Status of European critical loads focus on nitrogen.

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1. Status of European critical loads with focus on nitrogen

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1.1 Background

The Working Group on Effects (WGE), in its twenty-fifth session, approved the proposal of the ICP Modelling and Mapping to make a voluntary call for data with focus on nitrogen. It also recommended the use of the collaborative report commissioned by the CCE ‘Development in deriving critical limits and modelling critical nitrogen loads for terrestrial ecosystems in Europe’ (De Vries et al., 2007) as information for National Focal Centres (NFCs) for the call for data.

The CCE issued a call for voluntary data in the autumn of 2006. The voluntary nature of this call was intended to give scientific and technical leeway to the NFCs for testing new knowledge, prior to possible revisions of the 1999 Gothenburg Protocol and the Thematic Strategy for air pollution of the European Commission. The latter may require an update that will be formally adopted for use in integrated assessment modelling, i.e. based on a possible call for data in the autumn of 2007.

To support the call CCE had prepared, in collaboration with the Stockholm Environment Institute (SEI), a harmonized land cover database (see chapter 5) which covers the geographic domain of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants (EMEP). It is based on CORINE (Coordination and Information on the Environment) country-specific land cover information, where available, complemented with SEI data. It includes a translation from CORINE/SEI to EUNIS (EUropean Nature Information System) classes. This database could assist NFCs to verify ecosystem coverage, enable CCE to verify submitted data on empirical critical loads and provide information for Parties that have not submitted critical load data. The CCE used it to extend and update its background database, which now includes empirical critical loads (see Chapter 6), and enables the calculation of critical loads for acidification and eutrophication in countries in Eastern Europe, Caucasus and Central Asia (EECCA) (see chapter 7).

In response to the call for voluntary data the NFCs were requested to participate in:

1. a preliminary application of a broad range of critical limits in simple mass balance calculations to address biodiversity, as proposed in De Vries et al. (2007);
2. an application of empirical critical loads (Achermann and Bobbink, 2003) to (i) those EUNIS classes for which NFCs provided computed critical loads, and (ii) to Natura 2000 (N2K) sites. This work could improve the robustness of the European critical loads database, and could facilitate the interpretation of exceedances in a more biological context. Existing documentation on empirical critical loads is more explicit with respect to biological impacts then those related to exceedance of modelled critical loads;
3. an exploration of the possibility for dynamic modelling of eutrophication, taking into account available data (e.g. for the Very Simple Dynamic model (VSD), and more complex as described in De Vries et al., 2007)

The response to the call for data led to new information in comparison to earlier calls. Now, in addition to the traditional modelled critical loads, *CLnutN*, a number of NFCs extended their database to also include empirical critical loads, *CLempN*. This distinction will also be made in this chapter when describing the use of updated critical loads for the computation of average accumulated exceedances (AAE) and the percentages of area at risk.

The following sections provide a summary of the results of the call for voluntary data on critical loads for acidification and eutrophication and dynamic modelling variables, including exceedance maps. A more detailed overview and analysis of national data submissions regarding critical loads and dynamic modelling variables is presented in chapter 2, whereas country reports can be found in Part II of this report.

1.2 Response to the call for data

The CCE issued a call for voluntary contributions on empirical critical loads, modelled critical loads of acidification and eutrophication and dynamic modelling in November 2006. The deadlines for data submission were set as 28 February and 31 March 2007, respectively. The results are presented in Table 1-1. Nineteen parties responded to the call for voluntary data of which 17 countries submitted modelled critical loads, 12 responded to the first time call for empirical critical loads and 11 submitted data for dynamic modelling.

***Table 1-1**. The response of Parties to the Convention to the call for voluntary data.*

Country code	Country	Modelled critical loads of sulphur and nitrogen	Empirical critical loads of nitrogen	Critical loads for N2K areas	Dynamic modelling
AT	Austria	X	X	X	X
BE	Belgium	X	-		X
BG	Bulgaria	X	X	X	-
BY	Belarus	X	-		-
CA	Canada	X	-		X
CH	Switzerland	X	X		X
CZ	Czech Republic	-	X	X	-
DE	Germany	X	X	X	X
FR	France	X	X	X	X
GB	United Kingdom	X	X	X	X
IE	Ireland	X	X		-
IT	Italy	X	-		-
LT	Lithuania	X	-		-
NL	Netherlands	X	X		X
NO	Norway	X	X		X
PL	Poland	X	X	X	X
SE	Sweden	X	-		X
SI	Slovenia	-	X	X	-
UA	Ukraine	X	-		-
Total	19	17	12	8	11
EU-27	14	12	10	8	8

Note that the results for Belgium are limited to Wallonia, and that Canada, Lithuania and Slovenia submitted data for the first time. Reports describing the country submissions can be found in PART II. Not all Parties submitted reports to substantiate their results.

The updated European critical load maps and data statistics were presented at the seventeenth CCE workshop (Sofia, 23–25 April 2007) and the twenty-third Task Force meeting (Sofia, 26–27 April 2007) of ICP Modelling and Mapping. Belarus, Canada, the Czech Republic and Ireland submitted data after the Task Force meeting within the agreed period for revisions.

