Parliament Legislative Train Schedule (EC Priorities)



b - European Parliament Legislative Train Schedule (EP Committees)

Fig. 11 **a** European Parliament Legislative Train Schedule (EC Priorities). **b** European Parliament Legislative Train Schedule (EP Committees)

afford richer benefits and increase 'discoverability', it could usefully be integrated, for example, with the EUR-Lex data and technologies (see 2.3) and the Legislative Observatory (see 2.1) as well as other tools offered across the europa.eu website and elsewhere by the Bodies of the European Union.

2.5 Effectiveness as *sub*-EU Application of Instruments

One of the most contentious threads running through the relationship between the European Union as a collective polity and individual Member States concerns the occasions on which its legislation applies directly at sub-EU level, either through EU regulations, or through 'direct effect' [86]. States' sensitivity in this regard varies: Bellamy contrasts "state sovereigntists" with "suprastate federalist sovereigntists" [87, 88].[70] The former group can be exemplified in the extreme by the United Kingdom—leading to its withdrawal from the Union.[71] Another example of friction between these two positions came to a head in July 2023 in the shape of the Nature Restoration Law—the first environmental Regulation in 30 years to target degraded natural areas which came close to being rejected amidst dramatic political turmoil [90].

Notwithstanding the binding nature of EU law, the level of discretion afforded to Member States (or alternatively the level of 'coercion' exacted by the EU) can vary across acts and instruments: e.g., from a small margin of discretion in the Habitats Directive, to a moderate level in the Renewable Energy Directive, to a wider margin in the Common Fisheries Policy. This provides leeway for some of the many potential gaps through which marine environmental protection can slip.

In a landscape review of 2018, the European Court of Auditors found that "the Commission faces a complex legal landscape at EU and Member State level", and moreover that several factors "make overseeing the application of EU law a challenging activity":

- the size of the body of law to be monitored and the complexity of many legal instruments;
- the specificities of policy areas; and
- certain features of Member States' legislative and oversight arrangements, including the length of the legislative procedure, transposition preferences and administrative capacity [67].

[70] The European Council on Foreign Relations has established a "European Sovereignty Index" which "scores EU member states on their contributions" in six terrains: "climate, defence, economy, health, migration, and technology", where the "climate" terrain reflects "how far countries have progressed in their green transition […] and how much they contribute to EU leadership in the global green transition" [89]. Unfortunately, the marine environment has not been included as a terrain at this stage.

[71] The UK's Retained EU Law (Revocation and Reform) Act 2023 came into force at the end of 2023, and in particular lists the EU legislation, rights, liabilities, powers and principles that are to be revoked or retained.

2.5.1 The EU's National and Local Oversight Mapping Tools: Opaque, Uneven and Unreliable

For each piece of legislation requiring transposition, the EUR-Lex official portal enables an at-a-glance comparison of transposition measures to be made between the Member States. The "National Transposition" tab is updated weekly and shows which countries have failed to transpose the piece of legislation in question. It is important to note, however, that information supplied comes from Member States' own reporting:

> The member states bear sole responsibility for all information on this site provided by them on the transposition of EU law into national law. This does not, however, prejudice the results of the verification by the Commission of the completeness and correctness of the transposition of EU law into national law as formally notified to it by the member states.[72]

We tested the EUR-Lex portal for one of the instruments in our corpus using random sampling. In the case of the codified Birds Directive (2009/147/EC), 87 measures are listed for Denmark compared with only one in Finland, while Belgium, Bulgaria, Estonia, Hungary, Italy, Luxembourg, Malta, Portugal, and Sweden are, at the time of writing, listed as having no transposition measures, while Germany "does not consider the transposition necessary". That information appears, however, to be inaccurate, in the light of a joint NGO report of 2018 comparing transposition in 18 Member States [91]. The very fact that a report by NGOs was required, as opposed to reporting by the EU bodies themselves, speaks volumes about transposition scrutiny, and it further notes that "while the majority of the Member States assessed (67%) have fully incorporated the Birds and Habitat Directives into national law, they have failed to implement them properly".

Particularly as compared with other policy areas, we contend that the area of marine environment legislation is severely under-monitored. By contrast, the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) makes public the "Single Market Scoreboard", a laudable tool covering 1018 directives and 6224 regulations to ensure the functioning of the single market, with a transposition deadline on or before 30 November 2022.[73] A map clearly shows Member States' performance across all transposition indicators as well as succinct and readily understandable summaries for each indicator, and for transposition deficits and delays.

Somewhat less comprehensive, focused on the local monitoring and implementation of EU strategies, the "Urban Data Platform Plus" offered by the Directorate-General for Regional and Urban Policy (DG REGIO) provides public access to information on the status and trends of cities and regions and the local dimension of Sustainable Development Goals. Dashboards enable users to gain access to indicators on socio-economic and environmental aspects for land use and emissions.

[72] https://eur-lex.europa.eu/collection/n-law/mne.html.

[73] https://single-market-scoreboard.ec.europa.eu/enforcement-tools/transposition_en.

Regrettably, although one of the indicators is SDG 14 "Life below water", the only data in that section are CO_2 emissions, and overall the platform does not yet engage meaningfully with marine environment issues.

To unearth non-transposition action brought by the European Commission against Member States, an advanced search for "failure to fulfil obligations" (the basic search does not cover such failures) can be made using the EUR-Lex portal in its Court of Justice of the European Union case-law section. However, the available search criteria are not propitious—users must select from the EuroVoc thesaurus by navigating a complex series of nested themes, and given the fact, as already discussed at length, that marine environment issues may occur across a large number of themes, results are unlikely to bear fruit, and certainly not highlight interlinkages between action themes.

Another option is to search the Court's own online case-law service (InfoCuria), by selecting "action for a declaration of failure to fulfil obligations", but relevant subject-matter search criteria are limited to broad headings with sub-menus, and even a modicum of information about case grounds can only be obtained by multiple clicks and then speed-reading the whole judgment—no summaries are provided. Although far from satisfactory, the EUR-Lex portal entry point does at least require less work by the user to arrive at a relevant judgment.

