European Union Network for the Implementation and Enforcement of Environmental Law

Analysis and recommendations on article 6(3) Habitat Directive

Environmental Controls on (Intensive) Farms

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Introduction to IMPEL

The European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) is an international non-profit association of the environmental authorities of the EU Member States, acceding and candidate countries of the European Union and EEA countries. The association is registered in Belgium and its legal seat is in Brussels, Belgium.

IMPEL was set up in 1992 as an informal Network of European regulators and authorities concerned with the implementation and enforcement of environmental law. The Network's objective is to create the necessary impetus in the European Community to make progress on ensuring a more effective application of environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building and exchange of information and experiences on implementation, enforcement and international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation.

During the previous years IMPEL has developed into a considerable, widely known organisation, being mentioned in a number of EU legislative and policy documents, e.g. the 7th Environment Action Programme and the Recommendation on Minimum Criteria for Environmental Inspections, and more recently in the General Union Environment Action Programme to 2030 and EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'.

The expertise and experience of the participants within IMPEL make the network uniquely qualified to work on both technical and regulatory aspects of EU environmental legislation.

Information on the IMPEL Network is also available through its website at: www.impel.eu

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Executive Summary

The report looks at the current situation regarding the critical deposition values of nitrogen being exceeded throughout the EU and the urgency to act, making use of Article 6 of the Habitats Directives. But does this happen? How is this handled? And how does the HD relates to the 'zero-pollution' plan and are the objectives from this achievable looking at the CCE report?

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1. Glossary of terms

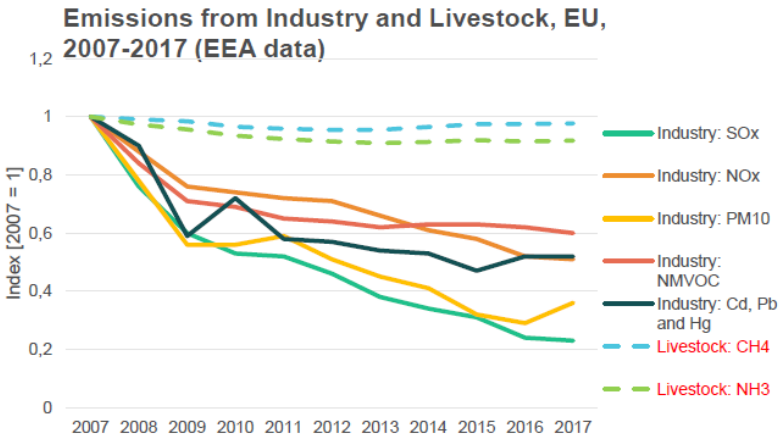
Term	Definition
Habitat Directive (HD)	The Habitats Directive requires all Member States to establish a strict protection regime for species listed in Annex IV, both inside and outside Natura 2000 sites.
Article 6 of the HD	Article 6 of the Habitats Directives defines how EU countries must protect and manage their Natura 2000 sites. They should take several factors into account: economic, social and cultural requirements and regional and local characteristics.
Eutrophication	Eutrophication is a general term describing a process in which nutrients accumulate in a body of water, resulting in an increased growth of microorganisms that may deplete the water of oxygen.
Acidification	Acidification is mainly aroused by the emission of acidic gases. The acidic gases usually contain elements, N, S, and P. They damage soil, change the pH value of water, and finally destruct the living environment.
Zero-pollution plan	The zero pollution vision for 2050 is for air, water and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, that respect the boundaries with which our planet can cope, thereby creating a toxic-free environment.
Coordination Centre for Effects (CCE)	The CCE is the Programme Centre of the International Co-operative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects Risks and Trends. The CCE is an organisational entity under the Convention on Long-range Transboundary Air Pollution of the UNECE.
EMEP	The co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (inofficially 'European Monitoring and Evaluation Programme' = EMEP) is a scientifically based and policy driven programme under the Convention on Long-range Transboundary Air Pollution (CLRTAP) for international co-operation to solve transboundary air pollution problems.
Gothenburg Protocol	The Executive Body adopted the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone in Gothenburg (Sweden) on 30 November 1999.
CLRTAP	The Convention on Long-Range Transboundary Air Pollution, often abbreviated as Air Convention or CLRTAP, is intended to protect the human environment against air pollution and to gradually reduce and prevent air pollution, including long-range transboundary air pollution.

UNECE	The United Nations Economic Commission for Europe (UNECE) was set up in 1947 by ECOSOC. It is one of five regional commissions of the United Nations. UNECE's major aim is to promote pan-European economic integration.
EEA	The European Environment Agency (EEA) provides valuable insights on the state of Europe's environment. Thanks to reliable data collected from an extensive network, they actively support Europe's environment and climate policies.

2. Introduction

Below we present an analysis of the current situation regarding the implementation and application of Article 6 of the Habitats Directives (HD). In particular, this concerns the enforcement of limits on nitrogen deposition, which are considered in this document to be one of the greatest threats to biodiversity within the EU at the moment.

The livestock sector is the largest contributor of nitrogen and its deposition to nature. This research assesses the current status . To what extent are regulatory bodies, through policy making, permitting or supervision, aware of the current state of exceedances of critical loads for nitrogen leading to eutrophication? And to what extent are these people aware of the existence of Article 6 of the HD, the mandatory 'screening' for licensing, and to what extent is this supervised?



For a quick overview, see the abbreviated explanation of the different chapters and their contents below.

Chapter	Title	Contents
3	Problem statement and urgency	Why nitrogen is a problem? And just how big is this problem? Why does this deserve our attention?
4	Analysis current state conservation of natural habitats regarding nitrogen	If we look at the EU-27, what is the situation when it comes to eutrophication by that nitrogen? A look at a 2022 Coordination Centre for Effects (CCE) study and its conclusions.
5	Status of Article 6(3) Habitat Directive within Europe	And what is the status of applying Article 6 per Member State? A look at what the 2023 survey answers tell us.
6	Previous work under IMPEL on the HD	Previous research has been done within IMPEL on nitrogen and article 6 of the HD. What were the conclusions?
7	HD and zero-pollution plan	A link to the EU's 'zero-pollution' plan, how does the HD fit into this? And can we or should we already do something about this by using the HD?
8	Recommendations regarding livestock farming in the context of Article 6(3) of the HD.	Looking at all the above. What can our recommendations be?

3. Problem statement and urgency

3.1 Effect on ecosystems and biodiversity

Eutrophication and acidification are serious threats to European ecosystems and are caused by the deposition of nitrogen and sulphur. Both processes alter the chemical properties of soils and thus also the availability of nutrients for plants. As a result of altered nutrient availability, species composition may change, and ecosystem integrity may be threatened. These changes carry the risk that more resilient ecosystems may prevail, resulting in the loss of ecosystem diversity as an integral part of overall biodiversity.

The impacts of nitrogen emissions from agriculture on Natura 2000 sites are a considerable issue as many sites already exceed critical levels and loads. This represents a significant issue for both regulators and, as a result, the farming sector.

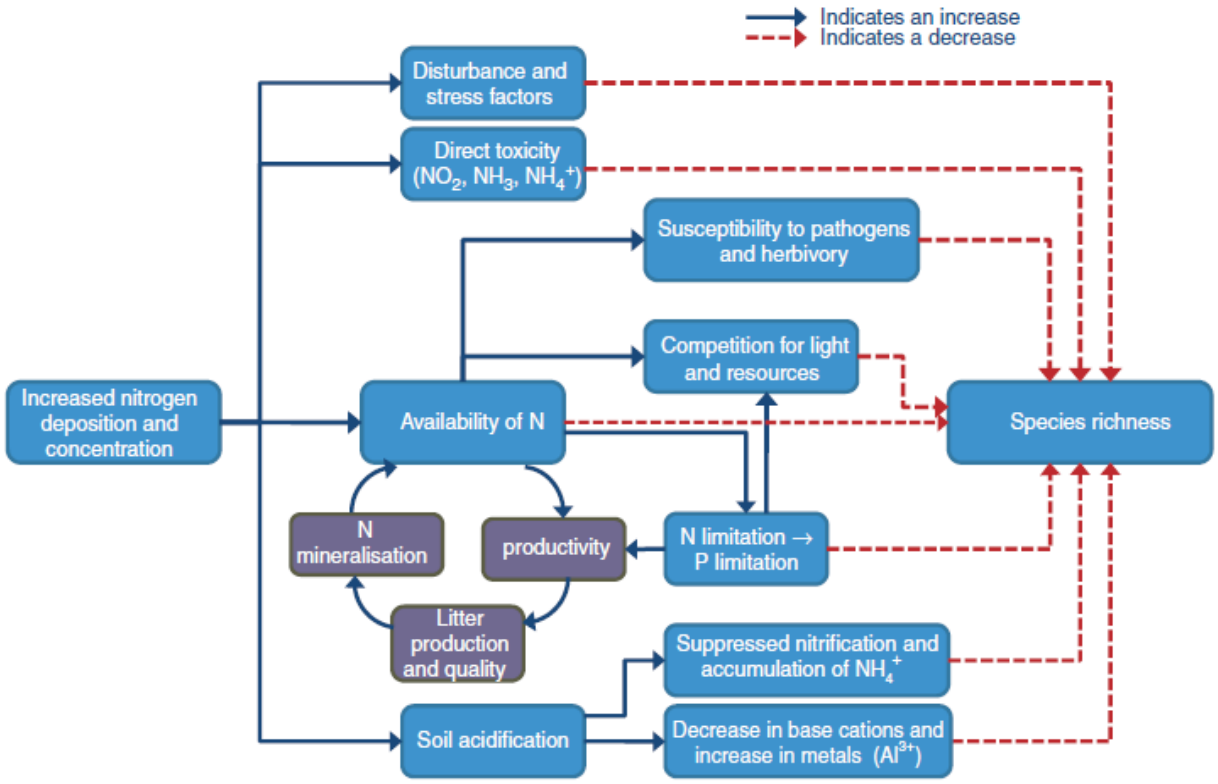


Figure displaying the effects of exceedance by nitrogen

For all industry sectors covered by European Pollutant Release and Transfer Register (E-PRTR), emissions of ammonia from pig and poultry farms represent 83.2 % of the total ammonia emissions.

Many semi-natural plants do not have the capacity to assimilate nitrogen in the presence of increased N availability (from N deposition) and can be outcompeted by plants that can (for example grass species). Such species replacements can lead to loss of specialized communities and ecosystems (APIS, 2017).

Acid deposition represents the mix of air pollutants that deposit from the atmosphere leading to acidification of soils and freshwaters. SO_2 contributions to acid deposition are now smaller than those historically experienced and, as such, oxidised and reduced nitrogen currently dominate. Deposition of reduced nitrogen (N) compounds can acidify via microbial transformations in the soil and via assimilation in plants leading to acidification of the rhizosphere (APIS, 2017).

Nitrogen is the primary limiting nutrient for plant growth in terrestrial ecosystems. As a consequence, different ecosystems present with different sensitivities and vulnerabilities to enhanced levels of atmospheric nitrogen and nitrogen deposition. **A large number of studies identify increased nitrogen inputs, particularly via atmospheric nitrogen deposition, as a major cause of biodiversity loss in both terrestrial and aquatic ecosystems worldwide** (RoTAP, 2006, Cleland and Harpole, 2010; Jones et al. 2013, Vogt et al., 2013 , UNCE, 2015).

Long term nitrogen enrichment in terrestrial ecosystems leads to competitive exclusion of characteristic species by more nitrophilic plants, especially under oligotrophic to mesotrophic soil conditions (Bobbink et al., 1998).

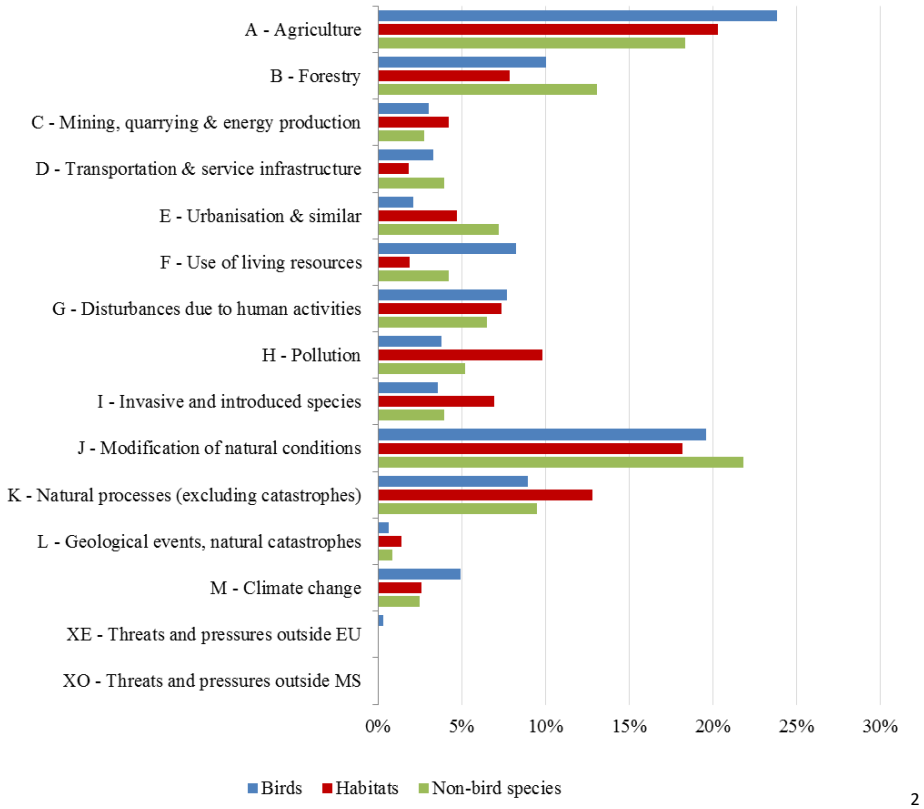
Acid-resistant plant species will gradually become dominant, and several species typical to intermediate and higher soil pH will disappear. **Habitats types occurring in soils with a weak buffering capacity are most sensitive to acidification from nitrogen deposition.**

Increased nitrogen deposition may affect plant sensitivity to factors such as drought, frost, and pathogens etc (Bobbink et al., 1998).
For more studies see annex II.