The Task Force noted the current European dataset on empirical critical loads covered a large part of Central and Western Europe and that differences between empirical and modelled critical loads existed. It recommended to use both the computed critical load for eutrophication and appropriate ranges of empirical critical loads, provided by Achermann and Bobbink (2003), and results from the Workshop on effects of low-level nitrogen deposition (Stockholm, 28–30 March 2007) as measures of risk of nitrogen deposition to biodiversity. It also noted that values for critical concentration in the leachate could be obtained using Swedish and Dutch data, as provided in De Vries et al. (2007). The values should be used with caution, for instance in regions with extreme precipitation.

It recommended the WGE at its 26th session to request the CCE to issue a call for data on empirical and computed critical loads and dynamic modelling to Parties under the Convention at the end of 2007.

Results of the new call are proposed to become available to the TFIAM in 2008 for the support of the possible revision of the Gothenburg protocol under the LRTAP Convention and of the Thematic Strategy on Air Pollution under the European Commission.

1.3 Maps of critical loads of nitrogen

Figure 1-1 shows modelled critical loads of nutrient nitrogen (left) and empirical critical loads (right) based on data provided by NFCs and on the CCE background database for countries that did not submit data. Comparison of both maps lead to a number of observations. First, *CLnutN* tends to be lower than *CLempN* in almost the whole of Europe. Empirical critical loads lower than 200 eq $ha^{-1}a^{-1}$ do not occur. Second, ecosystems in the north of Fennoscandia are more sensitive to eutrophication than those in the rest of Europe, irrespective of the kind of critical load. Third, the 5^{th} percentile *CLempN* of most ecosystems lies between 700 and 1000 eq $ha^{-1}a^{-1}$, while most of the 5^{th} percentile *CLnutN* fall in the ranges 200-400 and 400-700 eq $ha^{-1}a^{-1}$.

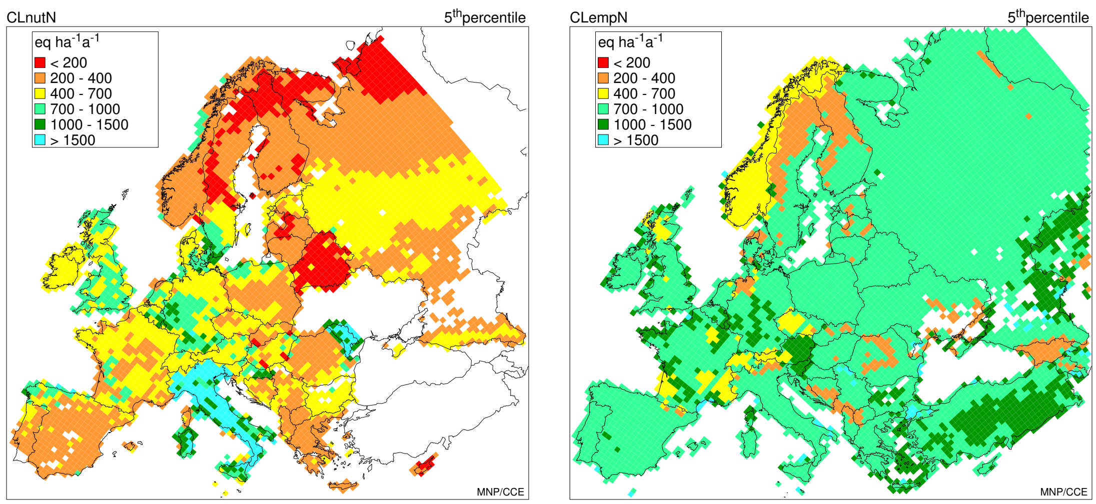

Figure 1-1. *The 5^{th} percentiles of the modelled critical loads of nutrient nitrogen for all ecosystems (left) and of the empirical critical loads (right) on the EMEP50 grid.*

The reasons for these differences are not straight-forward. Empirical critical loads are based on qualitative expert opinions that have been classified in ecosystem specific ranges. The expert opinions are based on biological (vegetation) impacts that have been reported at (elevated) nitrogen deposition levels (Achermann and Bobbink, 2003). Modelled critical loads of nitrogen are based on limits regarding nitrogen in the soil solution. Adverse N-effects occur, according to current applications of geo-chemical models, when the critical nitrogen concentration in the soil solution is violated. Depending on the value of the nitrogen concentration and subject to the variability caused by combinations of vegetation classes (uptake), soil types (denitrification) and meteorology (precipitation surplus), the Simple Mass Balance model can arrive at any positive number value for *CLnutN*. This explains the higher discriminatory power of European *CLnutN* compared to the qualitative *CLempN*. The fact that *CLempN* is generally higher than *CLnutN* seems to be related to the incomplete way by which values of critical limit parameters – relevant to *CLnutN* – can be associated to ranges of biological effects that have been assigned to *CLempN*. Current and near future work of the ICP M&M – with more focus on vegetation modelling – aims to remedy this discrepancy. Meanwhile, both the ranges of empirical critical loads and information on critical limit concentrations (See the instructions to NFCs in Appendix B) were provided to the National Focal Centres to assist them in responding to the call for voluntary contributions.

Finally, it is noted that NFC data can now be used to produce critical load maps for all ecosystems as illustrated in Figure 1-1, but also maps focussing on critical loads for distinctive EUNIS classes and for Natura 2000 areas. For countries that do not submit data, the CCE background database can be used. A compilation of a relevant background database for critical loads of Natura 2000 areas is currently in preparation.