2.5.2 Cascades of Governance Below National Level—From Regional to Grassroots

Below the national level in individual Member States, the governance of EU marine environment legislation is as fragmented as the legislation itself, and has been described as multi-actor, multi-sector and multi-layered.[74] To foreground and unpick water governance diversity, a conceptual framework with visual representation ("cascades of governance") has been developed by Rowbottom et al., comparing implementation of the Water Framework Directive and four related directives in nine Member States and focusing on "sticking points" of three types: institutional ("pre-existing policy, legislation and plans"); cognitive ("existing organisational processes and ways of working" including siloing); and political ("pre-existing power relations" and the defence of "existing interests and benefits") [93]. The visual representation (Fig. 12) speaks for itself, and shows with great clarity the divergent arrangements in the nine Member States studied, including top-down/bottom-up approaches, degrees of centralisation, intermediate layers of governance, extent of stakeholder involvement, and legacy effects.

Outside the EU, and this time in the area of fisheries, a governance tool has been developed to enable stakeholders (described as 'managing agencies, environmental organisations, funders/investors') to evaluate fisheries management against sustainability goals. The Fisheries Governance Tool (FGT) was based on a review of existing evaluation and assessment schemes, and "is designed upon the premise that the most comprehensive and revealing measure of performance can be found at the intersection of three components: (1) laws and policies governing fisheries,

[74] https://www.permagov.eu/project; [53, 92].

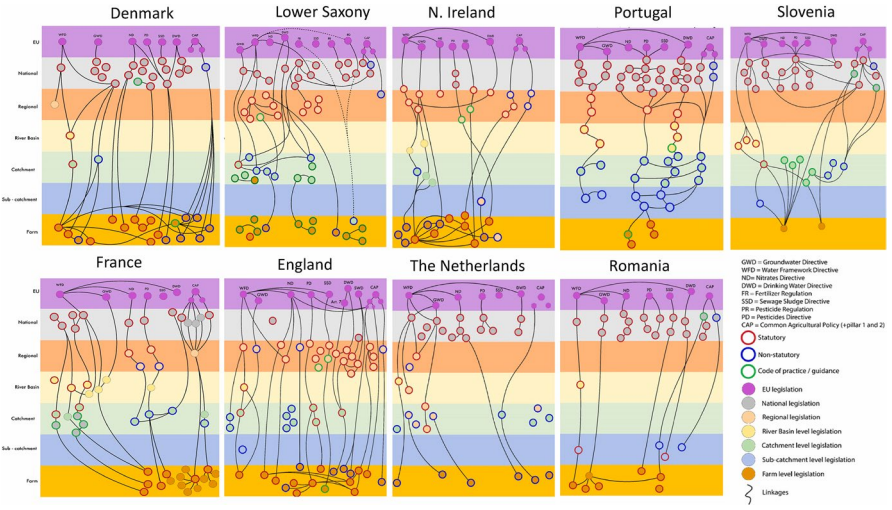


Fig. 12 The cascades of governance tool developed by Rowbottom et al. [93]

(2) capacity to implement those policies, and (3) function and performance of the fisheries themselves".[75] The tool draws from FAO guidelines and OECD reviews of fisheries policies. Funded by a philanthropic foundation and available for public download, in English, Spanish and Indonesian Bahasa, the FGT is aimed particularly but not exclusively at marine fisheries as a development assistance mechanism. Specifically, the FGT assesses management and performance in relation to 'local objectives', through the intersection of a) policy, b) capacity to sustain and implement policy, and c) management measures to advance policy achievement. It has been used in Chile, Peru, Indonesia, Mexico and the United States.

2.6 The Words of the Law: To What Extent Key Lexical Bundles form Interlinkages Across the Marine Environment *acquis*

2.6.1 Background to Legislative Drafting Tenets and Corpus Linguistic Methods

The tension between the letter of the law (written words) and its spirit (underlying intention) stretches back for centuries [95, 96]. In this section we hone in on the *letter* of EU law—i.e. how the marine environment *acquis* have been drafted at word level, and more specifically how key multi-word terms—lexical bundles [97]—are distributed and interlinked (or not), and how they are wielded across the whole set of laws.

In order to achieve effectiveness, the *constancy* of how the words of law are wielded is paramount, and in this regard we follow Flores:

[75] [94]; funded by the Walton Family Foundation and contracted to MRAG Americas.

> It is also worth noting that the Digest of Justinian compiled, among others, Ulpian's definitions of both *ius* (law) as *ars boni et aequi* (art of good and fair) and *iustitia* (justice) as *constans et perpetua voluntas, ius suum cuique tribuendi* (set and constant purpose of giving everyone what is due.) The latter implies a two-part formula: 1) "**set and constant purpose**" and 2) "give everyone what is due." Traditionally, authors have focused almost exclusively on the second, and almost entirely ignored the first, **the one compatible with the realization of (legal) certainty and security**. [98, our emphasis in bold type]

Before going any further, however, any study of EU law must take into consideration two foundational tenets of its drafting: (i) multilingualism; and (ii) clear writing. Within the ambit of EU law, given the Union's enshrined principle of full multilingualism[76] and equality among the official languages, legislative effectiveness passes through translation, adding a high level of complexity and multidimensionality.[77] As for clarity, ever since Mellinkoff inveighed against legal writing as "wordy, unclear, pompous, and dull" in 1963 [107], the plain language movement, focused on the transparency and clear legibility of the law by all users, has gathered momentum—primarily, but not only, in the English-speaking world. In Sweden, one of the torchbearers in this field, legislation is not considered effective unless clearly drafted [108]. Legislative language is now seen in several jurisdictions as inextricable from access to justice concerns; and plain language a means to defend democracy and achieve outreach and engagement.[78] For the last two decades, the *Joint Practical Guide* has been the key reference tool to ensure that legal acts are drafted clearly and precisely:

> towards the common goal of presenting to European citizens legislation which makes clear the objectives of the European Union and the means it deploys to attain them [112].

To delve into our set of laws at term level, our methodology is drawn from corpus linguistics, a methodological tool[79] whereby a group of texts (a corpus) and the words and phraseology it contains can be investigated in a structured way. Although studies of collections of texts have occurred for centuries, technological advances have led to corpus linguistics gaining momentum in recent decades. Corpora can be used for an extensive range of investigative purposes—for example examining the framing and shaping of environmental discourse [113, 114]. Given the fundamental, crucial and inextricable relationship between law and how language of the law is used [115], the tool is particularly useful for the legal domain[80]; and indeed, "[t]

[76] Charter of fundamental rights of the European Union (2000/C 364/01); [99].