3.2 Agriculture and nitrogen emissions

The main contributor to nitrogen emissions (and thus N deposition) is livestock farming.

The period 2007-2012 report[1] includes the graphic shown on Figure below It reflects the frequency of high ranked level 1 pressures and threats for terrestrial ecosystems. Agriculture is one of the highest frequent level 1 pressure & threat.



[2]

Nitrogen deposition is an important pressure and threat for Annex 1 habitats[3], particularly in North-West Europe and **the exceedance of critical loads for nitrogen is a useful tool to assess the conservation status of the habitat types** of Annex I as provided in the Article 17 of the Habitats Directive. **It could also be a tool to assess the effects of livestock farms on Natura 2000 sites.**

[1] Frequency (%) of high ranked level 1 pressures and threats (together) Terrestrial. Source: The State of Nature in the EU. Report under the EU Habitats and Birds Directives 2007-2012. European Commission

[2] Frequency (%) of high ranked level 1 pressures and threats (together) Terrestrial. Source: The State of Nature in the EU. Report under the EU Habitats and Birds Directives 2007-2012. European Commission

[3] https://inspire.ec.europa.eu/document/HabDir

The Netherlands and Belgium won't be the only countries to have to confront the challenge of nitrogen emissions. Experts say countries such as Denmark and Germany might also find themselves in a precarious situation concerning their conservation obligations under the HD.

“Germany, for example, at the moment does not have a judicial problem, **but they do have an actual problem**," said Chris Backes, professor of sustainability law at the University of Utrecht, referring to nitrogen emissions in the Ruhr and the Lower Rhine areas being as high (if not higher) than in Belgium and the Netherlands.
“The national German judges consider the German system for nitrogen emissions to be fine, so for now it is business as usual," said Backes, "but when someone will take the system to the Court of European Justice and claim it isn't, things may come down **and then they will come down right quick**.” (see footnote 4).

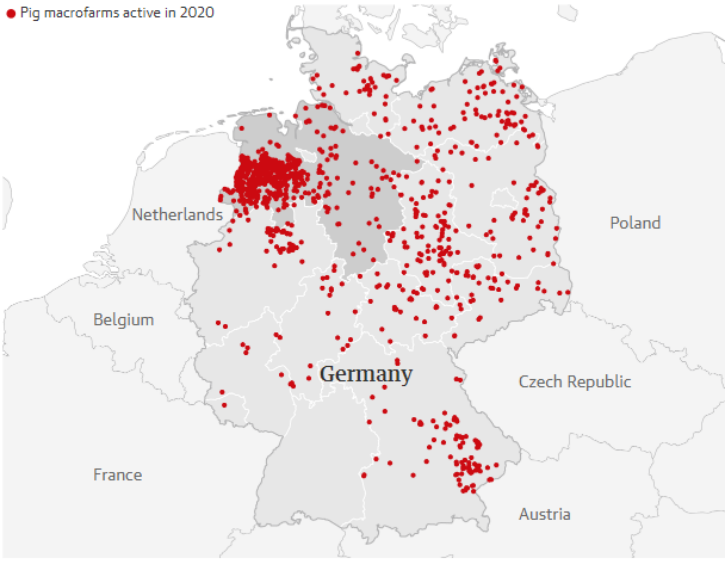
In the case of such a court ruling, many emissions-heavy projects in construction and agriculture will need to be reviewed and potentially put to an **abrupt standstill**. The same has already happened to the Netherlands, with Belgium following[4].

Below are two important examples which serve to highlight the urgency of the problem at hand in countries other than Netherlands and Belgium, which are already in a deep nitrogen crisis looking at the conservation, in accordance with Article 6 of the HD, of its Natura sites.

[4] https://www.politico.eu/article/livestock-netherlands-cows-pigs-chickens-farming-agriculture/

3.3 Germany

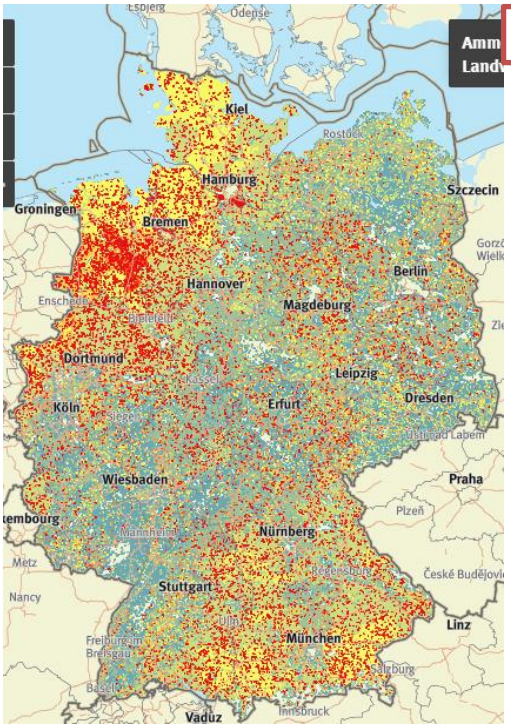
Lower Saxony has Germany's highest concentration of large-scale pig farms



Guardian graphic. Source: European Pollutant Release and Transfer Register [6]

Lower Saxony is the heartland of Germany's pork industry that exports pig meat across the world. But it has done so at a cost.

Maps of the Schweinegürtel (pig belt) indicate very high levels of ammonia emissions from farm animals and high levels of nitrates in groundwater.[5]



Ammonia emissions in Germany

[5] https://www.theguardian.com/environment/2022/jul/26/how-germany-pig-belt-got-too-big-lower-saxony

[6] ammonia emissions from agriculture Germany, https://www.umweltbundesamt.de/ammoniak-emissionen-der-landwirtschaft

3.4 United Kingdom

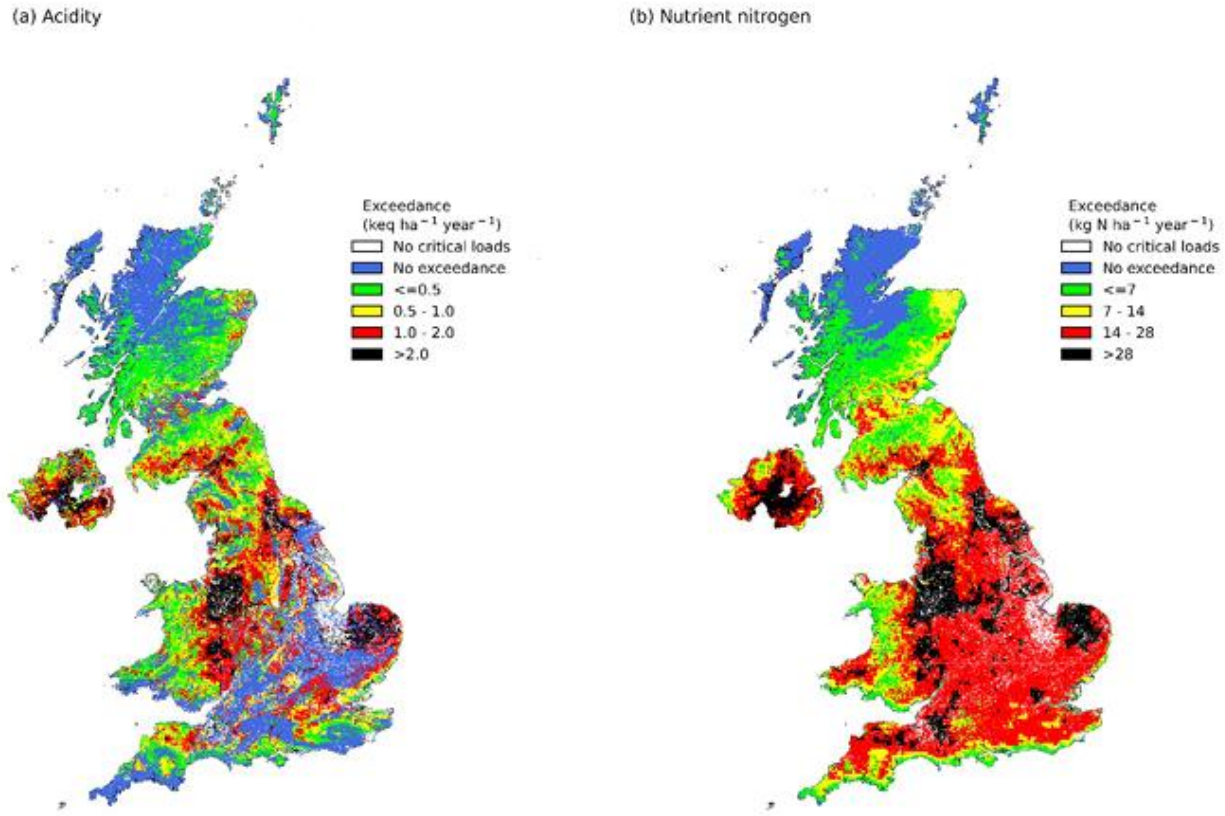
The area of N-sensitive habitats in the UK with exceedance of nutrient N critical loads decreased from 74.4% (69,781 km2) in 2010, to **67.7%** (63,470 km2) in **2019**.

The mean N deposition rate onto priority habitats in England was 27.9 kg N ha-1 yr-1 in 2016, and 28.9 kg N ha-1 yr-1 in 2019, **representing a 3.5 % increase** (see footnote 7).

Nearly **69% of the UK** currently was **exposed to ammonia concentrations above the critical level** set to protect lichens and bryophytes (1 µg m-3) in 2018; this represents 94.0% of England, 68.8% of Wales, 22.5% of Scotland and 99.7% of Northern Ireland.

There was an increase in the UK land area with ammonia concentrations above 1 µg m-3, **from 63.5% in 2010 to 69.2% in 2018.** See also: https://www.bbc.com/news/uk-northern-ireland-65677240

Figure below displays a) Excess **Acidity** (Average Accumulated Exceedance of acidity critical load) and b) Excess **Nitrogen** (Average Accumulated Exceedance of nutrient-nitrogen critical load) in 2018-20. Although the legends for the two maps are given in different units, the class intervals are the same (e.g. 7 kg N ha-1 year-1 is equal to 0.5 keq ha-1 year-1) (see footnote 7).



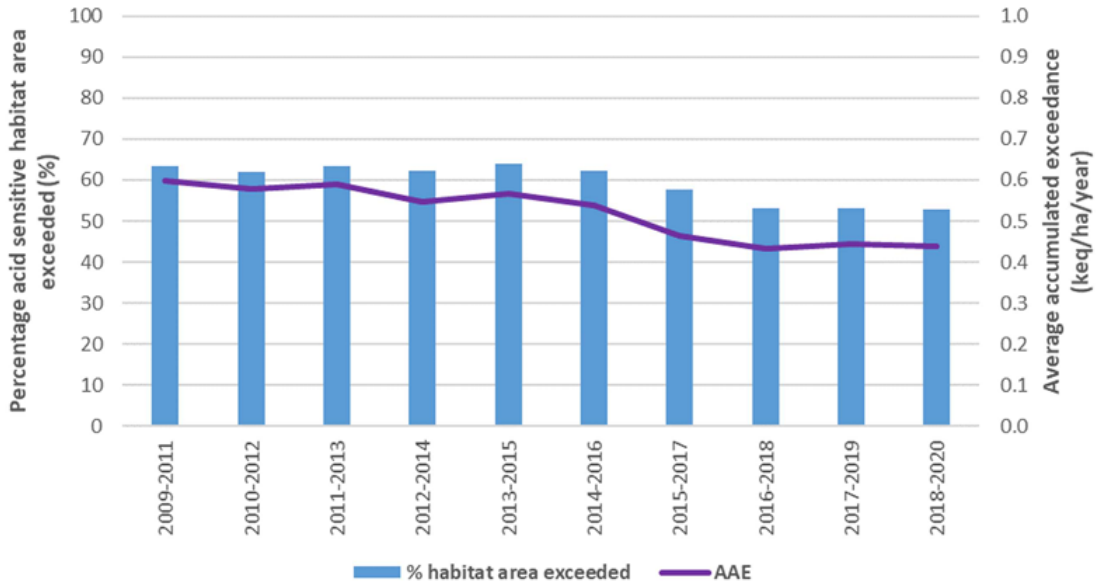


Figure 2.1: Acidity: Percentage area of acid-sensitive habitats with exceedance of acidity critical loads in the UK by year, and Average Accumulated Exceedance in keq ha^{-1} $year^{-1}$.