1.4 Critical load exceedances

Table 1-2 summarizes exceedances of the critical loads for acidification. Table 1-3 gives an impression of preliminary exceedances of *CLnutN* and *CLempN*. Two statistical indicators are relevant for the interpretation of exceedances. The first one is the percentage of the ecosystem area that is protected ('Protected %') and the second is the average accumulated exceedance (AAE in eq ha^{-1} a^{-1}). Acidifying and eutrophying depositions were calculated by EMEP with emissions for the Current LEgislation scenario in 2010 and 2020 (CLE-2010 and CLE-2020, respectively) and the Maximum Feasible Reductions scenario in 2020 (MFR-2020). The deposition to European ecosystems in EMEP grid cells of national emissions and seashipping emissions[1] were computed using source-receptor relationships that the EMEP programme has computed, using a 5-year average meteorology.

Exceedance of *CLempN* has been documented to cover a wide range of risk of nitrogen deposition. The exceedance of *CLnutN* implies a risk that is caused by an excessive amount of nitrogen in the soil solution. The use of both critical loads separately may contribute to the robustness of exceedances and their geographical distribution (see chapter 4).

Table 1-2 shows that 91% and 94% of European ecosystem area in the EMEP domain (EMEP) is computed to be protected against acidification under CLE-2010 and CLE-2020, respectively. The related average accumulated exceedances are 38 and 22 eq $ha^{-1}a^{-1}$. The application of best available technology leads to a protection against acidification of 99%, and an AAE of 3 eq $ha^{-1}a^{-1}$.

The area protected and AAE can vary considerably between countries with the highest protection of 100% and the lowest of 21%.

[1] Seashipping emissions have been assigned to three shipping categories that have been distinguished under the EMEP programme.

Table 1-2. *The area protected from the risk of acidification based on emission data according to Current LEgislation in 2010 (CLE-2010), 2020 (CLE-2020) and Maximum Feasible Reductions in 2020 (MFR-2020) using a recent RAINS -emission database for land-based and marine sources, the source receptor relationship obtained from the EMEP programme based on a 5 year average meteorology and critical loads for acidification updated in 2007 in response to the call for voluntary data. Critical loads are obtained from NFCs (in bold) and based on the CCE background database otherwise (also published in ECE/EB.AIR/WG.1/2007/11/Corr.1).*

Country code	CLE-2010		CLE-2020		MFR-2020	
	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}
AL	100	0	100	0	100	0
AT	**100**	**0**	**100**	**0**	**100**	**0**
BA	55	242	73	162	100	0
BE	**86**	**97**	**90**	**66**	**99**	**7**
BG	**100**	**0**	**100**	**0**	**100**	**0**
BY	**52**	**190**	**64**	**121**	**96**	**3**
CH	**93**	**29**	**94**	**20**	**99**	**1**
CY	**100**	**0**	**100**	**0**	**100**	**0**
CZ	**52**	**193**	**76**	**67**	**98**	**3**
DE	**41**	**364**	**53**	**227**	**83**	**44**
DK	**89**	**18**	**92**	**15**	**100**	**1**
EE	**100**	**0**	**100**	**0**	**100**	**0**
ES	**100**	**0**	**100**	**0**	**100**	**0**
FI	**99**	**2**	**99**	**2**	**100**	**0**
FR	**92**	**24**	**95**	**16**	**100**	**0**
GB	**86**	**46**	**91**	**28**	**98**	**3**
GR	94	28	97	13	100	0
HR	**100**	**0**	**100**	**0**	**100**	**0**
HU	**100**	**0**	**100**	**0**	**100**	**0**
IE	**90**	**23**	**94**	**13**	**99**	**0**
IT	**100**	**0**	**100**	**0**	**100**	**0**
LT	**39**	**290**	**44**	**197**	**86**	**13**
LU	78	200	79	143	82	12
LV	**100**	**0**	**100**	**0**	**100**	**0**
MD	**97**	**10**	**97**	**5**	**100**	**0**
MK	85	18	96	2	100	0
NL	**21**	**1594**	**22**	**1433**	**33**	**606**
NO	**88**	**27**	**89**	**22**	**96**	**5**
PL	**36**	**364**	**55**	**155**	**100**	**1**
PT	95	25	95	17	100	0
RO	94	19	98	3	100	0
RU	**99**	**2**	**99**	**1**	**100**	**0**
SE	**87**	**16**	**90**	**12**	**99**	**0**
SI	100	0	100	0	100	0
SK	**86**	**67**	**91**	**26**	**100**	**0**
UA	**100**	**0**	**100**	**0**	**100**	**0**
YU	73	47	94	5	100	0
EU25	84	84	88	48	98	7
EU27	85	79	89	45	98	6
EMEP	91	38	94	22	99	3

***Table 1-3**. Country specific areas protected from the risk of eutrophication and country specific Average Accumulated Exceedances (AAE) of critical loads for eutrophication based on modelled (left) and empirical critical loads (right) obtained from NFCs (in bold) and based on the CCE background database otherwise. Emissions and depositions from RAINS and the EMEP programme as in Table 1-2. (also published in ECE/EB.AIR/WG.1/2007/11/Corr.1).*