[77] Council Regulation 1/1958/EEC, *Official Journal* 017/0385. On this critical and far-reaching subject, see for example: [100–106].

[78] See in this regard https://www.clarity-international.org/search/legislation; [109, 110]; and [111]; also at the European Commission 'Fight the Fog' initiative 1998; 'Clear Writing Campaign' 2010.

[79] or discipline, scholars disagree on this point.

[80] corpora have been collected in such areas as: criminal or civil judgments; contracts; law reports; European legislation; European Union case law; regulatory instruments from international institutions such as the United Nations or the World Trade Organization; etc. Legal corpora may be monolingual or multilin-

he potential of corpus linguistics as a methodology for researching legal language […] is nowadays unquestionable" [116–118].

Moreover, given the complex nature of legislative language, corpus linguistics is not only used by scholars but is increasingly applied to assist judges in interpreting the law (particularly in the United States[81]). It is also called upon by courts for forensic uses [122]; as well as being able to provide insights for policymakers [123–126]. It is especially in the latter regard that we propose to pursue our quest. The complement to the present study afforded by this approach is summed up by Mattila:

> Legal science is mainly interested in abstract entities – concepts – that are to be found in the background of terms, that is, in the meanings of terms. This science systematises the legal order through legal concepts. Terms are designations of concepts, necessary to legal science. However, the primary interest of this science does not have bearing on legal terms but on the concepts themselves. By contrast, in legal linguistics it is the terms as such that constitute the primary object of research [127].

2.6.2 Investigating Key Lexical Bundles in our Corpus and Potential Interlinkages

We present below an initial investigation into how a selection of lexical bundles, in their role representing key legal principles in the domain, are (or are not) interlinked across our sample of marine environment legislation.[82] This is a first foray into mapping interlinkages in this policy domain using corpus linguistics, and does not purport to establish definitive meanings. It is important to emphasise that our aim in this study is not to carry out an exhaustive term analysis, but to demonstrate how this methodology, one of a suite, can shine light from different perspectives, by triangulation, into a highly complex legislative darkness, in order that the suite may be applied judiciously by others according to their own objectives.[83]

The corpus management and enquiry tool adopted was SketchEngine,[84] a unique platform used in particular by lexicographers, discourse analysts, (computational) linguists, and terminologists. The corpus we used in this section contains 28 legal instruments and 386,119 words.[85] It is worth noting here that corpora come in many

Footnote 80 (continued)
gual; cover a wide geographical spread, may be diachronic to review changes in the law over time; and in addition can be used as a lens in comparative law.

[81] [119]; for a nuanced counter-argument see [120]; for a European perspective see [121].

[82] For a manual textual analysis of the WFD, EIA, SEA, Birds, Habitats and Public Participation Directives, see [36].

[83] For a demonstration of the power of such a methodology, see for example [128–131]. On the representation and transmission of legal concepts, [132–134]. On divergence of meaning between language versions see [135, 136].

[84] [137, 138]. Other options widely used by scholars include the software packages AntConc, WordSmith Tools and #LancsBox [139].

[85] We excluded the REACH Regulation due to its discordant size (over 130,000 words, whereas the average for other instruments is 13,789) and its lexical specialisation which gave rise to heavy and unhelpful skewing of the corpus.

Principle (lexical bundle)	No. of instruments	Instruments (abbreviated, underlining indicates majority, if any, of occurrences)
coastal waters	6	CFP, IntMarPol, MSPD, MSFD, UrbanWastewD, WFD
ecosystem-based approach	6	BiodivStrat, CFP, EMFFD, IntMarPol, MSPD, MSFD
environmental impact assessment	6	EIAD, EMFFD, IndEmissD, SEVESOIID, SEAD, WFD
favourable conservation status	3	BiodivStrat, EnvLiabD, HabsD
good environmental status	9	BiodivStrat, CFP, EMFFD, EMFAFD, IntMarPol, MSPD, MSFD, OffRenEnC, SingUsePD
good ecological status	2	BiodivStrat, WFD
holistic approach	2	IntMarPol, OffRenEnC
low-impact fishing	1	EMFAFD only
maintain and/or restore	4	CFP, EMFAFD, HabsD, (MSFD)
marine biodiversity	5	BiodivStrat, CFP, EMFFD, IntMarPol, MSFD
marine degradation	None	
marine protected area	8	BiodivStrat, CFP, EMFFD, EMFAFD, IntMarPol, MSFD, OffRenEnC, OffSafetD
marine pollution	4	IntMarPol, MSFD, PortRecepD, SingUsePD
marine reserve	None	
maximum sustainable yield	5	BiodivStrat, CFP, EMFFD, EMFAFD, IntMarPol
polluter pays	5	BiodivStrat, EnvLiabD, InvasiveSD, PortRecepD, WFD
precautionary principle	7	BiodivStrat, CFP, ICZM, InvasiveSD, MSPD, SEAD, WFD
scientific advice	6	CMO, BiodivStrat, CFP, EMFFD, EMFAFD, FisheriesControlR
small-scale fisheries	4	CMO, CFP, EMFF, EMFAF
sustainable development	18	BirdsD, BiodivStrat, CFP, (EIAD), EnvLiabD, EMFFD, EMFAFD, FisheriesControlR, FloodsD, ICZMRec, IntMarPol, MSPD, MSFD, OffRenEnC, PortRecepD, SingUsePD, SEAD, WFD

Fig. 13 Selected key legal and fundamental principles and their occurrence across our corpus of legislation

shapes and sizes (e.g. from 10,000 to 10 billion words), and, as asserted by Bhatia, Langton and Lung, "the use of genre-based small corpora will be much more useful than large corpora covering a complete register of law" [140], marine environment being the genre in this case. The choice of lexical bundles to be studied was made drawing from one of the authors' extensive experience in the field (by iterative term candidate selection and by applying researcher triangulation principles [56]).

In the first phase of our lexical investigation we appraised the presence across the corpus of 20 key legal and fundamental principles relating to the marine environment. Our initial impression was that, despite their pivotal importance with respect to marine environment governance, these principles were mentioned in the legislation far less than we expected, as can be seen in Fig. 13 above. Moreover, the themes in which they do occur appear to support the findings of siloing we discuss in Sects. 1.5 and 2.3.2. Although the chronological order in which acts are adopted naturally bears upon the inclusion of key principles, good law-making practices would require the ongoing review/audit of associated laws and/or adaptive drafting, to achieve the long-term consistency and constancy of the (marine) *acquis* as a whole [9, 85].