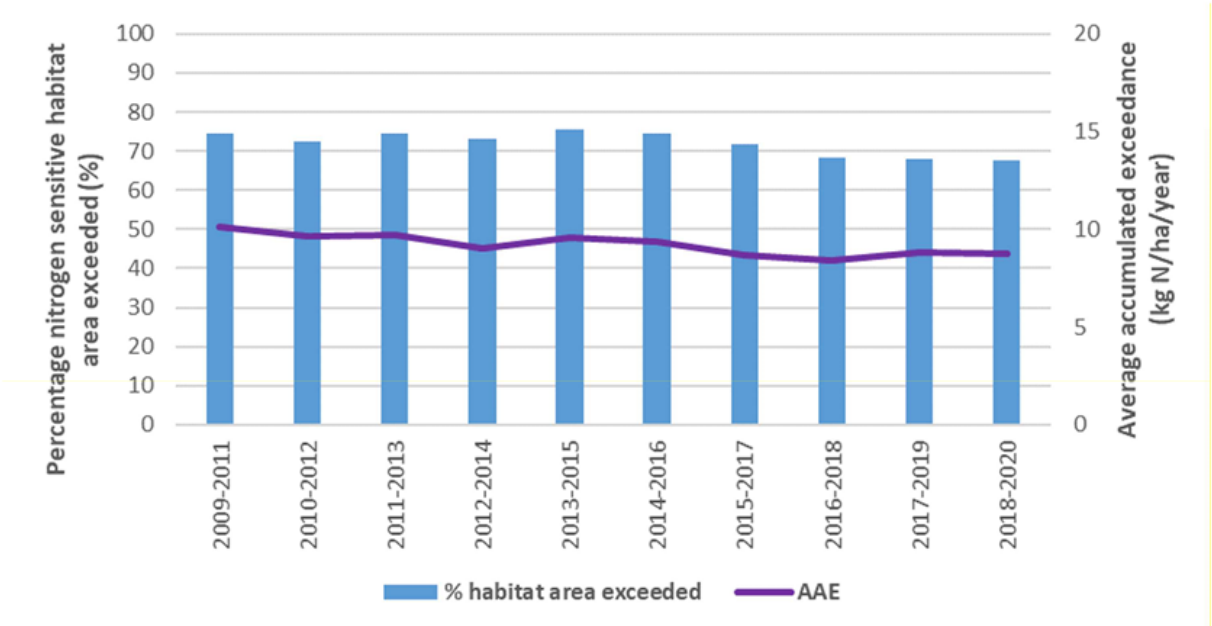


Figure 2.3: Nutrient nitrogen: Percentage area of nitrogen-sensitive habitats with exceedance of nitrogen critical loads in the UK by year, and Excess Nitrogen (Average Accumulated Exceedance in kg N ha^{-1} $year^{-1}$). [7]

[7] Trends Report 2022: Trends in critical load and critical level exceedances in the UK.

3.5 When no action is taken; explaining the Dutch situation

As already mentioned in, the Netherlands and Belgium, among others, have already reached an impasse regarding nitrogen depositions, resulting from a neglect of their nature reserves by not doing enough to protect them by means of Article 6 of the HD.

What lies ahead if sufficient action is not taken, or if it is taken too late, with regard to Article 6 and excessive levels of deposition, is explained on basis of 'the Dutch situation'.

Farmers riot in the Netherlands

3.5.1 How it started (Netherlands)

PAS (Programmatic approach to nitrogen)
In 2008, the Administrative Jurisdiction Division of the Council of State rejected the Assessment Framework for ammonia and Natura 2000, which made it more difficult to process permit applications involving the release of nitrogen.[8] Therefore an amendment was added to the Crisis and Recovery Act in 2009 about the nitrogen approach.[9] In 2011, officials of the Ministry of Economic Affairs converted this into the Nitrogen Approach Program, supported by State Secretary. In 2011 and again in 2012, the Environmental Impact Assessment Committee **criticized** the proposal, which they said was **legally untenable**. Reports from the Council of State and the Commission for the Acceleration and Improvement of Decision-Making Infrastructure also came to the same conclusion.
In the end the bill got passed in 2014.

The Nitrogen Approach Program (PAS) started on 1 July 2015. During this program, activities with low nitrogen precipitation continued under certain conditions. This was possible with a notification under the Nature Protection Act (Wnb). The program was designed to authorize activities that caused nitrogen deposition. And to ease the burdens of the initiators of these activities.[10]

After the introduction of the Programmatic Approach to Nitrogen (PAS) in 2015 – intended to combat biodiversity loss – ammonia emissions **increased** instead of decreasing, according to data from the RIVM [11]measurement network. This has led to lawsuits brought by an environmental association, which on 29 May 2019, resulted that the court ruled that the PAS was in conflict with the European Habitats Directive.

The European Union created the Habitats Directive to protect biological biodiversity in Europe. The Council of State ruled that it is mandatory for projects that cause nitrogen precipitation to apply for a permit. This obligation is laid down in the Nature Conservation Act (Wnb). As a result, projects that did not require a permit under the PAS still require a permit: the PAS did not comply with European environmental legislation. House construction, road widening: all nitrogen-emitting projects were halted. **The 'nitrogen crisis' was born.**

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[8] https://www.trouw.nl/verdieping/hoe-het-stikstofgedrocht-groeide-en-ter-wereld-kwam~be56db7b/

[9] https://www.tweedekamer.nl/kamerstukken/amendementen/detail?id=2009Z21410&did=2009D56398

[10] https://www.aanpakstikstof.nl/vergunningverlening/pas-meldingen

[11] The National Institute for Public Health and the Environment (RIVM) is an institute committed to a healthy population and a sustainable, safe and healthy living environment. This is on the basis of independent scientific research. They identify which research is required and carry it out. They advise the government, professionals. https://www.rivm.nl/

3.5.2 Trying to get the desire line of desire path

By ignoring warnings about the dangers and effects of the excessively high nitrogen depositions for too long, politicians failed to actually tackle this problem.

After the system of the PAS was found illegal in court, licensing of project with a nitrogen deposition on Natura 2000 area in the Netherlands came to a standstill. As soon as nitrogen deposition was involved in the project in question, for which a permit was required, it cannot be granted. Over the years, Dutch politicians have tried to evade the judge's ruling by creating so-called short cut's, however, this was a postponement of execution as each new short cut was eventually rejected in court after being challenged again and again by the environment associations. On of the main exemptions tried by the cabinet was excluding the building phase in projects of requiring a licence.

The court concluded that the chosen policy is something for the future until the quality of the Natura 2000 area's is significantly improved. One by one, the Council of State puts the policy measures on which the cabinet invoked in the lawsuit through the meat grinder. 'Buying out livestock farms is done on a voluntary basis, so the results are uncertain. The administration of low-protein animal feed has not yet been regulated. Neither does grazing cows more often. The calculated outcomes of climate measures that should lead to nitrogen reduction are no more than a poorly substantiated estimate. The yields of shore power facilities for shipping: guesswork.'

As a result, the required certainty that nature is protected in advance against damage caused by the exempted construction work is lacking. The explanatory notes to the judgment show that the judges have taken into account that the cabinet is making little progress in reducing national nitrogen emissions. A solid government plan to reduce ammonia emissions from intensive livestock farming before 2030 was in fact completely dismantled in the summer of 2023 during the 'Remkes consultations', so that it is completely unclear what this policy will yield and when.[12]

3.5.3 Status quo

Thus we come to the current situation. In short, the nitrogen crisis has not yet been averted and is in full swing. The current, cabinet has proved unable to curb the many-headed monster called 'nitrogen', Prime Minister (at that time) Rutte called the nitrogen crisis 'the toughest and most complex crisis he has ever had to deal with'. As a result, the Netherlands is still 'locked', endangering many developments, including the much-needed energy transition to achieve climate goals.
For the time being, it seems that a way out has not yet been found and the future is difficult to predict, especially with the new coalition and its political choices. All this paints a disconcerting picture of what ignoring the problem called 'nitrogen' and Article 6 of the HD can lead to…

[12] https://www.volkskrant.nl/nieuws-achtergrond/bestuursrechter-blokkeert-alweer-een-geitenpaadje-van-het-kabinet-uit-de-stikstofcrisis~bcd1e7a0/

3.6 Troubleshooting in lowering emissions

To add even more to the nitrogen problem, a number of scientific studies[13] have shown that the 'low-emission stable techniques' introduced in livestock farming (the solution to the nitrogen problem according to the sector itself) do not live up to their promises. In the cattle and dairy farming sector in particular, these techniques appear to work very poorly, or even counterproductively. This is distressing since the largest emissions come from the cattle sector, making it even harder to get to a solution.

By using these low-emission stable techniques, it was hoped to avoid the forced buy out of farmers. These latest studies show that this ship now seems to have sailed. There are little to no options left in getting the emissions of nitrogen lower, except lowering the numbers of livestock in the Netherlands.

[13] https://research.wur.nl/en/publications/schatting-van-stikstofverliezen-uit-stallen-op-basis-van-de-stiks

4. Analysis current state conservation of natural habitats regarding nitrogen

Since agriculture is the sector with the least reductions in air pollutant emissions, the importance of making the most of funding available under the Common Agricultural Policy was underlined as well as the need to focus action on the largest emitters in the first place (see footnote 8).

EMEP (2020a) estimated that **critical loads for eutrophication were exceeded in virtually all European countries** and **over** about **65 %** of the European ecosystem area (3 million km2) in 2018. As in previous years, the highest exceedances in 2018 were modelled in the **Po valley (Italy), in the Dutch-German-Danish border areas and in north-eastern Spain.**
Similar to eutrophication effects, acidification effects are estimated using the concept of 'critical load' (Section 11.2). EMEP (2020a) estimated that exceedances of the critical loads for acidification occurred over about 6 % of the European ecosystem area in 2018. Hotspots of exceedances occurred, as usual, in **the Netherlands and its borders with Germany and Belgium and in small parts of southern Germany and Czechia**. However, most of Europe did not exceed the critical loads for acidification in 2018.[14]

Coordination Centre for Effects
The Coordination Centre for Effects (CCE) is the programme centre for the International Cooperative Programme on Modelling and Mapping (ICP M&M) under the Working Group on Effects of the Convention of Long-range Transboundary Air Pollution (CLRTAP). The mandate of the CCE is to develop and update methodologies for assessing critical loads (CL), to compile data on CL and to generate maps of CL and their exceedances.

Calculated exceedances of CL in the investigated years 2000 - 2020 occurred in a relatively large area of around 74% - 61% (decreasing trend from 2000 - 2020), within the 27 EU-member states, of the model domain for eutrophication and a smaller area of 14% - 4% for acidification. Projections of CL exceedances for the years 2030 to 2050 as a function of multiple emission scenarios highlighted ecosystem risks for eutrophication even under low emission scenarios; v). Estimation of exceedance of critical atmospheric nitrogen inputs to the Baltic sea as a first attempt to evaluate the risk of open sea eutrophication.

'However, even under the most ambitious scenario, i.e. **2050** LOW, **22%** of European ecosystems would **still be exposed to nitrogen deposition beyond Critical Loads**.'

[14] Air quality in Europe — 2020 report, EEA Report No 09/2020

To support the review process of the Gothenburg Protocol, the CCE compared the latest Critical Load database described in the previous chapters with a time series of deposition of eutrophying and acidifying air pollutants.

The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg Protocol)[15] was amended in 2012 by the Executive Body of the CLRTAP to include national emission reduction commitments to be achieved by 2020 and beyond[16] [17]. The amended Protocol entered into force on 7 October 2019. Following that, in 2020 the CLRTAP Executive Body started the review of the 2012 Protocol. Therefore, the Gothenburg Protocol Review Group formulated guiding questions for the scientific bodies of the Working Group on Effects to work on.

To be able to quantitatively assess the risks for ecosystems from changes regarding eutrophication and acidification, the concept of Critical Loads was developed. **As soon as the estimated deposition exceeds the Critical Loads, ecosystems are considered to be at risk.**

The results of the exceedance calculations for acidification and eutrophication are given in Figure 9 and Figure 10. Statistics for the different parties to the convention are shown in Table 2 and Table 3. Figure 9 a-e shows that exceedances of Critical Loads **for acidity** occur on 14.1% (2000) and 3.6% (2020) of the ecosystem area and the European average AAE (Average Accumulated Exceedance) is about 145 eq ha-1 yr-1 (2000) and 22 eq ha-1 yr-1 (2020). Hot spots of exceedances can be found in **the Netherlands and its border areas to Germany and Belgium**, and some smaller maxima in **southern Germany and Czechia**, whereas most of Europe is not exceeded (grey areas). Summarized descriptive statistics for the share of Critical Load exceedance and European average of AAE are shown in Figure 9f.

By contrast to Critical Loads of acidity, it is worth noting that **Critical Loads for eutrophication are exceeded in large parts** of the model domain and in all years (Figure 10 a-e). The share of ecosystems, where the Critical Loads for eutrophication are exceeded, decreases relatively slowly, **starting at 74,0% in 2000 and going down to 61.2% in 2020**, with a European average AAE of about 434 eq ha-1 yr-1 and 235 eq ha-1 yr-1 in 2000 and 2020, respectively. The **highest exceedances** of CL are found **in the Po Valley in Italy, the Dutch-German and German-Danish border areas and in north-eastern Spain**. Summarized descriptive statistics for the share of Critical Load exceedance and European average of AAE are shown in Figure 10 f. [18]