Country code	Empirical						Modelled					
	CLE-2010		CLE-2020		MFR-2020		CLE 2010		CLE 2020		MFR 2020	
	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}	Protected area %	AAE eq ha^{-1} a^{-1}
AL	27	152	27	156	100	0	0	482	0	491	51	38
AT	**65**	**49**	**87**	**20**	**99**	**1**	**4**	**272**	**20**	**158**	**95**	**8**
BA	43	75	52	49	100	0	0	289	1	235	94	3
BE	49	481	49	408	51	126	**35**	**371**	**54**	**289**	**80**	**97**
BG	**56**	**108**	**65**	**89**	**100**	**0**	**2**	**391**	**4**	**340**	**83**	**12**
BY	10	179	11	148	100	0	**38**	**262**	**41**	**241**	**78**	**49**
CH	**32**	**157**	**49**	**100**	**97**	**1**	**1**	**608**	**3**	**488**	**47**	**72**
CY	96	3	79	16	100	0	**39**	**88**	**24**	**139**	**80**	**9**
CZ	**7**	**262**	**33**	**126**	**93**	**6**	**1**	**553**	**4**	**390**	**55**	**63**
DE	**5**	**483**	**17**	**338**	**73**	**71**	**24**	**455**	**33**	**341**	**63**	**99**
DK	32	501	32	473	41	88	**13**	**618**	**14**	**576**	**42**	**120**
EE	98	1	97	1	100	0	**54**	**58**	**57**	**60**	**98**	**3**
ES	64	68	72	43	99	2	**19**	**259**	**27**	**207**	**65**	**28**
FI	100	0	100	0	100	0	**56**	**42**	**59**	**37**	**97**	**1**
FR	**37**	**180**	**48**	**122**	**93**	**5**	**3**	**453**	**5**	**363**	**58**	**63**
GB	**91**	**32**	**92**	**25**	**97**	**2**	**21**	**334**	**28**	**261**	**75**	**36**
GR	71	40	71	40	100	0	0	438	0	436	26	75
HR	33	197	34	149	100	0	**59**	**161**	**61**	**125**	**93**	**8**
HU	35	208	35	141	100	0	**9**	**262**	**25**	**178**	**90**	**10**
IE	**65**	**124**	**70**	**89**	**97**	**2**	**16**	**528**	**19**	**444**	**33**	**167**
IT	19	452	19	369	68	73	**99**	**2**	**99**	**2**	**100**	**0**
LT	22	174	22	148	100	0	**0**	**521**	**0**	**487**	**27**	**93**
LU	31	572	31	457	31	122	0	1007	0	840	2	354
LV	82	12	86	9	100	0	**5**	**317**	**5**	**298**	**59**	**38**
MD	39	274	39	252	100	0	**100**	**0**	**100**	**0**	**100**	**0**
MK	46	99	48	85	100	0	0	396	0	364	90	4
NL	**8**	**1217**	**10**	**1095**	**25**	**488**	**11**	**1170**	**12**	**1049**	**28**	**460**
NO	**99**	**1**	**99**	**1**	**100**	**0**	**98**	**2**	**98**	**1**	**100**	**0**
PL	**1**	**255**	**3**	**149**	**100**	**0**	**12**	**504**	**17**	**410**	**55**	**73**
PT	85	16	93	7	100	0	6	215	8	153	93	3
RO	22	270	22	216	96	1	0	645	0	572	20	74
RU	97	4	96	4	100	0	**65**	**51**	**65**	**54**	**99**	**2**
SE	92	9	94	8	100	0	**88**	**14**	**89**	**12**	**96**	**2**
SI	**71**	**42**	**88**	**17**	**100**	**0**	0	572	0	458	42	36
SK	12	218	19	114	97	0	**1**	**380**	**6**	**257**	**85**	**15**
TR	98	2	96	6	100	0						
UA	1	373	1	328	100	0	**0**	**385**	**0**	**416**	**100**	**0**
YU	60	40	74	26	100	0	1	316	2	271	99	1
EU25	59	139	64	99	94	14	42	232	45	186	79	33
EU27	57	147	61	107	94	12	38	256	42	208	76	34
EMEP	77	69	79	52	98	5	56	133	58	115	90	15

Table 1-3 shows that the area within the EMEP domain that is protected against the risk of eutrophication effects (non-exceedance of *CLnutN* is 56% for CLE-2010 and 58% for CLE-2020 (90% under MFR2020). The protection based on empirical critical loads (non-exceedance of *CLempN*) is computed to increase from 77 % to 79% under emissions from CLE-2010 and CLE-2020 respectively (98% under MFR-2020). The Average Accumulated Exceedance using empirical critical loads is reduced from 69 to 52 eq $ha^{-1}a^{-1}$ in CLE-2010 and CLE-2020, respectively in the EMEP domain.

Figures 1-2 to 1-4 show trends between 1990 and CLE-2020 as well as MFR-2020 in the average accumulated exceedances of critical loads for acidity, empirical critical loads and critical loads for nutrient nitrogen. The size of the coloured squares reflects the area exceeded. It is clear from these figures that the risk is significantly reduced in 2020 compared to 1990 if maximum feasible reductions are applied. Areas with high exceedances (shaded red) are significantly reduced. However, in each of the maps it is also illustrated that areas with low exceedances (light-blue shaded) become larger and more areas are shown where exceedances do not occur any longer.