In the second phase of our lexical investigation, we performed corpus queries for each of our 20 lexical bundle candidates using the 'Word Sketch' function (collocations and word combinations) and the Concordance function enabling line-by-line KWIC (Key Word In Context) examination, along with co-text reading and analysis (left and right contexts can be highlighted, and the full original text is accessed upon clicking).

As explained by the creator of the software, "[t]he function that gives the Sketch Engine its name is the word sketch: a one-page summary of a word's grammatical and collocational behaviour", while the Concordance function takes the user to the textual data underlying the analysis [138]. A recent option is the presentation of the Word Sketch by visualisation, where distance from centre represents typicality, circle size represents frequency, and circle colour indicates grammatical relation.

Figure 14a, b show the two Word Sketch alternatives, and Fig. 15 shows the Concordance, where A indicates the term queried, B indicates in which law of our corpus the term occurs, and the blue box highlights how the user can explore more deeply the co-text—in this instance sorted to the left of the term.

We present below three sets of second-stage results as an initial illustration of insights that can be obtained. At this stage, rather than occurrence, we focused on the lexical bundle as the representation and transmission of a legal principle,[86] and in particular lack of constancy and slippage between focal terms and underlying metalinguistic concepts [141].

A. Quésaco 'good' status?

In this Case Study A, we focused on the word "status", and its collocates to be found in our corpus. By using the Word Sketch function, it was apparent that the most frequent lexical bundles were "good environmental status", "favourable conservation status", "ecological status" and "chemical status" (see Appendix, Fig. 16). We then drilled down into the texts of the legislation using the Concordance function (see Appendix, Figs. 17, 18), and could see in which laws the terms appeared (left-hand column), and explore how they appeared in sentences.

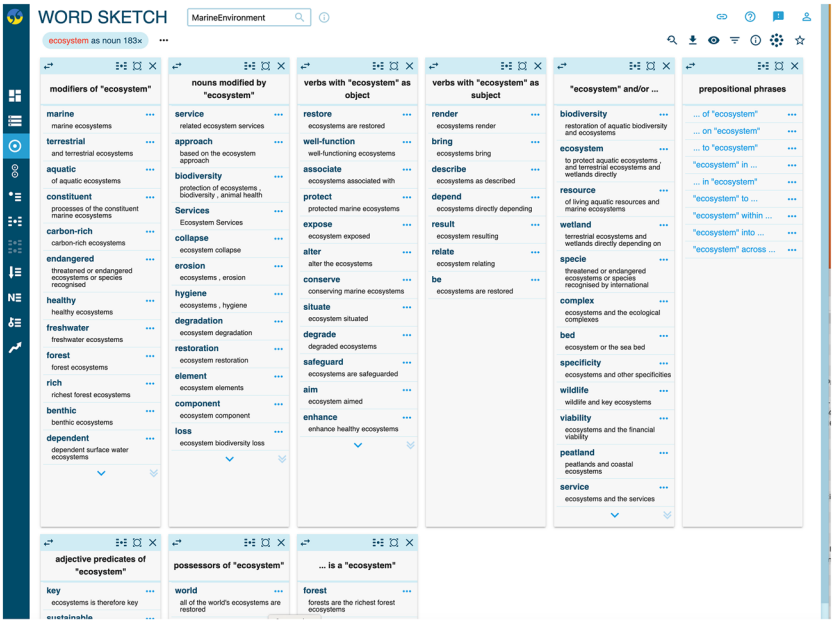
The EU assigns Good Environmental Status of marine waters its own official acronym—'GES', as proclaimed on the current 'Overview' web page for the marine environment, where it appears together with the stated "main goal" of the Marine Strategy Framework Directive (MSFD): to achieve Good Environmental Status of EU marine waters.[87] The definition of *Good Environmental Status*, as enshrined in the MSFD and not subsequently amended, is "[t]he environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive".[88] However, as first noted by Mee et al. [142], other pieces of legislation refer to "*good ecological status*' (with its own definition 22, Article 2, Water Framework Directive[89]); and "*favourable conservation status*" (defined in Article 1, Habitats Directive), and as is the case for the MSFD, the latter

[86] We will not tackle here textualist vs purposivist arguments, nor consistency in terms of application by courts.

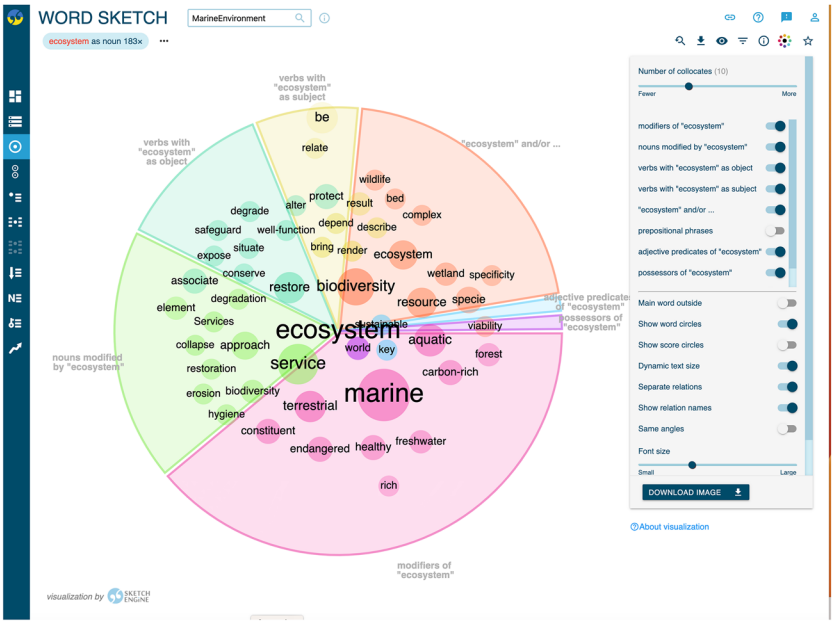
[87] https://environment.ec.europa.eu/topics/marine-environment_en.

[88] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (Text with EEA relevance) [2008] OJ L 164/19.