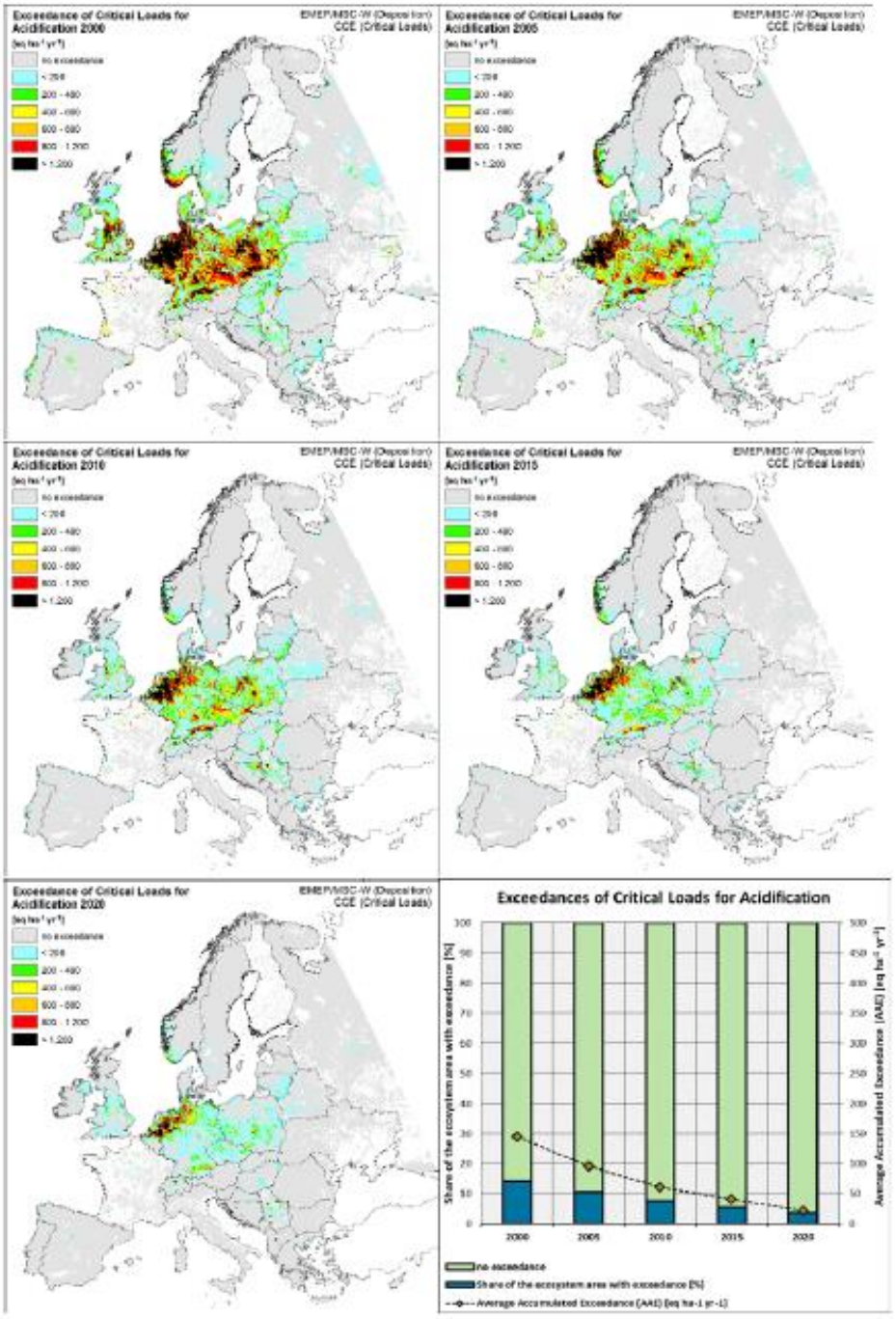
[15] Protocol to Abate Acidification, Eutrophication and Ground-level Ozone | UNECE

[16] https://unece.org/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_1.pdf

[17] https://unece.org/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_2.pdf

[18] CCE Status Report 2022, Coordination Centre for Effects (CCE)

Figure 9: a-e: CL Exceedance for Acidification for the years 2000, 2005, 2010, 2015 and 2020; f: Summarized descriptive statistics for exceedance of CL for acidification for European ecosystems.

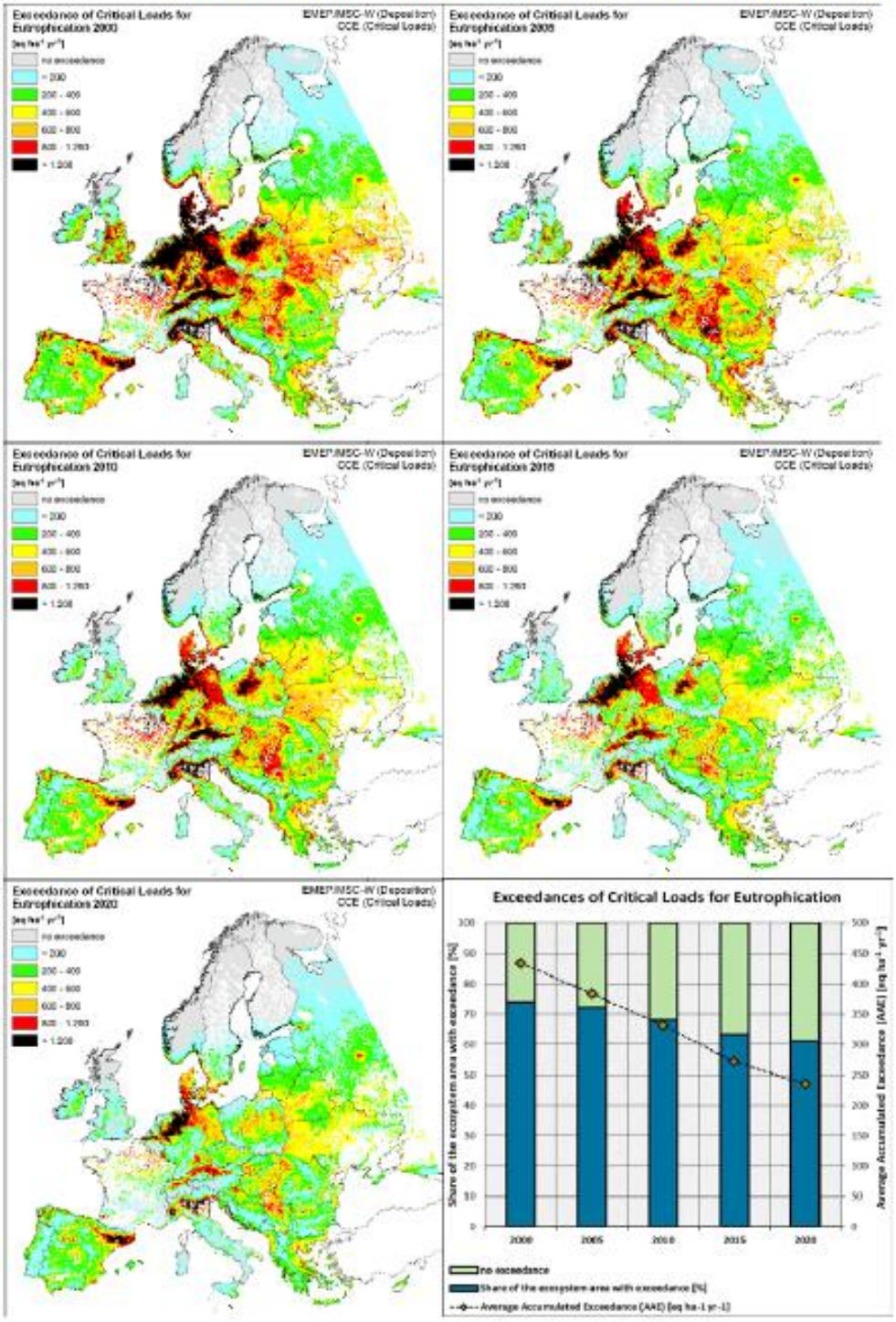


Source: Own illustration, Coordination Center for Effects

Table 2: Exceedance of CL for acidification presented as share of the receptor area and the AAE.

Acidification		**Exceedance of CL acid**									
Country	Eco area [km²]	Share of the Eco Area in [%]					AAE in [eq ha-1 yr-1]				
		2000	2005	2010	2015	**2020**	2000	2005	2010	2015	2020
Austria	38.957	2	2	<1	<1	**<1**	9	7	3	0	0
Belgium	15.482	68	58	45	39	**31**	1506	1154	713	482	248
Bulgaria	54.470	4	6	<1	<1	**<1**	70	76	7	2	0
Croatia	36.484	3	4	3	2	**<1**	15	20	13	3	0
Cyprus	1.701	<1	<1	<1	<1	**<1**	0	0	0	0	0
Czech Republic	23.831	91	86	78	65	**30**	760	584	351	182	46
Denmark	6.741	41	31	10	10	**2**	261	115	23	23	3
Estonia	30.735	<1	<1	<1	<1	**<1**	2	1	1	0	0
Finland	286	2	1	1	<1	**<1**	2	1	1	0	0
France	177.006	12	10	7	4	**3**	68	42	19	9	4
Germany	106.947	75	67	54	43	**26**	780	560	379	276	131
Greece	78.016	3	3	1	<1	**<1**	12	18	3	1	0
Hungary	30.120	25	13	10	5	**4**	135	59	41	19	11
Ireland	16.195	3	2	<1	<1	**<1**	11	5	1	1	0
Italy	101.030	3	<1	<1	<1	**<1**	52	9	6	8	4
Latvia	44.389	11	5	5	2	**1**	19	7	8	1	1
Lithuania	26.522	31	27	26	23	**20**	172	96	98	48	34
Luxembourg	1.388	18	16	14	14	**12**	268	198	124	81	23
Malta	35	<1	<1	<1	<1	**<1**	0	0	0	0	0
Netherlands	2.827	74	73	72	72	**70**	2810	2162	1531	1299	936
Poland	95.950	69	50	42	24	**18**	516	270	196	85	44
Portugal	42.199	8	3	2	1	**<1**	41	12	5	3	2
Romania	109.564	2	3	<1	<1	**<1**	10	22	5	1	0
Slovakia	26.875	13	7	6	4	**2**	78	30	24	9	3
Slovenia	14.104	2	<1	<1	<1	**<1**	7	1	0	0	0
Spain	252.450	2	1	<1	<1	**<1**	23	12	2	2	1
Sweden	391.745	14	6	4	2	**2**	20	5	2	1	0
EU 27	**1.726.049**	**18**	**13**	**10**	**7**	**5**	**283**	**202**	**132**	**94**	**55**

Figure 10: a-e: CL Exceedance for Eutrophication for the years 2000, 2005, 2010, 2015 and 2020; f: Summarized descriptive statistics for exceedance of CL for Eutrophication.



Source: Own illustration, Coordination Center for Effects

Table 3: Exceedance of CL for Eutrophication given as share of the receptor area and the AAE.

Eutrophication		**Exceedance of CL eut**									
Country	Eco area [km2]	Share of the Eco Area in [%]					AAE in [eq ha-1 yr-1]				
		2000	2005	2010	2015	**2020**	2000	2005	2010	2015	2020
Austria	50.588	82	75	68	65	**50**	386	353	294	234	147
Belgium	15.552	88	82	71	59	**52**	1433	1161	900	671	432
Bulgaria	54.470	92	94	89	83	**76**	276	389	259	221	170
Croatia	36.484	93	95	89	81	**81**	510	571	470	318	291
Cyprus	1.701	100	100	100	100	**100**	366	347	306	320	361
Czech Republic	23.831	99	98	95	91	**84**	753	639	486	383	257
Denmark	6.741	100	100	100	100	**100**	1313	1055	825	885	664
Estonia	30.735	65	57	56	46	**39**	128	93	98	73	58
Finland	41.141	15	9	9	3	**2**	15	7	6	3	2
France	177.006	85	85	82	69	**61**	549	497	429	294	195
Germany	106.975	88	85	82	78	**70**	1080	921	798	707	467
Greece	78.016	100	100	100	100	**100**	483	552	469	431	337
Hungary	30.120	97	96	92	86	**78**	602	639	567	452	395
Ireland	16.776	60	51	37	36	**48**	160	135	81	71	95
Italy	105.946	81	80	73	62	**53**	572	454	356	250	179
Latvia	44.389	95	94	94	92	**88**	288	245	272	220	191
Lithuania	26.522	99	99	99	99	**98**	517	432	477	393	367
Luxembourg	1.388	100	100	100	100	**100**	1539	1350	1199	1034	798
Malta	35	99	99	99	99	**99**	877	772	688	602	517
Netherlands	3.093	92	88	81	81	**76**	1770	1314	941	783	491
Poland	95.950	84	79	76	70	**67**	589	429	396	280	238
Portugal	42.199	89	85	85	81	**76**	329	228	221	188	168
Romania	109.564	94	96	92	92	**88**	419	475	344	292	251
Slovakia	26.875	100	98	97	95	**91**	622	527	459	386	338
Slovenia	14.104	93	92	84	75	**75**	615	529	441	334	320
Spain	252.450	97	96	94	92	**92**	463	426	383	346	338
Sweden	58.688	19	17	16	15	**15**	100	71	60	54	45
EU 27	**1.451.339**	**85**	**84**	**80**	**75**	**71**	**621**	**541**	**453**	**379**	**300**

Conclusion:

As can be seen above, natural habitats in most of the countries within the EU-27 member states suffer from high eutrophication levels, mostly caused by the deposition of ammonia which in turn mainly comes from the livestock sector.

Only a handful of countries have an exceedance of less than 50%. These are:

1. Finland (2%)
2. Sweden (15%, the vast majority of which are in the south)
3. Estonia (39%)
4. Ireland (48%, there are already some court cases related to the Habitats Directive)

5. Status of Article 6(3) Habitat Directive within Europe

In order to gain insight into the status of the application of Article 6 of the HD, a survey was drawn up and shared among the Member States. In this chapter, the results are plotted in order to gain insight into the current status within the various Member States with regard to HD.

The questions as asked were as follows:

1. *Country*
2. *Province / State*
3. *Department / agency*
4. *Is your department authorized to supervise and enforce the HD?*
5. *If no under 4, can you name the authorized department? If you have a contact within this authorized department, please add this in your answer*
6. *Is there a critical deposition value/load established in legislation as a threshold for nitrogen (wet/dry deposition thru the air) on natural habitats, in your country or province / state?*
7. *If yes under 6, what is the critical deposition value/load?*
8. *Is there active supervision and enforcement of Article 6 HD, in particular nitrogen deposition from livestock farming?*
9. *If yes under 8, is this the case for both licensed and unlicensed companies?*
10. *Is there any use of tools like a calculator for ammonia emissions or nitrogen deposition? And if yes, can you add the calculator via link or attachment with guidance of use of this tool?*
11. *Can you describe how this supervision takes place? Think of a nitrogen calculation, checking the functioning of the housing system and licensed animal numbers, etc.*
12. *Can you estimate how many of these inspections take place on an annual basis?*
13. *Is there an strategy / methodology in place for selecting facilities for inspection on the HD? If yes, can you share this strategy as attachment?*

See annex 1 for a quick overview of the given answers, as well as a complete and more detailed overview.
In general, the following questions are most relevant for giving an insight in the status amongst the countries that provided an answer (please note here it is translated in Dutch so ‘Andere’ means ‘other’):

6. Is there a critical deposition value/load established in legislation as a threshold for nitrogen (wet/dry deposition thru the air) on natural habitats, in your country or province / state?