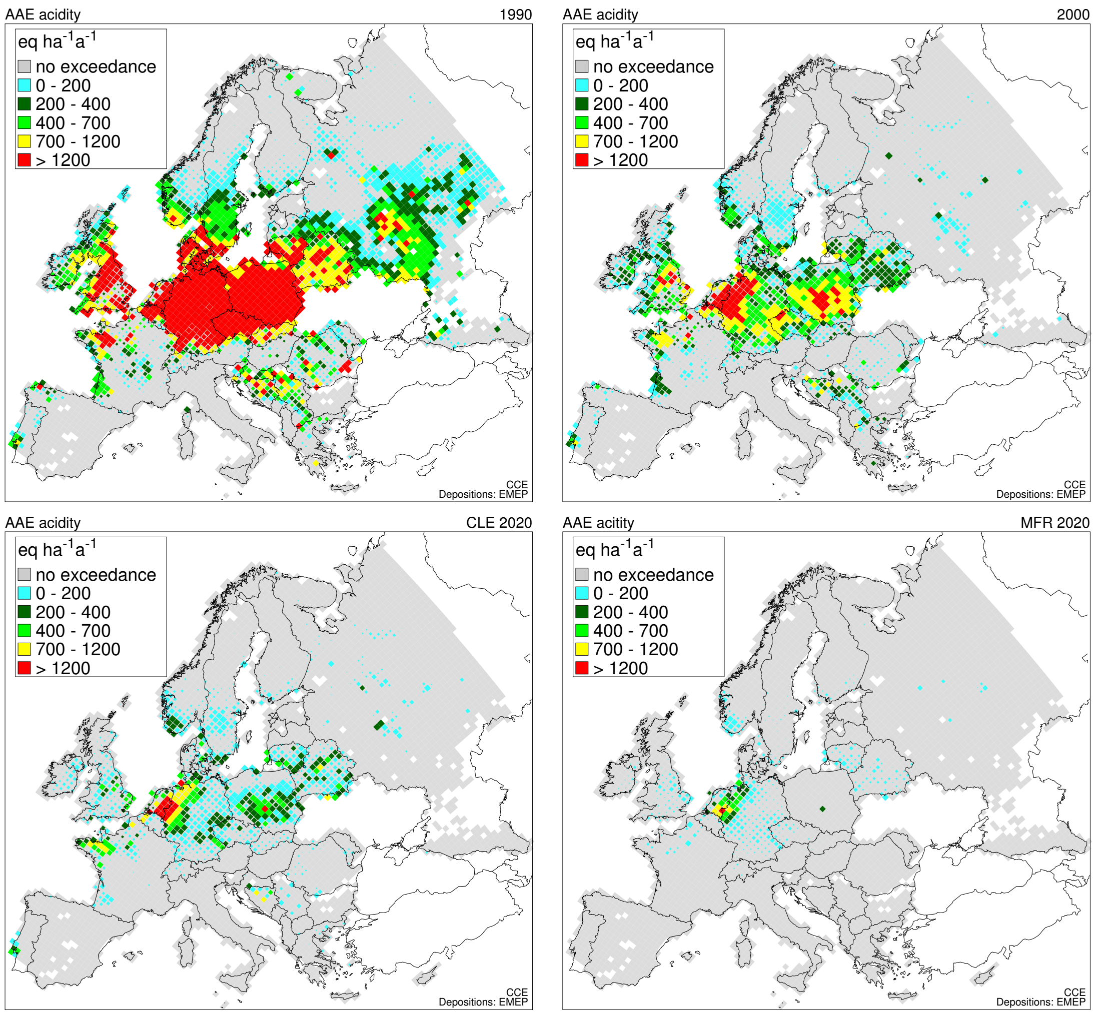

***Figure 1-2**. Average accumulated exceedance (AAE) of critical loads for acidity in 1990 (top left), 2000 (top right), in 2020 according to current legislation (bottom left) and in 2020 according to maximum feasible reduction. The size of the coloured squares reflects the area exceeded. Red shaded areas indicate highest exceedances.*