[89] As well as 'Good surface water status' (definition 18), 'Good groundwater status' (definition 20), 'Good surface water chemical status' (definition 24), and 'Good groundwater chemical status' (definition 25), as well as ''Good quantitative status' (definition 28), Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327/0001.



a - A Word Sketch presented in textual form (Sketch Engine)



b - A Word Sketch presented in visualisation form (Sketch Engine)

Fig. 14 **a** A Word Sketch presented in textual form (Sketch Engine). **b** A Word Sketch presented in visualisation form (Sketch Engine)

Fig. 15 Concordance function of Sketch Engine (Sketch Engine)

two legal principles and their definitions have not been amended since the laws' adoption. We thus have three key suites of legislation on the marine environment that do not 'speak the same language'.

A great deal of ink has flowed on the subject of these divergent wordings and definitions, e.g. [143], and they have even been the subject of a European project deliverable towards an 'operational Good Environmental Status definition'.[90] Our point here is simply to illustrate that by using a tool such as the Sketch Engine, heterogeneous wordings immediately stand out, and can then be further investigated, and that such comparisons can be carried out easily and for any number of combinations of laws.

Other avenues for enquiry gleaned from our corpus analysis of this lexical bundle were:

- the key principles analysed can be found more frequently and explicitly in marine directives relating to funding than in those instruments relating to marine environment management;
- the instruments relating to implementation are somewhat opaque on the subject of monitoring of good status;
- for fish stocks within 12 nautical miles of baselines, the CFP refers both to "good environmental status" in relation to the MSFD, and to "conservation status" (without qualifier and without referring to any legislation).

[90] DEVOTES (DEVelopment Of innovative Tools for understanding marine biodiversity and assessing good Environmental Status) project; https://mcc.jrc.ec.europa.eu/documents/201502120842.pdf.

B. Member States 'Shall Restore' the Marine Environment (If They Like)

In Case Study B, we focused on the word "restore", and its collocates to be found in our corpus. The Word Sketch function enabled us to see that the most frequent lexical bundles were "protect and restore", "restor* and maintain*", with one occurrence of "restor* and sustain*" (Appendix, Fig. 19). We then drilled down into the texts of the legislation using the Concordance function (Appendix, Figs. 20, 21), to see in which laws the terms appeared (left-hand column), and to explore how they appeared there. By a close reading of the lexical bundles in context facilitated by the tool, we were able to highlight modifiers such as "where feasible"/"as far as is feasible", "where practicable", and "where appropriate".

The principle of "*maintain or restore*" is laid down in the Habitats Directive (Art. 1) as the aim of measures relating to habitats and species of wild flora and fauna—at/to a level of 'favourable conservation status'. In the Common Fisheries Policy, the same verbs (phrased both as "restor* and maintain*" and as "maintain and restore"), apply to "marine resources" (recital 6), "populations of harvested [fish] stocks" (recital 7), "populations of harvested [fish] species" (Art. 2), the latter also occurring in the EMFAFD by reference to the CFP, and "fish stocks" (Art. 9), the target being "above levels which can/are capable of produce[cing] the maximum sustainable yield". Whilst the targets differ, there is thus some congruence between these two instruments (Habitats Directive and CFP), although notably the Habitats Directive wording is "*or*", while the Common Fisheries Policy employs "*and*".

The lexical bundle "protect and restore" appears only in the Biodiversity Strategy, and in the EMFFD (Appendix, Fig. 21). On the other hand, Article 4 of the Water Framework Directive requires that Member States "*protect, enhance and restore*" bodies of surface water and groundwater, and the stated aim of the WFD as per recital 19 is "*maintaining and improving* the aquatic environment" (which, incidentally, diverges from 'maintain and *restore*'). The force of these fundamental and prime obligations to maintain and restore the marine environment is not, however, replicated in other instruments.

The EIAD (recital 10) aims to "contribute to […] halting biodiversity loss and the degradation of ecosystem services […] and *restoring them where feasible*". The principle is far weaker than the above examples. Similarly, the MSFD aims to "protect and preserve the marine environment, prevent its deterioration or, *where practicable, restore* marine ecosystems in areas where they have been adversely affected" (Art. 1), and "to enable the integrity, structure and functioning of ecosystems to be *maintained or, where appropriate, restored*" (Art. 13). While in its Article 19, the Invasive Alien Species Regulation states that management measures shall "include, *as far as is feasible, the restoration* measures [of damaged ecosystems] referred to in Article 20".

Such modifiers render the latter three instruments subject to weakness in their implementation. We might posit that this lack of teeth, along with the absence of references to restoration in the vast majority of other instruments in our corpus, could have been a contributing factor to the need for the Nature Restoration Law. Lastly, as an interesting aside, we found no reference at all in the corpus to "ocean health" or "marine health".

C. Crosscutting (or not) 'Environmental Impact Assessment'

In Case Study C, we focused on the lexical bundle "environmental impact assessment" and how it arises in different laws and whether there are interlinkages and/or

consistency in its use therein. For this purpose we made use of the "phrase" Concordance function for "environmental impact assessment" and "impact assessment" to identify which laws they occurred in (Appendix, Fig. 22), and then carried out close readings of the lexical bundle in context facilitated by the tool: as well as consulting a whole corpus it is possible to carry out bounded contextual analyses by creating subcorpora for each individual law.

The EU legal principle of "environmental impact assessment" was introduced by the first Environmental Impact Assessment Directive (EIAD) in 1985.[91] The Directive has since been updated, and was codified in 2011—the instrument that is currently in force. Its scope is the "assessment of the environmental effects of those public and private projects which are likely to have significant effects on the environment", and its objectives are to guarantee environmental protection and transparency with regard to the decision-making process for public and private projects, so that:

> "With its wide scope and broad purpose, the EIA ensures that environmental concerns are considered from the very beginning of new building or development projects, or their changes or extensions. It allows the public to actively engage in the EIA procedure".[92]

Given that the principle has been in existence for almost 40 years, we might expect it to be embedded in a multitude of marine environment laws. Our corpus analysis, however, did not bear out this hypothesis, as discussed in the following paragraphs. Only six of the 29 laws in our corpus include the lexical bundle. As regards contextual analysis, in the Environmental Liability Directive, for instance, "impact assessment" refers to the effectiveness of that directive in *remediating environmental damage*; while Annex I refers to *assessment "by reference to the conservation status* [of habitats or species] at the time of the damage" thus an oblique reference to the Habitats Directive. Moreover, the method of assessment of damage appears to be at operators' discretion: "the competent authority shall be entitled to require the relevant operator to carry out *his own assessment*" (Art. 11). Risks on contaminated land are to be "assessed through *risk-assessment procedures*" (Annex II) which are not specified.