Meer details

Yes	1
No	4
Andere	4

8. Is there active supervision and enforcement of Article 6 HD, in particular nitrogen deposition from livestock farming?

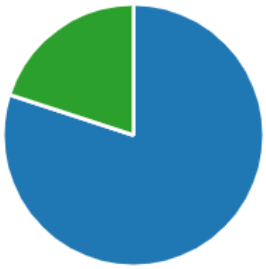
Meer details

Yes	5
No	4

9. If yes under 8, is this the case for both licensed and unlicensed companies?

Meer details

Licensed	4
unlicensed	0
Both	1



13. Is there an strategy / methodology in place for selecting facilities for inspection on the HD? If yes, can you share this strategy as attachment?

Meer details

Yes	3
No	1
Unknown	3
Andere	2

The ‘other’ under question 6 being:

1. *‘No domestic legislation, objectives of the Gothenburg Protocol.’*
2. *‘Not in legislation but there is guidance with critical loads for certain Natura 2000 sites.’*
3. *‘Not set in legislation. Critical Load thresholds are determined by best available scientific advice’*
4. *‘I have spoken with the competent department of housing regulations, which issues reports that are used to obtain the permit or the environmental impact assessment, they have explained to me that they inform the object of species of flora and fauna or other natural values. For purposes of nitrogen emission value, it is not within their competence, they have explained to me.’*

The ‘other’ under question 13 being:
‘There is a framework for targeting inspections of Intensive pig and poultry farms that fall under IED. These permits have controls to limit impacts of ammonia. Other types of farms are inspected based on a number of risk factors. That may include the status of a nearby Habitats Directive site - but the focus will be on Water Framework Directive targets rather than Air Quality’

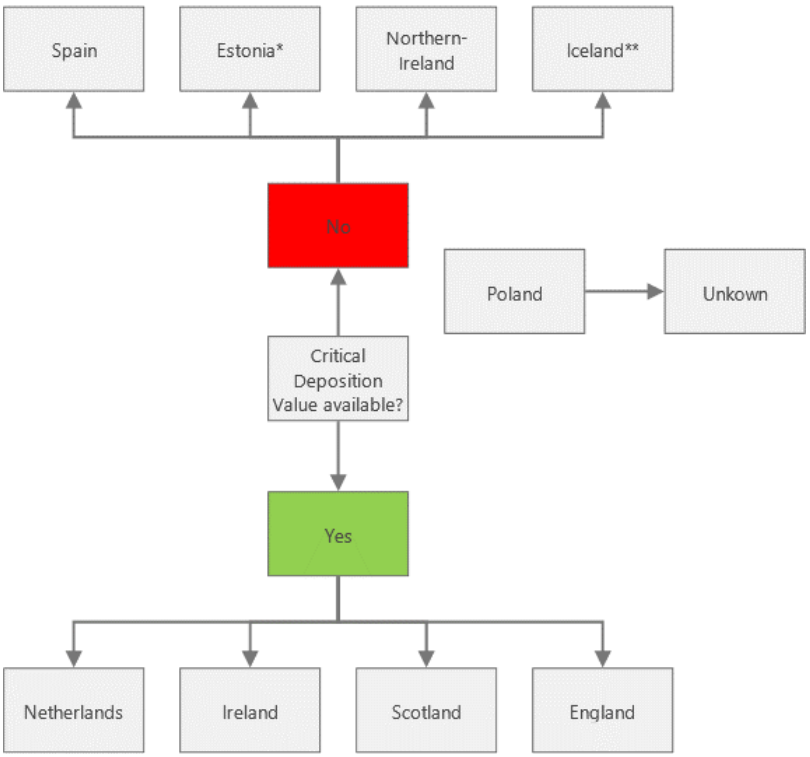
Unfortunately, the number of respondents is limited to 11, some of which are in the same country (twice Spain (different region)) and the UK (England, Scotland and Northern Ireland). So the real number of unique answers (countries) is 8, although UK answers represent different regions. This limits a good overview of the state of application and compliance with Article 6 of the HD. The conclusions will therefore be limited to 7 of the 27 Member States in total, not statistically large enough for a representative representation.

The question we can also ask ourselves is whether such a survey provides the answers we are looking for. Concerned respondents (possibly) only answer them based on their own knowledge, while you look for those people who have a complete picture. For a good and complete picture, a study per Member State will have to take place in more depth than such a survey, which appears to be too superficial a set of instruments.

Recommended is to use 2025 to attempt to obtain this information from the other 20 Member States to get the full picture.

Conclusions regarding the survey:

Based on the survey, the following conclusions can be visualised:



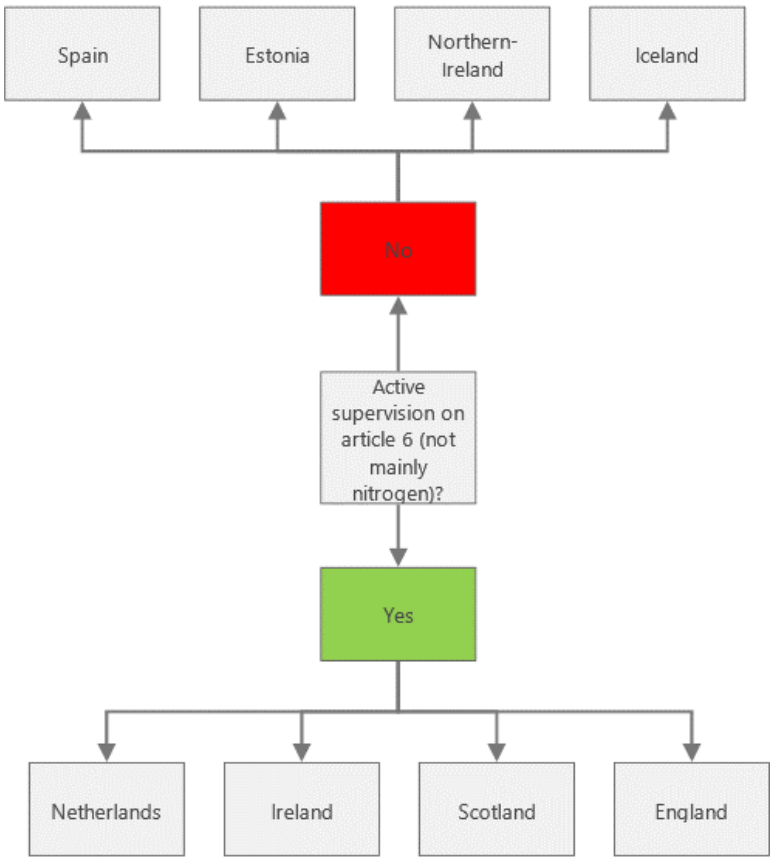
Countries from the survey who apply- or don't apply a Critical Depositional Value (CDV) for nitrogen

* Estonia answered with a 'no' here, the reason for this 'no' is based on own research[19] into exceedances of deposition values and eutrophication in Estonia. This study would show that there is little to no exceedance within Estonia, which is why the choice is not to use a CDV or to apply any supervision & enforcement on it. However, looking at the CCE study, this indicates an excess of 39% of eutrophication by nitrogen, which is quite significant. It is not clear what accounts for this difference in conclusions between the Estonian and the CCE study. If 39% is indeed the base, action on Article 6 of the HD would nevertheless be justified as well as urgently needed.

** Since Iceland has indicated that it has not implemented the HD in national legislation and regulations, there is no question of any CDV on nitrogen here either.

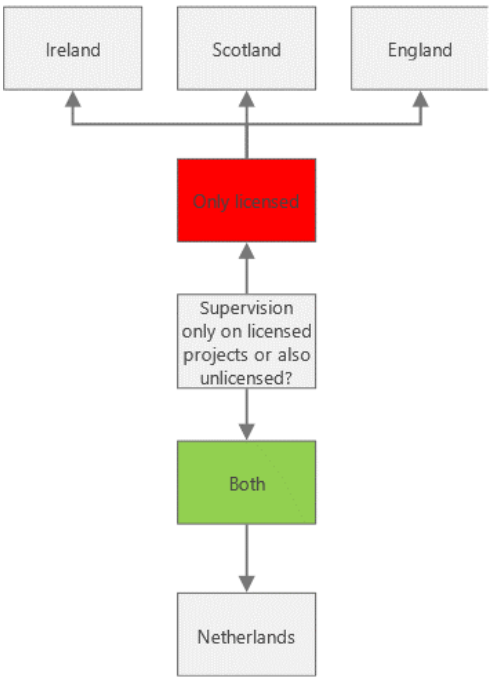
In general it can be stated that without an available CDV, you can't supervise on the deposition of nitrogen. This creates an unwelcome variation in the actual application of Article 6 of the HD by different Member States.

[19] https://www.klab.ee/wp-content/uploads/2020/11/Aruanne_16112020.pdf



Active supervision on the HD

The countries that indicate that they use a CDV also supervise this. Those without CDV, not surprisingly, don't.



Supervision on only licensed- or unlicensed projects as well?

Although the red colour can give a somewhat negative connotation, supervision is of course good. The 'negative' colour means that by only supervising those companies that already have a permit, you create a blind spot. The focus should be on those companies without a license (on the HD) and may therefore be operating illegally, considering the HD. Those who already have a license could get a more 'rewarding' attitude due to less supervision, depending on the situation of course.

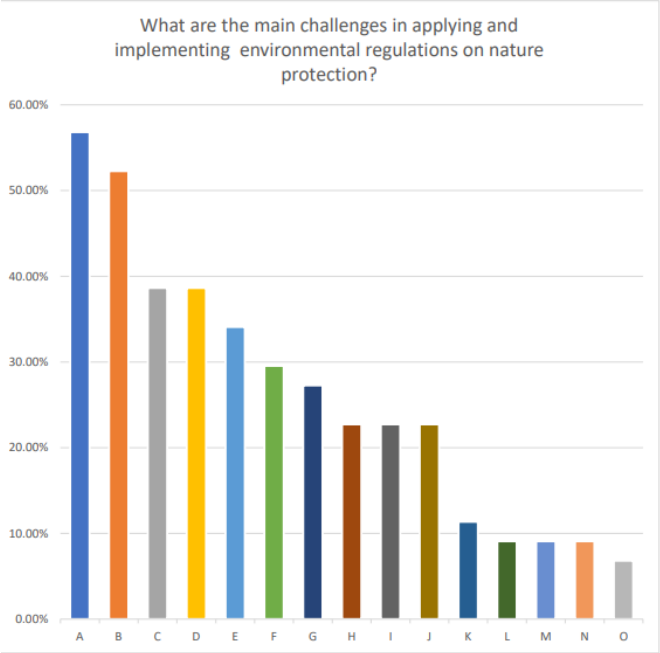
Strategy in place for methodological programming of supervision?

The responses from Member States that actually supervise Article 6 of the HD show that they all do so on the basis of a well-considered risk prioritization for the programming of supervision.

6. Previous work under IMPEL on the HD

6.1 Challenges in the practical implementation of EU environmental law

In 2021 IMPEL research was undertaken on problems related to the implementation and enforcement of EU regulations, specifically nature-related legislation (Habitats and Birds Directive).[20] 30 responses were received from different member states involved with laws and regulations regarding nature. The result is briefly shown in the Figure below.



Letter	Corresponding answer option
A	Preserving/restoring vulnerable protected habitats
B	Management of invasive species
C	Assessing and reducing impacts from activities outside protected areas
D	Detecting illegal change of land use
E	Ensuring implementation of mitigation/compensation measures
F	Combating illegal trade in/trafficking of protected species
G	Drawing up habitat management plans
H	Designating protected areas
I	Creation and management of green spaces
J	Detecting illegal killing of protected species
K	Detecting poaching
L	Detecting illegal fishing
M	Detecting illegal logging
N	Detecting illegal ploughing up of grassland
O	Other

The main sector seen as a threat to the protection of the Habitats Directives and biodiversity **is intensive livestock farming** (67.44 %).

[20] Challenges in the practical implementation of EU environmental law and how impel could help overcome them. 2021 Survey Report. Date of report: April 2022. Report number: 2021/18

21.95% of the respondents indicated that they were not aware of the extent to which intensive livestock farming complies with the habitat guidelines, data is simply being missed.
It was (strangely enough) indicated in 31.71% of the cases that the sector has a high degree of compliance with nature legislation (again in contrast to the 67.44% above). But this can also be due to a lack of insight and good laws and regulations to act with.

Respondents gave varying answers to what the obstacles are to good regulatory compliance. Most said that **a lack of knowledge of the legislation** (46.15%) and **staff capacity** (46.15%) were the **main problems**. **Lack of trained inspectors and appropriate equipment and tools for inspection**, in addition to overly complex legislation, were also identified as barriers.

Nearly half of respondents (42.22%) would **like IMPEL to provide some form of training or guidance, requesting training for prosecutors and those involved in enforcement**. However, a majority of respondents (48.89%) were unsure whether this material would be useful.

6.2 Nature protection in permitting and inspection

In a previously IMPEL project from 2017[21], on the protection of habitats, the use of 'Critical Loads (CL)' such as the CDV has already been raised and named as criteria to be applied to nature areas for their protection, under the habitat regulations.

What has been done with this? Which member states adopted this? An extensive research was carried out under IMPEL on the effects of intensive livestock farming on N-2000 areas, with subsequent advice from the relevant working group.

'3. Main conclusions and proposals for future work
3.1 Main findings
Exchange of knowledge about screening criteria and assessment methodologies, e.g accepted practices: use of Critical Loads (CL), criteria for habitat loss, new approaches.