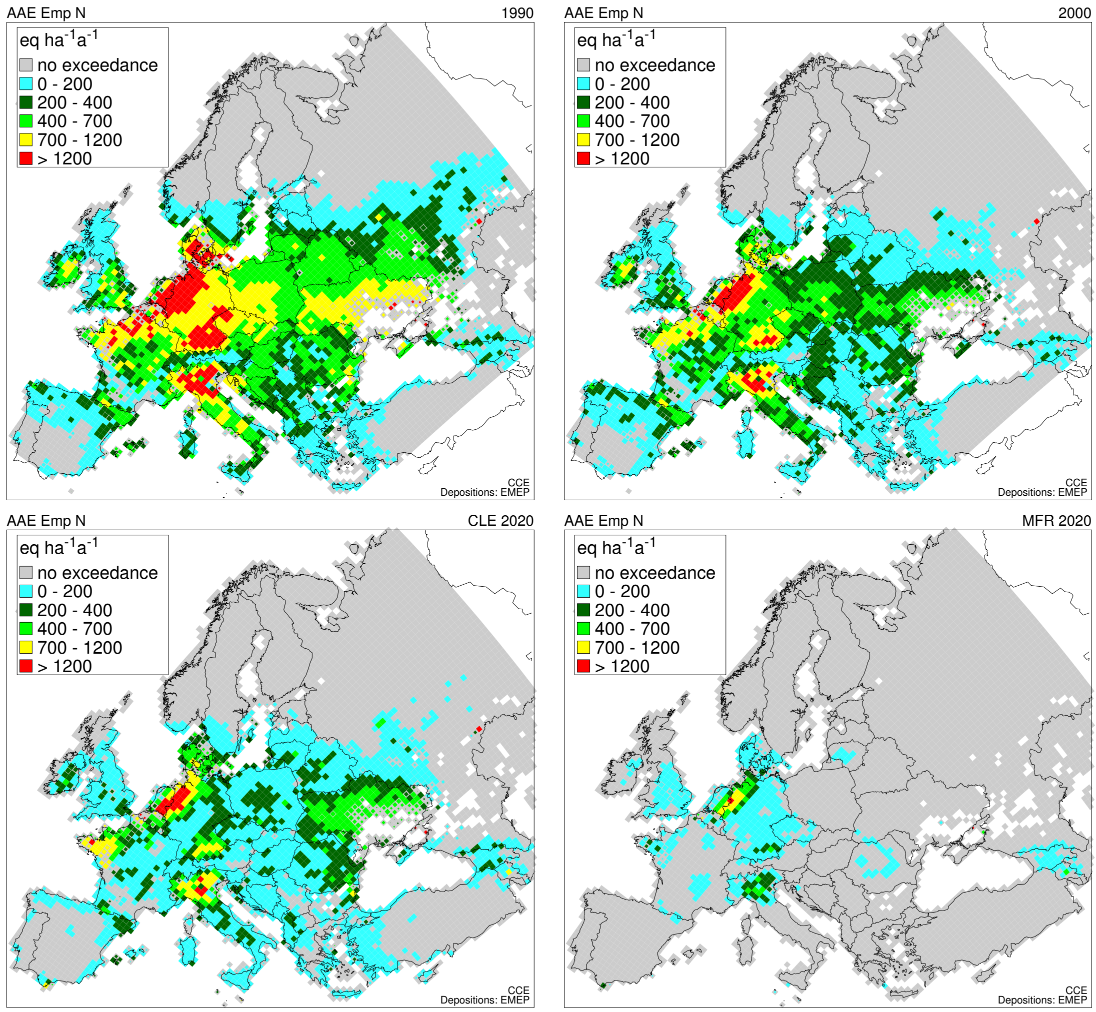

Figure 1-3. *Average Accumulated Exceedance (AAE) of empirical critical loads, CLempN, in 1990 (top left), 2000 (top right), in 2020 according to current legislation (bottom left) and in 2020 according to maximum feasible reduction. The size of the coloured squares reflects the area exceeded. Red shaded areas indicate highest exceedances.*

Figure 1-3 illustrates that ecosystem areas of which the empirical critical loads are exceeded under MFR-2020 (bottom-right map) are mostly in EMEP grid cells located in Belgium, Denmark, Germany and the Netherlands. Areas with a high exceedance remain in the border area between the Netherlands and Germany also in MFR-2020.

Figure 1-4 shows that the magnitude of the average accumulated exceedances of *CLnutN* diminishes significantly from 1990 to MFR-2020. However, in comparison to Figure 1-3 a larger area remains at risk in MFR-2020. On the other hand the magnitude of AAE in the border area between The Netherlands and Germany lies in the range between 700 and 1000 eq $ha^{-1}a^{-1}$ compared to values higher than 1000 $ha^{-1}a^{-1}$ in Figure 1-3.

Figure 1-5 shows the AAEs using modelled (left) and empirical (right) critical loads that NFCs submitted for all ecosystems (top) and Natura 2000 areas (bottom). The geographic pattern of exceedances of critical loads for all ecosystems turns out not to differ significantly from exceedances for Natura 2000 areas only. This indicates that Natura 2000 areas are representative of all sensitive ecosystems in countries that submitted critical loads for both ecosystem categories. A general conclusion regarding the extent to which Natura 2000 areas are representative in the critical loads database for EU27 countries necessitates a common response of a larger number of EU countries.