The Strategic Environmental Assessment Directive refers to "[t]he *different environmental assessment systems operating* within Member States" (recital 6) and to supplementing "the existing provisions on environmental impact assessment in a transboundary context" (recital 7). Moreover, recital 8 treads carefully, with regard for subsidiarity: "Action is therefore required at Community level to lay down a minimum environmental assessment framework, which would set out the broad principles of the environmental assessment system and *leave the details to the Member States*".

[91] Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment *Official Journal* L 175/40.

[92] https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en.

The Water Framework Directive contains internal references to "impact assessment"—in its Article 5 ("*review of the environmental impact of human activity* and economic analysis of water use") and Annex II, which under a heading "1.5 Assessment of Impact" lays down "an *assessment of the susceptibility* of the surface water status of bodies to the pressures identified above". In Annex VI there is a reference to the 1985 EIAD (not updated in the current 2014 consolidated version of the WFD) regarding minimum requirements to be included within programmes of measures, and in Article 16, on water pollution strategies, we unearth external legislative interlinkages—on the subject of risk assessment, focused on chemicals and agrochemicals:

> "(a) risk assessment carried out under Council Regulation (EEC) No 793/93(22), Council Directive 91/414/EEC(23), and Directive 98/8/EC of the European Parliament and of the Council(24), or
> (b) targeted risk-based assessment (following the methodology of Regulation (EEC) No 793/93) focusing solely on aquatic ecotoxicity and on human toxicity via the aquatic environment.

The Common Fisheries Policy sets out 11 principles for good governance in its Article 3, including "*the use of impact assessments as appropriate*". There is no specific mention of the EIAD principle: the term 'assessment' refers respectively to fleet capacity, fishing opportunities, data collection for fisheries management, economic activity of the fisheries sector, and "*scientific assessments*" of fish stocks (Art. 31). However, regarding data collected for funding purposes, Art. 25 refers to the assessment of "the state of exploited marine biological resources" and "the level of fishing and the impact that fishing activities have on the marine biological resources and on the marine ecosystems".

The EIAD principle does not appear in the SEVESO II Directive either, but "*national or transboundary environmental impact assessment*" appears in its Article 15, and the same wording is used without further explicitation, in the context of public information on decision-making, in the Industrial Emissions Directive (2010/75/EU), which also refers in its Article 23 to "*a general assessment of relevant significant environmental issues*".

2.6.3 Summary of Findings and Potential for Use of Corpus Methods by Policymakers and Stakeholders

In Case Study A we seek to give examples of how corpus methods can highlight inconsistent and/or divergent legal wordings. This is of particular interest given the extent to which they can render legal principles and tests unstable. In Case Study B we focus on using corpus methods to uncover uncertainty in drafting language, with particular regard to the ensuing dangers of weak implementation. Case Study C uses the methods to reveal how terms are used across a body of laws, to scrutinise how they knit together (or not) to achieve their ultimate aims. These are only three brief illustrations of the wide range of powerful insights that can be gleaned from working with corpus methods.

The online Sketch Engine tool enables corpora of texts to be created in a matter of minutes, including directly from EUR-Lex URLs. Users can get to grips with the concordance and collocation tools in a couple of hours at most. Other, software-based solutions, are similarly easy to handle.[93] Subcorpora can be created, to add extra dimensions to an investigation, especially when drilling down into how terms are used in individual texts. It is also worth noting that, if drafted legal material is confidential, a corpus can be made private on the online tool, or ring-fenced if a software package is used.

Our overall corpus (Sect. 2.1) was used as a sample to test all five methodologies contained in this study. It will be evident to readers that far more detailed scholarly corpus linguistic analyses can be carried out. At the same time, it is equally valid that non-academic stakeholders may wish to avail themselves of the power of corpus linguistic methods to research a particular point of interest to them in a fast and accessible way.

3 Conclusions

This study has presented five methodological lenses through which to examine a broad sample corpus of legislation and instruments in the domain of the marine environment. Our aim throughout has been to seek out effectiveness with a bounded scope: effective policy integration, effective law-making processes and effective management of the *acquis*. The specific cross-cutting element of effectiveness selected as our object of study is how laws are interlinked, and how 'discoverable' interlinkages are. This was not a mere academic exercise, since fundamental pillars of environmental democracy are transparency of the law and access to justice. We hope that this research can serve policymakers at EU and national levels alike, and form a contribution towards increasing public inclusivity by optimising transparency of the law for all stakeholders including fishers, environmental NGOs, marine scientists and industries.

A systems approach enabled us to focus on interlinkages within subsystems (Parliament, Directorate-Generals); and between the laws themselves through the leveraging of interoperable digital solutions with network mapping. The former lens revealed, notably, limited interactions between the Parliamentary committees where broader exchanges could lead to richer refinement of legislation before it is adopted. Moreover, regarding policy implementation, our findings build upon and bear out earlier studies on siloing at Directorate-Generals.

A diachronic approach concentrated on the freshness of legislation in terms of consolidations, codifications and recasts (or the lack of them), bringing to light changes in the pace of law-making over a 30-year period—both as a body of law in the marine environment field, stepping up legislative effort to address current challenges, and also significant pace differences across the range of instruments. Interlinkages can arise or disappear across time, *inter alia* through amendments and updates to acts or when new acts are introduced.

[93] e.g. https://www.laurenceanthony.net/software/antconc/.

Sub-EU application of marine environment legislation is as difficult to unearth as the legislation itself. In this area, the legislation search tools provided by the European bodies and agencies are in fact still less likely to shine light on interlinkages—even where the target may be known! In contrast, DG GROW's tool for oversight of single market legislation demonstrates that a highly accessible but at the same time comprehensive transposition oversight tool is entirely feasible. Additionally, a stakeholder-focused approach to implementation seems highly valuable given the diversity of arrangements across Member States.