Another aim was to find out more about instruments, methods and supporting tools that are used in practice in the IMPEL member states

d) Identified impacts of intensive farming projects on Natura 2000 sites, identified threats and pressures on Natura 2000 sites from intensive rearing of poultry and pigs
e) Methodologies for the assessment of nitrogen deposition
f) Information on documents and data to be submitted to the permit authority

[21] Nature protection in permitting and inspection of industrial installations – implementation of art. 6(3) of the habitats directive (phase 3). Development of an IMPEL guidance document pig and poultry farms and Natura 2000 And Updated wind energy development case studies. Date of draft report: March 2017, report number: 2015/14

g) Some examples on criteria for determining significant effects
h) information about screening and assessment tools in practice
This guidance also includes several practical and effective examples and tools, together with links to further information. Examples include the Dutch, German, English, Scottish, Danish, Portuguese, Flemish and Romanian experience and in particular approaches to nitrogen deposition arising from pig and poultry farms and the impacts on Natura 2000 sites.

*'The main purpose of this guidance is to provide information on how best to ensure the consideration of pig and poultry farm impacts on Natura 2000 sites remains in line with the provisions of the Habitats Directive**. It provides specific information related to the appropriate assessments made under Article 6(3) Habitats Directive for pig and poultry farm projects**. This guidance also includes several practical and effective examples and tools, together with links to further information. Examples include the Dutch, German, English, Scottish, Danish, Portuguese, Flemish and Romanian experience **and in particular approaches to nitrogen deposition arising from pig and poultry farms and the impacts on Natura 2000 sites.** The document is intended to be used by competent authorities, permit writers, inspectors, nature protection agencies, sites managers, consultants, enforcement, experts and other practitioners involved in the planning, design, implementation or approval of pig and poultry farms plans or projects, as well as other interested parties such as local communities, nongovernmental organizations and international bodies.'*

According to the Article 6(3) of the 'Habitats Directive' 92/43/EEC, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, **shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.** The appropriate assessment of the impacts of a plan or project on the site, provided for in Article 6(3), enables the competent national authorities to arrive at conclusions regarding the consequences of the proposal in relation to the integrity of the site concerned.

The Habitats Directive does not prohibit the operation of already existing farms or the building of new installations in or near to Natura 2000 sites and their areas of influence; **however it does require an assessment of impacts from the proposal on the nature conservation site to be undertaken.** The operation of both large regulated and smaller non-regulated farms can have negative effect on the conservation status of natural habitats and species of community interest. So far on the European level there is **no guidance document** that deals with the impacts of pig and poultry farms on Natura 2000 sites. This document aims to help populate this gap in knowledge.

Of considerable concern to the implementation of the Habitats Directive in Natura 2000 sites recognized in the IMPEL report ”Building up IMPEL nature conservation capacities” (2013) is related to the appropriate assessments made under Article 6(3), which are often **of poor quality**. Typical issues that are inadequately addressed include assessment of cumulative impacts, analysis of the baseline condition, or drawing conclusions in conformity with the assessment results.

PARAGRAPH 6(3) OF THE HABITATS DIRECTIVE

Paragraph 6(3) states: Any plan or project likely to have a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects, shall undergo an ***appropriate assessment*** *to determine its implications for the site in view of the site's conservation objectives. The competent authorities can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned.*

Conservation objectives: indicates the need for establishing site-related conservation objectives as a necessary reference for identifying site-related conservation measures and for carrying out appropriate assessments of the implications of plans and projects for a site.
Critical loads for eutrophication and acidification are linked to impacts on biodiversity and this can be translated into policy.

The National Emissions Ceilings Directive is currently being reviewed as part of the Clean Air Policy Package. The proposal repeals and replaces the current Union regime on the annual capping of national emissions of air pollutants, as defined in Directive 2001/81/EC. By doing so, it ensures that the national emission ceilings (NECs) set in the current Directive 2001/81/EC for 2010 onwards for SO_2, NO_x, non-methane VOC (NMVOC) and NH_3 shall apply until 2020 and establishes new national emission reduction commitments ("reduction commitments") applicable from 2020 and 2030 for SO_2, NO_x, NMVOC, NH_3, $PM_{2,5}$ and methane (CH_4).

Under Article 6 (3) of Habitats Directive (HD) it is crucial to determine whether a project, such as a livestock farm, can have significant effects on the conservation objectives of a Natura 2000 site and should be subject to an appropriate assessment, a process usually referred to as screening.

As a consequence, all projects (including those related to industrial activities as well as to other activities **such as agriculture**, silviculture, aquaculture, tourism, infrastructures, building etc.) likely to have a significant effect on a Natura 2000 site shall be subjected to an appropriate assessment procedure. The EC Guidance (2000) clarifies that annex this definition is not limited to physical construction, also covering for example a significant intensification of agriculture which threatens to damage or destroy the semi-natural character of a site. **In this context a project can be a new installation or a change (including extensions) in an existing installation.**

The requirements concerning smaller farms differ very much throughout Europe. The findings of the IMPEL project 2014 “Nature protection in permitting and inspection – implementation of Article 6 (3) of the Habitats Directive” and the information of table 3.2, on Annex III, shows that:

A. in some countries all kinds of farms need a permit;
B. in some countries the competent permitting authority is the same for small and large pig and poultry farms, whereas in others local authorities issue the permits for small farms and regional or state authorities are responsible for larger farms and IED installations respectively.

However, regardless of the size and the competent authority responsible, due to their potential impacts on Natura 2000 sites **<u>all</u> new or changing farm projects have to undergo the Article 6 (3) procedure.**

Table 3.2: Threshold for projects of livestock stated in EU legislation and examples from Member States´ legislation

EU/MS	Threshold or criteria applied for livestock projects				
EU	**IED**	**EIAD, Annex I**	**EIAD, Annex II**	**HD**	**Legislation for the permitting of this economic activity**
New projects	*The need for environmental permitting is mandatory for intensive rearing of poultry or pigs: (a) with more than 40 000 places for poultry; (b) with more than 2 000 places for production pigs (over 30 kg), or (c) with more than 750 places for sows.*	*EIA is mandatory for installations for the intensive rearing of poultry or pigs with more than: a) 85000 places for broilers, 60000 places for hens; (b) 3000 places for production pigs (over 30 kg); or (c) 900 places for sows.*	*EIA is mandatory for Intensive livestock installations (projects not included in Annex I), project category not limited to pigs and poultry (Note)*	*Not defined. All projects must be considered*	*Not applicable*
Change projects	*Operators should notify the competent authority of any planned change which might affect the environment.* *Substantial changes to installations which may have significant negative effects on human health or the environment should not be made without a permit granted in accordance with this Directive;* *Any change in the nature or functioning or an extension of an installation shall be deemed to be substantial if the change or extension in itself reaches the capacity thresholds set out in Annex I.*	*Any change to or extension of projects listed in Annex I where such a change or extension in itself meets the thresholds, if any, set out in this Annex;* *Any change or extension of projects listed in Annex I, already authorized, executed or in the process of being executed, which may have significant adverse effects on the environment.*	*Any change to or extension of projects listed in Annex II where such a change or extension in itself meets the thresholds, if any, set out in this Annex;* *Any change or extension of projects listed in Annex II, already authorized, executed or in the process of being executed, which may have significant adverse effects on the environment.*	*Not defined. All changes must be considered*	*Not applicable*

Note: By way of example, national EIA legislation in several Member States explicitly includes the intensive rearing of calves and cattle under this project category. In at least one Member State, this project category i considered to cover amongst other species the rearing of rabbits, ducks, geese and horses. Another Member State includes ostriches and ostrich-like animals (CE, 2015:37).

The most relevant impacts for activities located both within and outside of Natura 2000 site Boundaries, **are primarily due to nitrogen and phosphorus emissions,** which can produce impacts far away from the source via both air and water media.
Under the provisions of Article 6(3) of the Habitats Directive, likely significant effects on Natura 2000 sites must be assessed independently of how far the plan or project is located.

In some Member States standard screening distances for pig and poultry farms are established as in England (UK) where a 10 km screen is implemented on the basis that emissions reaching beyond this distance (following a generic risk assessment) are likely to be inconsequential. **However, this still does not exclude a case by case approach where necessary.**

Ammonia emissions from intensive agricultural systems are the main pollutant to air from this sector, and whose deposition is one of the major drivers of biodiversity loss in Europe. For all industry sectors covered by European Pollutant Release and Transfer Register (E-PRTR), emissions of ammonia from pig and poultry farms **represent 83.2 % of the total ammonia** emissions.

'A key policy tool for mitigating nitrogen pollution has been the critical load of nitrogen input'

Methods for assessing nitrogen deposition impacts on ecosystems are being developed by scientific groups established under the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP).

Using nitrogen critical loads exceedance in the habitats conservation status assessment framework of Article 17 of the Habitats Directive has been **recommended**.

England, **Belgium** the **Netherlands** and **Denmark** have each used empirical nitrogen critical loads to make assessments of the potential impacts on Special Areas of Conservation and/or conservation status. In **Germany**, the guidance for road construction projects issued by Federal for Agency for Road Construction proposes the use of modelled critical loads for the assessment of impacts of nitrogen deposition **on Natura 2000 sites arising from traffic**.

The Danish approach can be found in NERI Technical Report No. 647, 2007. 'Criteria for favorable conservation status in Denmark'. Natural habitat types and species covered by the EEC Habitats Directive and birds covered by the EEC Birds Directive'. For habitat types, critical loads for nitrogen deposition in kg/ha/year UNECE 2003 are used to assess the habitat structure and function of the area. For example, for the Annex I of the Habitats Directive habitat type 7110 - *Active raised bogs, the following criteria for the assessment of the conservation status regarding nitrogen deposition are set in Table 4.

Table 4: Criteria for the assessment of the conservation status regarding nitrogen deposition for habitat type 7110

Type 7110	Property	Unit of measurement	Criteria	Comments
Structure and function	Naturally low nutrient level	Nitrogen deposition (kg/N/hectare/year)	Nitrogen deposition should not exceed the level laid down	Critical load 5-10 kg/N/year, UNECE 2003

Source: NERI Technical Report No. 647, 2007

The method is proposed in 'Critical Loads based nitrogen deposition assessment for Habitats Directive Article 17 reporting' (Whitfield, Hettelingh and Hall, 2013). It includes the following steps:

- Step 1: Applying critical loads of nitrogen deposition from Bobbink and Hettelingh 2011 to Annex I of the Habitats Directive habitats.
- Step 2: Mapping critical loads.
- Step 3: Obtain and map available nitrogen deposition data for the most recent year available and if available a future scenario e.g. 2020. (At the European level, estimates of deposition are available through EMEP26[22])
- Step 4: Generate exceedance estimates
- Step 5: Record nitrogen deposition as threat to future prospects

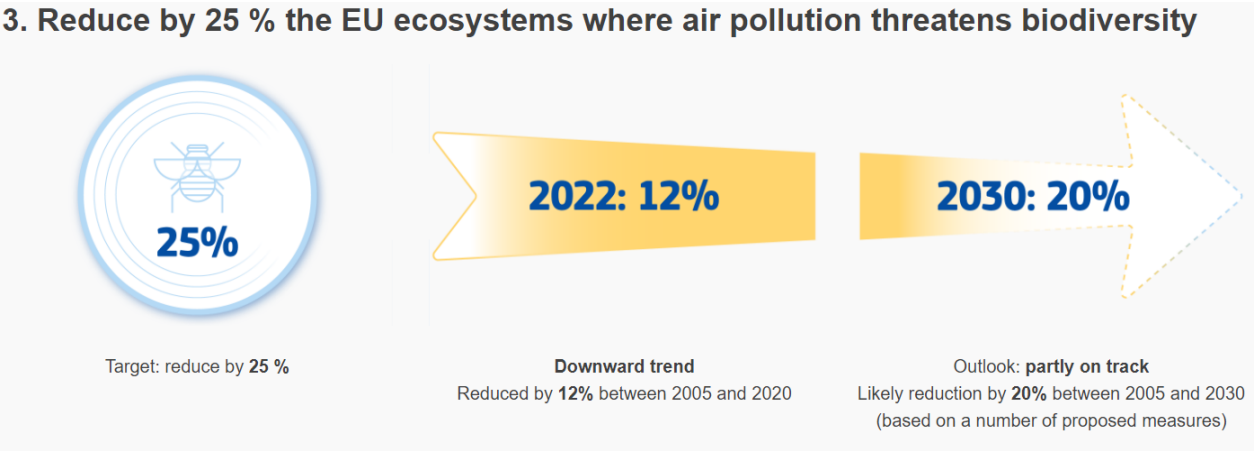
[22] http://webdab.emep.int/Unified_Model_Results/AN/

7. Habitats Directive and zero-pollution plan

The zero pollution vision for 2050 is for air, water and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, that respect the boundaries with which our planet can cope, thereby creating a toxic-free environment.

This is translated into key 2030 targets to speed up reducing pollution at source. These targets include:

- improving air quality to reduce the number of premature deaths caused by air pollution by 55%;
- improving water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%);
- improving soil quality by reducing nutrient losses and chemical pesticides' use by 50%;
- **reducing by 25% the EU ecosystems where air pollution threatens biodiversity;**
- reducing the share of people chronically disturbed by transport noise by 30%, and significantly reducing waste generation and by 50% residual municipal waste.[23]



If one wants to achieve the set targets as described in the zero pollution plan, a more active management of the correct use of the HD is indispensable. As the relevant research has shown, the legislation and regulations for combating further biodiversity loss, caused in particular by too high levels of nitrogen deposition (see chapters 3 and 4), are already available for regulators to use.

[23] https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en

Thus, by using Article 6 of the HD with correctly used limit values to restrict further nitrogen deposition, use in permitting and an active supervision on this.

The fact that this does not always happen has led to calls for tighter control from the European Commission. Stricter requirements within the new IED with has not been passed, so still only covers a very small part of livestock farms, with companies that remain below these limit values that are not hindered much by rules on emission reduction. In view of the often poor condition of natural areas due to excessive nitrogen deposition, regulators should consider that environmental damage to natural areas could be counteracted by correct use of the HD. You don't need the IED to enforce stricter emission requirements, this is enforceable through the HD.

With the elimination of stricter control via the IED, the HD remains as the main element to still achieve the objectives of the zero-pollution plan. But to achieve this, member states must actively utilize the HD for this purpose.