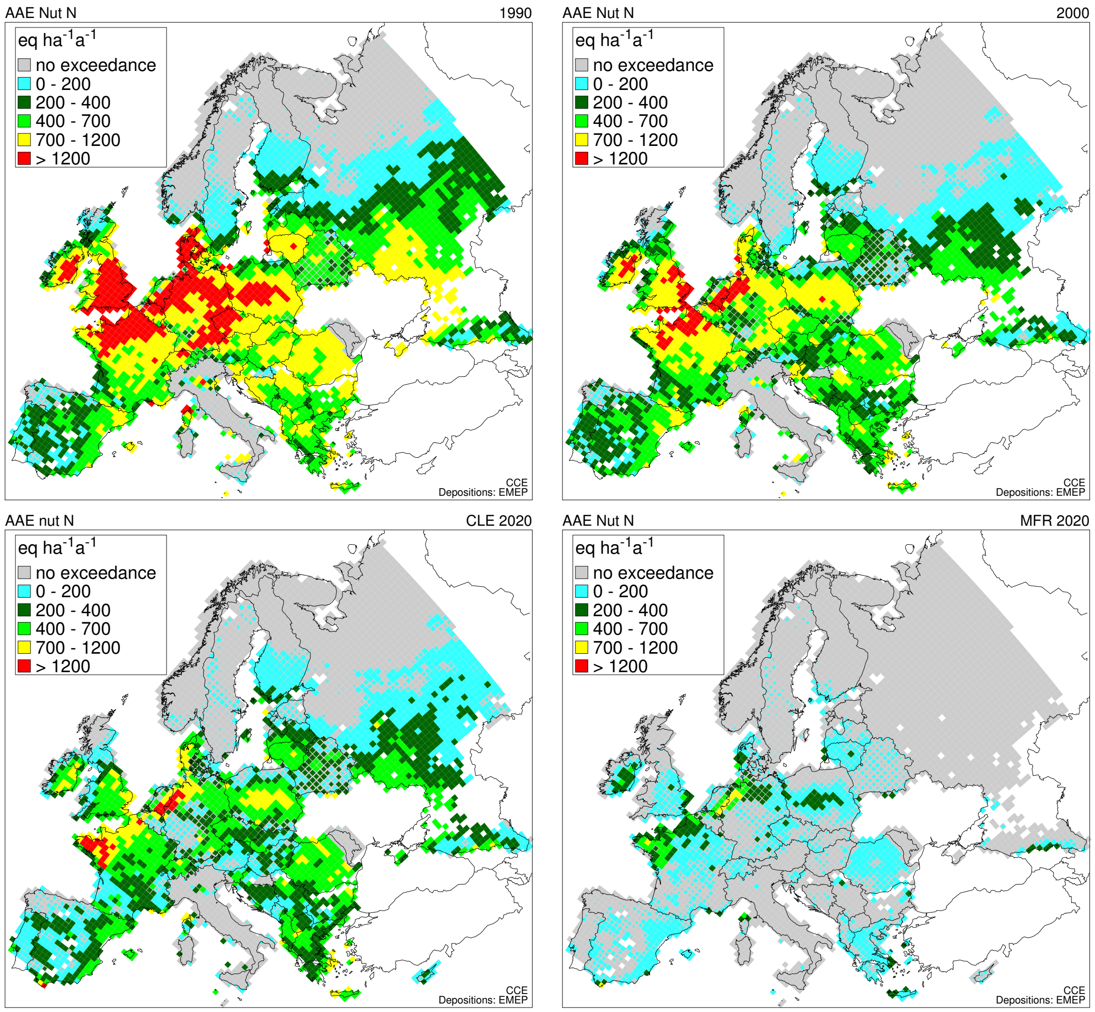

Figure 1-4. *Average accumulated exceedance (AAE) of modelled critical loads, CLnutN, in 1990 (top left), 2000 (top right), in 2020 according to current legislation (bottom left) and in 2020 according to maximum feasible reductions. The size of the coloured squares reflects the area exceeded. Red shaded areas indicate highest exceedances.*