Efforts to combat divergences in EU law have been focused on the one hand on harmonisation (seen here as national laws being convergent with EU law, also referred to as 'approximation', [144]), and on the other the consistent application of law by judges. The blurring of legal principles by EU legislation itself (inconsistent statutes) has been little studied—which is startling, given the dangers in terms of loopholes and litigation of co-existing but different legal tests for the same subject matter. In Sect. 2.6, our deep dive into the words of the law illustrates the power of corpus-based methods to scrutinise the drafting of a cross-section of laws in a multidimensional way, with particular regard to their constancy and consistency, and their potential to supplement any existing techniques employed by policymakers and lawmakers, as well as their potential to support environmental democracy and transparency where used by stakeholders such as NGOs and citizens' organisations.

In parallel, our research demonstrates that despite being a highly complex legal locus, the EU has made laudable efforts to achieve coherence, consistency, and integration within its legislation, through Better/Smart Regulation, Fitness Checks, the work of the European Court of Auditors, and by funding research programmes on marine governance such as LIFE and others. Moreover, our taxonomical overview reveals that despite public/NGO perceptions, the EU has in fact been incorporating sustainability criteria in its law for some considerable time.

As often repeated by certain high-ranking judges and expert working groups, more perspicacious implementation of existing laws is essential, as is good 'stock management'—*inter alia* to identify overlaps, underlaps and gaps—and to ensure that additional laws are formulated and introduced in the most carefully discerned way. At the same time, access to justice and transparency have become primary institutional concerns internationally. None of these aims can be achieved without an ultra-accessible and high-performing database of laws in conjunction with effortlessly discoverable relationships between those laws. Interoperability, ontologies and knowledge graph principles should drive this forward apace.

To sum up, one crucial dimension of effectiveness may be defined as better, stronger and clearer interlinkages—(i) between the various EU law-making bodies, (ii) between the large number of legal texts constituting the *acquis* in this domain, and (iii) between texts at drafting level. In the same vein, the holistic approach propounded by scientists for marine environment ecosystems should also be applied to the law relating thereto.

4 Appendix

See Figs. 16, 17, 18, 19, 20, 21 and 22.

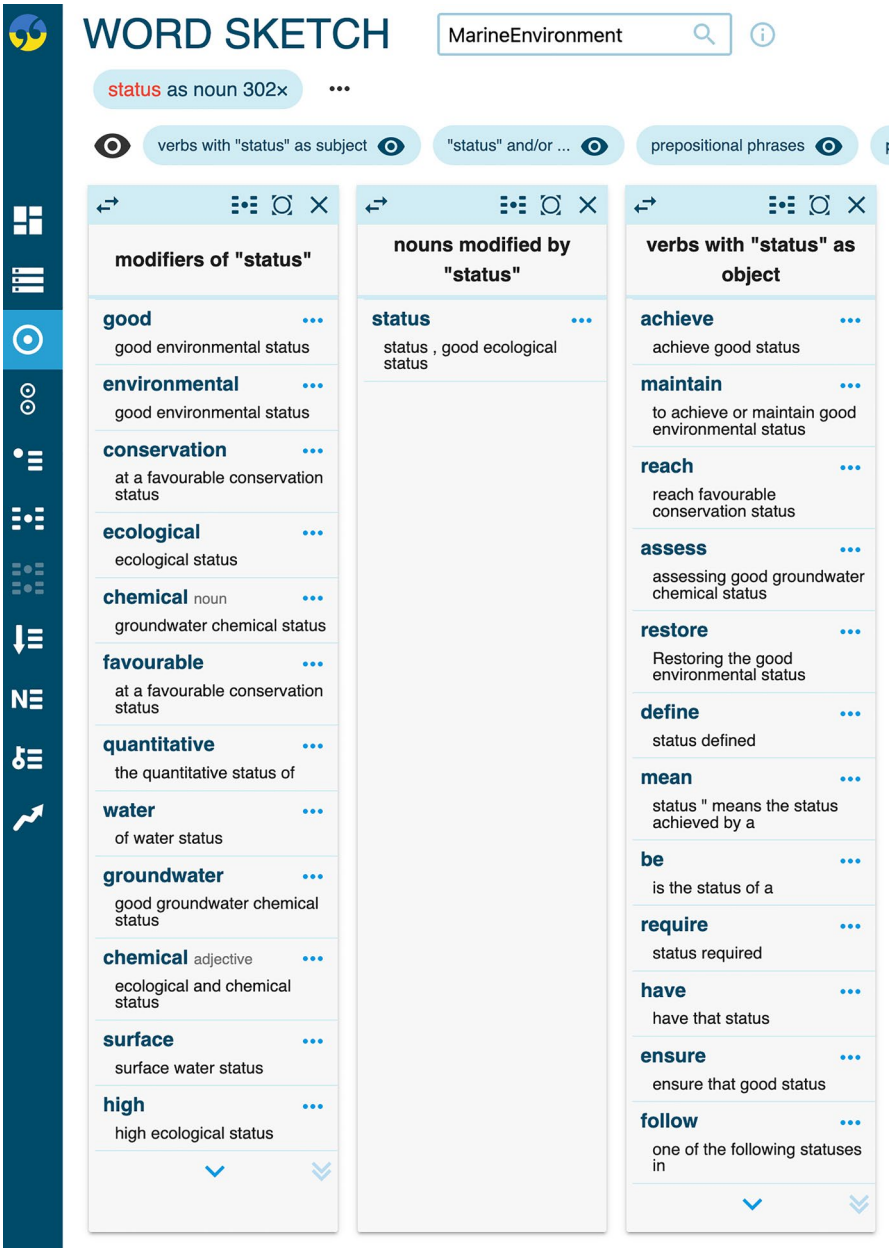


Fig. 16 Word Sketch of the term "status" (Sketch Engine)