8. Recommendations Article 6(3) of the HD regarding livestock farming

As been pointed out under the problem statement and urgency, as well as the analysis of the current state conservation of natural habitats regarding nitrogen (and acidification), conservation of the natural habitats are falling short. **The current state of nature reserves**, regarding eutrophication and acidification, mainly caused by high deposition levels of nitrogen, **is, in general, very poor**.

The main reason of this is that many of the member states fail to address this problem by determining an appropriate level of the needed Critical Load (CL) regarding nitrogen, or having no CL on nitrogen at all or the permitting and enforcement isn't carried out appropriately (reason can vary such as understaffing, inadequate tools to actually determine the deposition of a site, shortcomings in knowledge etc.).
This might be because it is not (properly) imbedded in legislation, so it is useable for permitting.
In other examples the CL for individual projects is simply (much) to high, not addressing the problem properly.

There is also much uncertainty about the authority on permitting of this specific part, or being able to enforce on it through supervision. In many cases no emission cuts through low emission housing systems are prescribed in the permit, making it difficult, as not impossible to enforce (what to supervise on then? Mainly only animal count or any adjustments made in the installation remain).

As long as the CL is not being exceeded by the individual project, livestock farms continue to grow (with or without a HD permit), even though the CL in general is already exceeded (see CCE report 2022) and so the growth will generate even more pressure on the already exceeded habitats.

All this will potentially eventually lead to the same problems as currently in the Netherlands (complete permit standstill as every new project adds more deposition of nitrogen on already heavily exceeded natural sites).

In order to prevent this, a change in handling of Article 6 of the Habitat Directive is needed. While there might not be a judicial problem at the moment, there is an actual problem, and the longer that member states wait to take action, the bigger the problem will get **when (not if)** it is ruled on in the judicial system (see the Netherlands yet again).

In chapter 7 the interdependence between the HD and the zero pollution plan is further explained. But it is already clear in advance that the goals set in the zero pollution plan will **not** be achieved as long as the CL for nitrogen is not correctly implemented, measured, licensed and enforced.

Considering the content of the relevant report so far, the following concrete recommendations can be made. A shortened step-by-step plan outlines it, first described in more detail below.

The first step will be (next to including the HD in national laws and regulations) to first establish a national critical deposition value with regard to nitrogen, as well as to **review** existing ones, since the CCE report shows that the degree of exceedance is considerable within Europe, also in those countries that already have a CDV. Although it is realized that this is beyond the sphere of influence of many 'regular' executive services or departments for environmental supervision, it is necessary to realize this. Looking at the conclusion of the CCE *'However, even under the most ambitious scenario 2050 LOW **22% of European ecosystems would still be exposed to nitrogen deposition beyond Critical Loads.**"* it simply cannot be said that (if any) existing CDVs are sufficient to protect nature. This is simply not the case. Preferably, a signal is hereby issued 'upwards' by these same departments.

Second, a calculation tool is needed to be able to convert emissions into deposition which descend upon a nature reserve. This tool will have to be used in both the permitting and supervision process to determine the degree of deposition. Whether this deposition is then low or too high will have to be determined based on the established limit value as indicated under 1 (step-by-step plan). See already known calculation tools as used in the Netherlands (Aerius), Ireland and Scotland (SCAIL) and Estonia (Kotkas). This is an overview given in the answer to the survey.

Thirdly, it will have to become standard procedure that a screening (as referred to in Article 6 of the HD) is carried out with every permit procedure to ensure that the project with its modification, for which a permit is required, does not have any significant negative effects on a nature reserve. This is only possible with a first proper assessment of the nature reserve on whether any critical deposition values (CDVs) are exceeded. The permit can only be granted if it can be ruled out that the project will not have any significant negative effects on nature sites, which usually means that no additional deposition may be released if the nature area concerned already exceeds CDVs. As an example of how this is handled in the Netherlands, if the company does not yet have a permit under the HD:

In the Netherlands there are 2 designation dates for nature areas under the HD; 1994 or 2004. At the moment when a company applies for a license while there is no underlying HD license yet, there is therefore no licensed situation from which it can be assumed whether the intended change will cause a deterioration (in the case of a license that has already been granted, you simply check whether the deposition increases or decreases compared to the permit already granted).
In the Netherlands, if there is no initial situation (ergo: no permit) a project fall's back on what we call 'the reference situation'. This means as much as 'that which was permitted on location even before the designation of the nature reserve where deposition takes place' or the permit with the lowest permission of nitrogen-emission since that date.

Example; in 2003, farmer X had a permit for cows with a total of 1.000 kg NH_3 per year, in 2004 a nature reserve 500 meters away was designated under Natura 2000. It is decided to expand in 2023, but they do

not have a nature permit. Its reference is that 1.000 kg NH_3 from 2003, a difference calculation must be made between its situation in 2003 and the proposed change. The nitrogen emission load must not be more than the load on each Nature 2000 area in 2003.

N.B. If the company has changed after 2004 (without a nature permit) whereby there is a reduction in ammonia emissions, that is the reference situation, in such a case he is not entitled to more emissions on the basis of his old permit from 2003. This does not work the other way around, if one has already grown in emissions after 2004 then this is illegal.

If the licensing authority itself is not responsible for granting permits under the HD, then it will have to be properly laid down in procedures that the nature permit is linked separately via a separate procedure and the 'regular' permit cannot be granted until this nature permit has been obtained (or may be granted, but may not be used). The situation most always be rated from the situation the most advantageous for a Natura 2000 area.

In the event of the CDV being exceeded due to the proposed change, it is up to the initiator to take sufficient measures to nullify this exceeding. This by e.g. adjustments in stables to reduce emissions (such as air scrubbers).

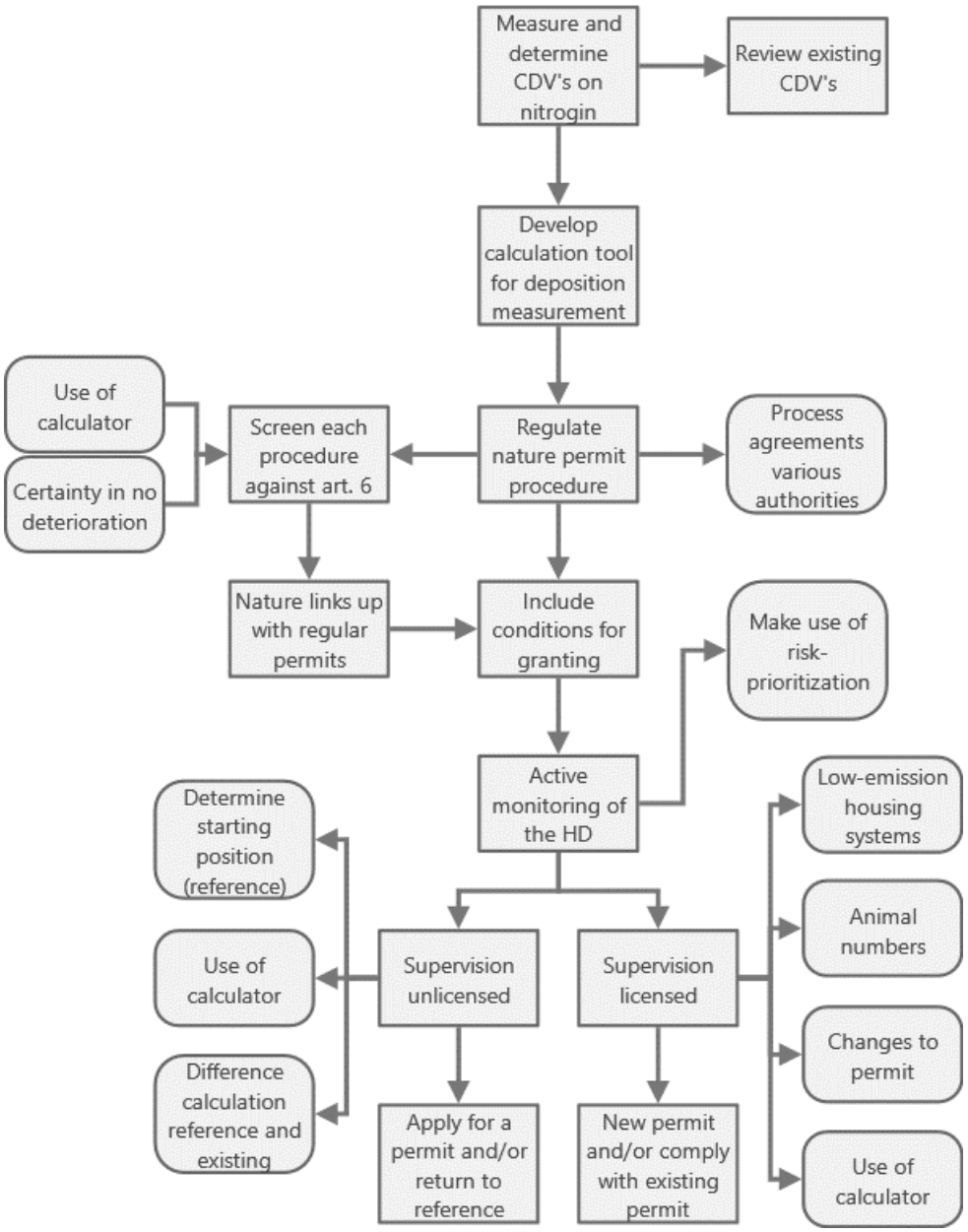
In addition to a sound permit procedure, reserved for an authority with sufficient capacity, policy will also have to look at (undesirable) side effects that we are currently experiencing in the Netherlands. We call one of the most important of these 'latent space', which means that a permit holder reserves (much) more ammonia emission space than the initiator will ever actually use. In fact, he reserves a larger piece of cake for himself, for possible need in the distant future which are not certain. This puts developments in his immediate vicinity on hold, since the much-needed nitrogen space is now fixed in his company, so that neighbours A, B and C cannot expand. You will therefore have to develop a withdrawal and enforcement policy. How to deal with latent space? Build in an 'automatic expiration moment' in case the licensed rights are not used in full? Make revocation of this space legally possible, and preferably easy for your supervision. Please note that you always keep fluctuations in animal density within livestock farming, this concerns permanently unused space (unbuilt stables / demolished stables, unused stables).

As a final element, proper supervision and enforcement will have to be drawn up. It will have to be ensured that the proposed projects are actually carried out as requested. Are the emission reduction systems operating properly? Is there no exceeding of the number of animals than permitted? Do the emission points match the permit?
Even more important may be the correct inspection of those companies without a permit, to prevent you only looking at those situations that are already licensed. Because regardless of the fact that one does not have a permit, this should probably be the case (remember the reference situation mentioned earlier).

What about the CDV exceedance in the nearby nature reserve (remember, according to CCE 2022, the average exceedance within the EU-27 is **71%!!**)?
What was the reference situation and have changes occurred since then? If so, are they licensed? Even small changes with a close distance to a Natura 2000 area can have big effects on that area. If not, can this be licensed or must the entrepreneur take measures to reduce his company's emissions?

What has been described in more detail above is set out below in a more clear process diagram and abbreviated step-by-step plan:

1. establish CDV's on nitrogen or review existing CDV's and act on it;
2. develop (or copy hence there are already several there) an adequate calculation tool to determine depositions for use in both permitting and supervision;
3. standardize the permit process for nature. Make nature a permanent part of the regular procedure, without proper screening (in accordance with art. 6 of the HD) the permit cannot be granted;
4. develop sound policy around the reference situation (conditions) and a revoke and enforcement policy. Permits can only be granted if nature is not demonstrably deteriorating an let the initiator demonstrate that there is no harm in accordance with art. 6 of the HD;
5. in addition to policy for implementation, strong policy is also needed at the administrative level. This by means of setting up programs to curb nitrogen loads. Also think about questions like; 'how do you determine which individual project makes the bucket (called CDV) overflow? Because that project is significant. What is the definition of significant (as mentioned in Article 6 HD). And what about cumulation of projects with a deposition? The individual project-concept approach also seems to be getting stuck in the Netherlands;
6. organize supervision and enforcement in accordance with a solid prioritization. Think of risk indicators such as A. level of emissions on site B. location of company in relation to nature (closer to it scores higher) C. reduction systems present (the more systems, the greater the risk of failure of those systems). In addition to licensed locations, also involve non-licensed locations!