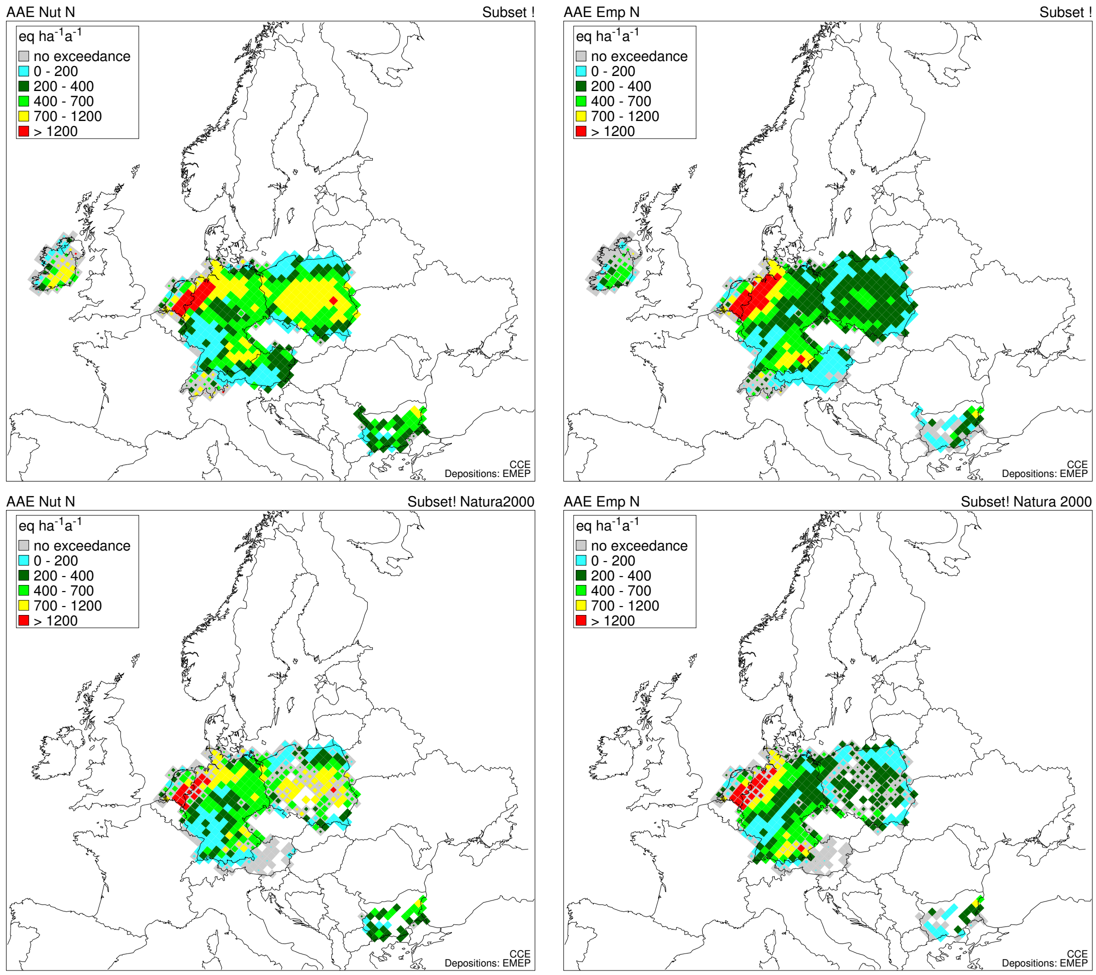

Figure 1-5. *Average accumulated exceedance (AAE) using NFC data for CLnutN for all ecosystems (top left), CLempN (top right), CLnutN for Natura 2000 areas (bottom left) and CLempN for Natura 2000 (N2K) areas. The shaded area covers AAE computations by NFCs that submitted computed critical loads, empirical as well as critical loads for N2K areas.*

1.5 Dynamic modelling results

Dynamic modelling is an important part of the effects-based work. It can improve the understanding of the delayed response of natural systems to changes in exceedances. It is the key to understanding the effects on biodiversity caused by dynamic interactions between climate change and air pollution.

The call for voluntary contributions on dynamic modelling focussed on the application of the VSD model to acidification and eutrophication. It also explored national input data requirements for dynamic soil-vegetation models (De Vries et al., 2007).

Eleven NFCs provided results using selected deposition scenarios provided CCE. These included ecosystem-specific deposition (forest, (semi-)natural vegetation and grid average) for the period 1880–2010 for each grid cell. Deposition with CLE, MFR and natural background from 2020 onwards were made available.

Output was requested for the three deposition scenarios and sufficient scenarios in-between. It comprised the temporal development of critical indicators for acidification (e.g. base cation to aluminium ratio) and eutrophication (e.g. N concentration).

The temporal development of nitrogen concentration in soil solution with deposition scenarios was analyzed. Nitrogen dynamics are complex and slow. It was possible to compute damage delay times due to the exceedance of the critical load of nitrogen. However, it was more difficult, with simple biogeochemical models, to model the mechanisms behind recovery delay times, which bear relevance to air pollution policies.

The CCE and the Centre for Integrated Assessment Modelling (CIAM) will collaborate in testing to extend the current critical loads database in the RAINS model with dynamic modelling data. The results of the NFC response on dynamic modelling form the basis, e.g. by interpolation, for dynamic modelling of alternative deposition scenarios by the TFIAM.

1.6 Conclusions and recommendations

The call for voluntary data reached its objectives. This call was new compared to earlier calls in its request to NFCs to also submit empirical critical loads and critical loads for Natura 2000 areas and to apply new information for dynamic modelling. In addition, NFCs could use a novel land cover database that was harmonized in collaboration with the Stockholm Environment Institute.

Nineteen NFCs submitted data. Seventeen NFCs submitted data on modelled critical loads, twelve on empirical critical loads, eight on critical loads in Natura 2000 areas and eleven on dynamic modelling.

Maps of critical loads and exceedances relative to empirical and modelled critical loads and critical loads for Natura 2000 areas were summarized in this chapter.

Computations with the data yielded results that can be summarized as follows regarding nitrogen. For the 25 European Union member states (EU25) the area protection using empirical and modelled critical loads with CLE-2010 deposition is 59% and 42%, respectively. For the EU27 these percentages are 57% and 38% respectively and for the EMEP-domain 77% and 56% respectively. The AAE under CLE-2010 is 139 (based on empirical critical loads) and 232 eq ha^{-1} a^{-1} (based on modelled critical loads) for the EU25, 147 and 256 eq ha^{-1} a^{-1} for the EU27 respectively, and 69 and 133 eq ha^{-1} a^{-1} for the EMEP domain, respectively.

Regarding acidification, the protected area in the geographical domain of EMEP is 91%, 94% and 99% with CLE-2010, CLE-2020 and MFR-2020, respectively.

Results documented in this chapter have been presented to the twenty-third Task Force meeting (Sofia, 26–27 April 2007) and reported to the 25th session of the Working Group on Effects (WGE, Geneva, 29-31 August 2007; report nr. ECE/EB.AIR/WG.1/2007/11/Corr.1).

On the basis of this report the WGE approved the proposal of ICP Modelling and Mapping and CCE to make a new call for data related to critical loads and dynamic modelling in the end of 2007, and that the results would be made available to integrated assessment modelling in 2008.

References

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