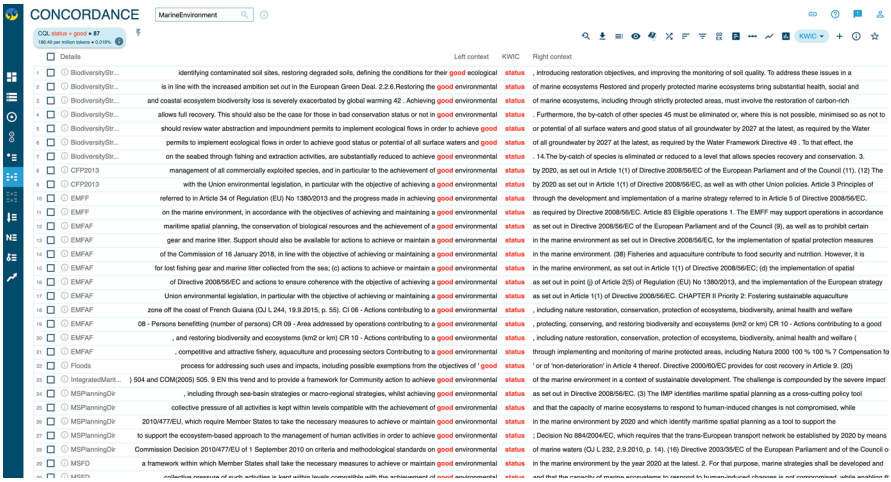


Fig. 17 Concordance of the lexical bundle “good environmental status” (Sketch Engine)

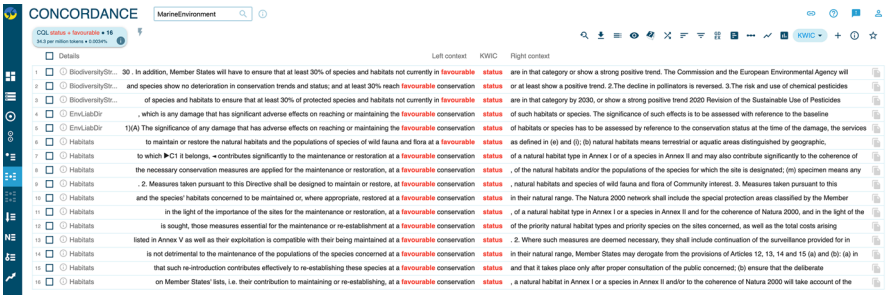


Fig. 18 Concordance of the lexical bundle “favourable conservation status” (Sketch Engine)

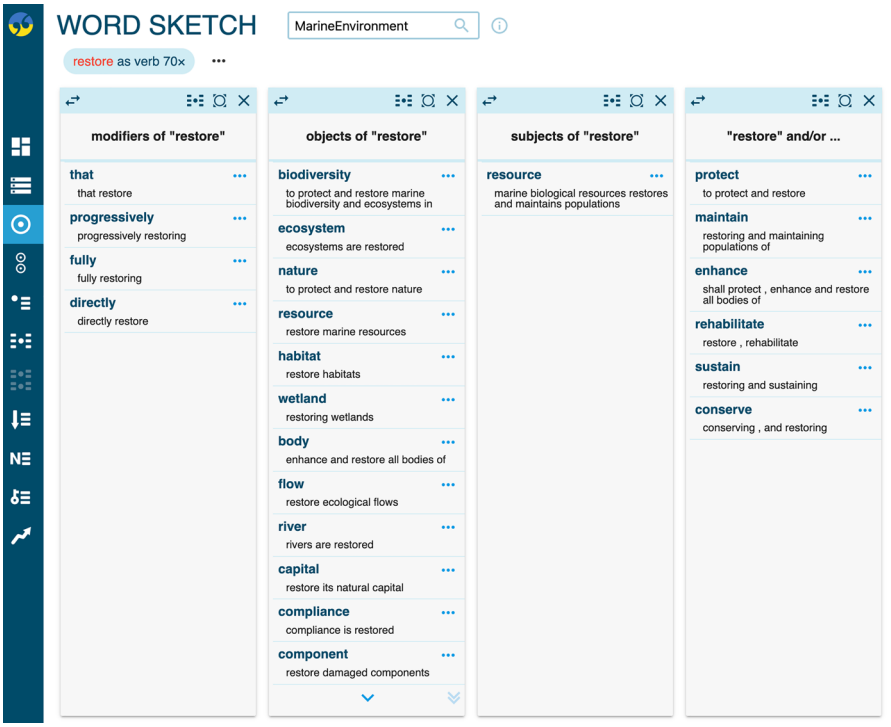


Fig. 19 Word Sketch of the term "restore" (Sketch Engine)

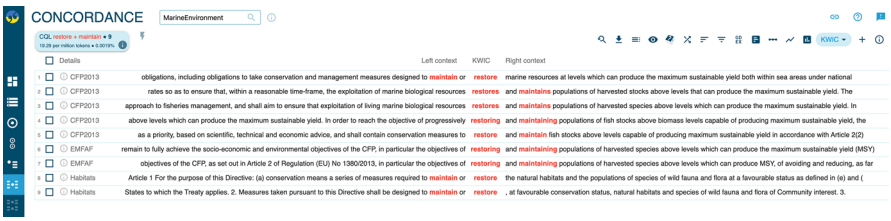


Fig. 20 Concordance of the lexical bundle "restore + maintain" (Sketch Engine)

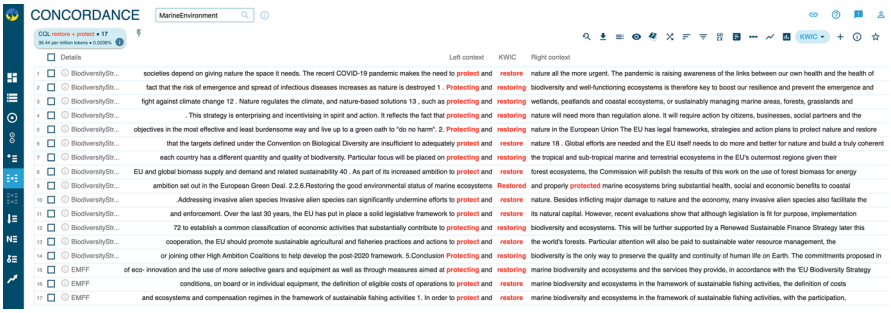


Fig. 21 Concordance of the lexical bundle "restore + protect" (Sketch Engine)

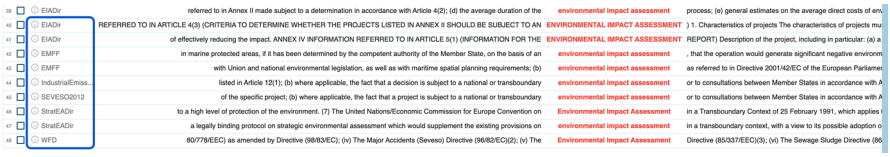


Fig. 22 Concordance showing which laws in the corpus include the phrase "environmental impact assessment"

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