Processmap regulating permitting and supervision on the HD

Annexes

Country	Province / State	Department / agency	Is your department authorized to supervise and enforce the HD?	If no under 4, can you name the authorized department? If you have a contact within this authorized department, please add this in youre answer	Is there a critical deposition value/load established in legislation as a threshold for nitrogen (wet/dry deposition thru the air) on natural habitats, in your country or province / state?	If yes under 6, what is the critical deposition value/load?	Is there active supervision and enforcement of Article 6 HD, in particular nitrogen deposition from livestock farming?
Netherlands	Noord-Brabant	Omgevingsdienst Midden- en West-Brabant	Yes		Yes	0	Yes
Poland	Mazovian Voivodeship	Chief Inspectorate of Environmental Protection	No				
Ireland	National	Environmental Protection Agency	Yes		Not in legislation but there is guidance with critical loads for certain Natura 2000 sites.	The value is habitat specific. For example in a sensitive habitat the critical load may be 5kgN/ha/yr (active raised bog) but in a less sensitive habitat (salt meadow) it may be 20-30kgN/ha/yr.	Yes
England	England	Environment Agency	No	Natural England We will consult Natural England when determining IED Pig and Poultry permits and seek their advice to inform our permit decision and permit conditions.	Not set in legislation. Critical Load thresholds are determined by best available scientific advice	Critical Load value is dependant on the sensitivity of the site N Deposition values range 5kgN to 30KgN. For ammonia we use the internationally recognised 1 and 3 ugm3 critical level values	Yes

Spain	Galicia	Inspección ambiental. Xunta de Galicia	No	Direccion General de Patrimonio Natural. Conselleria de Medio AMbiente. Xunta de Galicia	No		No
Iceland	Iceland	Environment Agency	No	Iceland has not implementet the HD			
SPAIN	REGION DE MURCIA	DIRECCION GENERAL DE MEDIO AMBIENTE	No	DIRECCION GENERAL DE MEDIO NATURAL	I have spoken with the competent department of housing regulations, which issues reports that are used to obtain the permit or the environmental impact assessment, they have explained to me that they inform the object of species of flora and fauna or other natural values. For purposes of nitrogen emission value, it is not within their competence, they have explained to me.		No
Estonia		Environmental Board	No	Environmental Board, but a different department (may be split between several departments)	No		No
United Kingdom - Northern Ireland		Department of Agriculture, Environment & Rural Affairs - Northern Ireland Environment Agency	Yes		No		No
Scotland	Scotland	Scottish Environment Protection Agency	No	NatureScot	no domestic legislation, objectives of the Gothenburg Protocol.		Yes

Part 2:

Country	If yes under 8, is this the case for both licensed and unlicensed companies?	Is there any use of tools like a calculator for ammonia emissions or nitrogen deposition? And if yes, can you add the calculator via link or attachment with guidance of use of this tool?	Can you describe how this supervision takes place? Think of a nitrogen calculation, checking the functioning of the housing system and licensed animal numbers, etc.	Can you estimate how many of these inspections take place on an annual basis?	Is there an strategy / methodology in place for selecting facilities for inspection on the HD? If yes, can you share this strategy as attachment?
Netherlands	Both	Yes	An onsite inspection is carried out. During this inspection the enforcer will look into the functioning of the housing systems, the compliance with the permit (if granted), the number of animals and will make an nitrogen calculation in order to determine the level of deposition of the site on neighbouring Habitats and if it exceeds the allowed critical deposition value or that what is permitted	Regarding only the provincie of Noord-Brabant: 1027	Yes
Poland					
Ireland	Licensed	Yes, https://www.scail.ceh.ac.uk/	1. ELVs in the licence, 2. animal number restrictions, 3. ammonia monitoring requirement. Livestock levels restricted via Industrial Emissions licence based on emission factors and housing type. Enforcement look at stocking levels during inspections.	Target is once every 3 years. Also inspected on receipt of complaints. Approximately 110 per year.	Yes. A priority list for problem sites (mostly odour). All licenced sites are inspected once every three years.
England	Licensed	Yes	The Environment Agency assesses the impacts of ammonia emissions using screening tools such as SCAIL (https://www.scail.ceh.ac.uk/cgi-bin/agriculture/input.pl) and ADMS modelling tools. The permit limits the number of animal place, this is checked during compliance visits. The housing system is also checked to ensure ammonia emissions are being managed to BAT and the original impact assessment which determined emissions would be below allowable critical level and load thresholds.	We may visit a farm to check compliance once a year. Assurance Scheme inspectors can check farms on our behalf. Environment Agency officers will also check farms.	There is a framework for targeting inspections of Intensive pig and poultry farms that fall under IED. These permits have controls to limit impacts of ammonia. Other types of farms are inspected based on a number of risk factors. That may include the status of a nearby Habitats Directive site - but the focus will be on Water Framework Directive targets rather than Air Quality
Spain		No	There is no monitoring, nor measurements on ammonia emissions from farms	none	Unknown
Iceland					
SPAIN		Calculadora de Nitrógeno. This web application has been developed to perform the calculations Determination of the nitrogen fertiliser dose. Nitrogen balance on action programmes on the areas vulnerable to nitrate pollution from agricultural origin in the Region of Murcia. https://www.carm.es/chac/calcunitro/	It is calculator oriented to nitrogen doses for crops.	no data	Unknown

Estonia		There is an ammonia emission calculator, but it is integrated into the management system for environmental decisions/permits (https://kotkas.envir.ee/). To find it, you need to log in and start filling out the permit application and it is in the section where you need to write down the emissions of the installation). This calculator is based on legal regulation (https://www.riigiteataja.ee/akt/122122016004) and is developed by Estonian University of Life Sciences (www.emu.ee).	There is no active supervision of nitrogen deposition from livestock farming.	There is no active supervision of nitrogen deposition from livestock farming.	No
United Kingdom - Northern Ireland		Yes	During the determination of Pollution Prevention & Control intensive farming permits. Also, through planning applications - NIEA-DAERA have a consultancy/ advisory role.	Approx. 200 PPC Farm inspections take place per year to assess compliance with conditions in PPC permits.	Unknown
Scotland	Licensed	SCAIL Agriculture	Assessment of proposals for new pig and poultry installations above the PPC thresholds	110	Yes

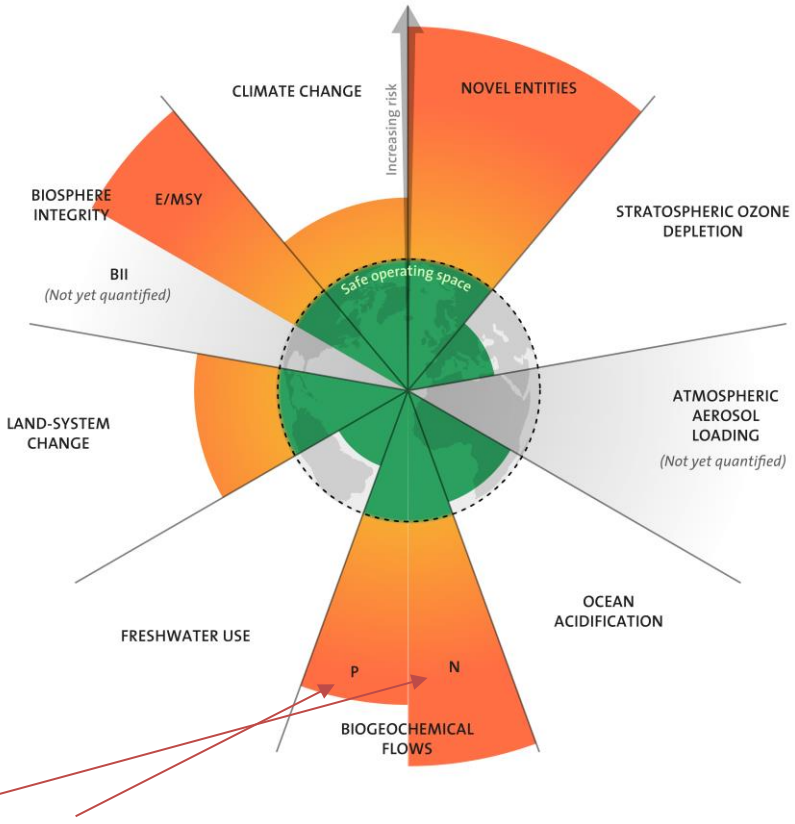
Given answers on the HD-survey

	Country	Province / state	CDV on N in legislation?	Active supervision of HD?	Supervision on licensed- or unlicensed farms?	Use of calculation tool for emissions or depositions?	Number of inspections on HD annualy	Strategy or methodology for selecting inspections?
Answers	Netherlands	Noord-Brabant	Yes (thru use of guidance)	Yes	Both	Yes	Fluctuates. For specific province 2022: 1.027	Yes
	Ireland	National	No, use of guidance	Yes	Licensed	Yes	1 x 3 years, about 110 a year	Yes
	Poland	Mazovian Voivodeship	Unknown	Unknown				
	UK	National	No, use of scientific advice	Yes	Licensed	Yes	once a year	Yes
	Spain	Galicia & Murcia	No	No		No		
	Iceland	National	HD not implemented in law	No				
	Estonia	National	No	No		Yes		
	UK - Northern Ireland	Northern Ireland	No	No		Yes		
	Scotland	Scotland	Gothenburg Protocol	Yes	Licensed	Yes	110	Yes

Annex II Planetary boundaries / Donut-model

Planetary boundaries

The concept of planetary boundaries was introduced in 2009 by the Swedish earth scientist Johan Rockström. He identified nine boundaries within which humanity must operate in order to continue to make sustainable use of the Earth's resources. Those planetary boundaries are: global warming (greenhouse effect), **loss of biodiversity**, **closing of the nitrogen and phosphorus cycle**, hole in the ozone layer, ocean acidification, water scarcity, land use (restrict agricultural land), chemical pollution of toxic substances and plastics; and the concentration of harmful compounds in the atmosphere.
Many boundaries have almost been crossed or have already been crossed.
The exact values of the boundaries are arbitrary, but the approach is seen as a promising first step for the safe survival of humanity.[24]



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Nitrogen and phosphorus flows to the biosphere and oceans

[24] https://www.wur.nl/nl/nieuws/leven-binnen-de-planetaire-grenzen-is-de-grootste-opgave-voor-de-wereldbevolking-.htm

[25] Licenced under CC BY-NC-ND 3.0 Credit: "Azote for Stockholm Resilience Centre, based on analysis in Persson et al 2022 and Steffen et al 2015".

The biogeochemical cycles of **nitrogen** and phosphorus have been radically changed by humans because of many industrial and **agricultural processes**. **Nitrogen** and phosphorus are both essential elements for plant growth, so fertilizer production and application is the main concern.
Human activities now convert **more atmospheric nitrogen into reactive forms than all of the Earth's terrestrial processes combined**. Much of this new reactive **nitrogen is emitted to the atmosphere in various forms rather than taken up by crops**. When it is rained out, **it pollutes waterways and coastal zones or accumulates in the terrestrial biosphere**.

Similarly, a relatively small proportion of phosphorus fertilizers applied to food production systems is taken up by plants; much of the phosphorus mobilized by humans also ends up in **aquatic systems**. These **can become oxygen-starved as bacteria consume the blooms of algae that grow in response to the high nutrient supply**. A significant fraction of the applied nitrogen and phosphorus makes its way to the sea, and can push marine and aquatic systems across ecological thresholds of their own. One regional-scale example of this effect is the decline in the shrimp catch in the Gulf of Mexico's 'dead zone' caused by fertilizer transported in rivers from the US Midwest. [26]

Donut-model
According to Raworth, an economy is well organized if no planetary boundaries are crossed: climate change must not go too far, **biodiversity must be preserved** and the oceans must not acidify. That's the outer ring of the donut. At the same time, it is not the intention to sink through the bottom: we want to meet basic human needs. Therefore, there must be a minimum of health care, income or social equality. That's the inner ring of the donut. In the donut dough, the economy can safely flourish.

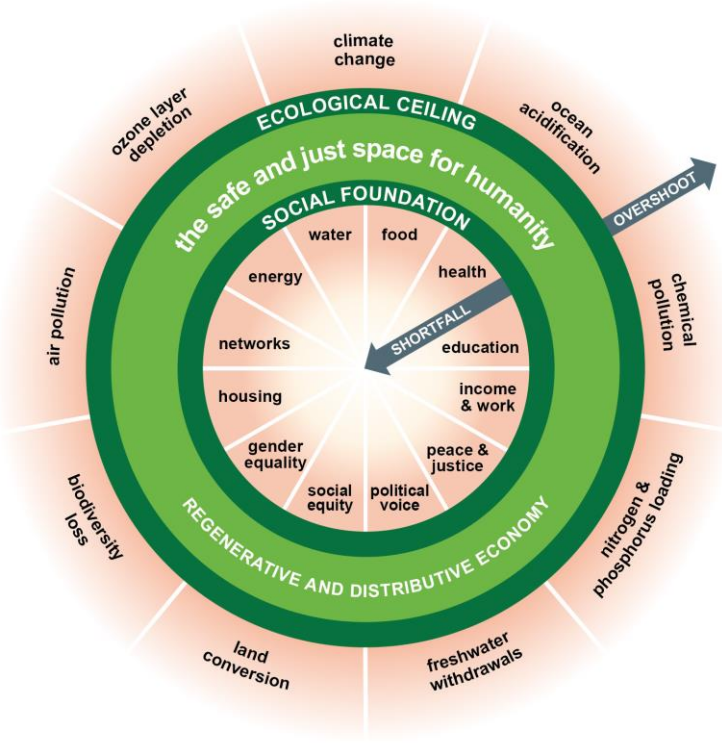
Growth cannot go on forever (but we already knew that).
The subjects that Raworth addresses are therefore far from new. The famous report Limits to Growth from 1972, among others, already describes in detail that the earth is not an inexhaustible source of raw materials. The Club of Rome, responsible for the publication, therefore already warned of catastrophes if economic growth continued unbridled. At that time this was still quite shocking news, nowadays knowledge about the misery caused by climate change, **nitrogen deposition**, depletion of agricultural land and pollution has increased sharply. Fewer and fewer economists are convinced that growth can continue indefinitely.

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their needs.

The social lower limit that Raworth describes does not come out of the blue either. The SDGs, and earlier, for example, the Millennium Development Goals (from 2000), already emphasized that

[26] https://www.stockholmresilience.org/research/planetary-boundaries/the-nine-planetary-boundaries.html

education, health care and combating child mortality should be given priority in order to guarantee a liveable world.[27]



[28]

The donut-model by Kate Raworth

Several scientific studies and publications warn against dangerous levels of nitrogen and phosphate emissions and their consequences for sustainability and biodiversity. As can also be seen in Kate Raworth's Donut Model & Johan Rockström's planetary boundaries, we have already passed the limit for a 'safe operating space' (also see chapter 4 regarding the CCE study). Regarding the nitrogen & phosphorus loading we already are in the overshoot situation. The consequences of this are currently mainly expressed in the Northern countries, with the Netherlands & Belgium as canaries in the coal mine. It is clear that this subject has been neglected for too long, and action is needed.

[27] https://www.mvonederland.nl/news/kate-raworth-de-nieuwe-economie-is-een-donut-economie/?psafe_param=1&gclid=CjwKCAjwhJukBhBPEiwAniIcNWSR85YPFTJieZczqQ2-OIqDkjFpeodWKVBfBd86fZ9CUOS_TA_MzhoCaX8QAvD_BwE

[28] Beeld door DoughnutEconomics – Eigen werk, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=75695171