



ICP Modelling and Mapping Contribution to the review of the Gothenburg Protocol in 2021

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ICP M&M contribution to the GP review

Questions from the preparatory document

ECE/EB.AIR/2020/3 – ECE/EB.AIR/WG.5/2020/3

- » Question 2.2 b “**What is the annual change (or change every 5 years) in exceedance of critical loads for acidification and eutrophication** between 1990 and 2018/2019 in terms of percentage ecosystems with exceedances and accumulated excess, based on current critical loads”
- Details have been delivered to be included in the joint report

Background of the question

- Eutrophication and acidification are serious threats to European ecosystems and are caused by the deposition of N and Sulphur
- Changes in nutrients availability carry the risk that ecosystem diversity, as an integral part of overall biodiversity, will be lost.

Data used in the assessment

- » Latest deposition data 2000 – 2019 modelled by MSC West in Summer 2021 to support the GP review (0.1°*0.1° latitude-longitude resolution)

- » Latest European CL database at CCE
 - National Focal Center data
 - For 8 parties, old 2017 data has been used (resubmitted)
 - For 6 parties, newly submitted updated 2021 CL data has been used
 - European background database CL used for the rest of the parties (22 countries)

- » Field of application
 - Ecosystems sensitive to acidification:
 - More than 4.1 Mio sites and around 2.5 Mio. Km²
 - Forest 53%, freshwater 29%, grasslands 13%
 - Ecosystems sensitive to eutrophication
 - Nearly than 4.1 Mio sites and around 2.2 Mio. Km²
 - Forest 66%, different types of grasslands 17%

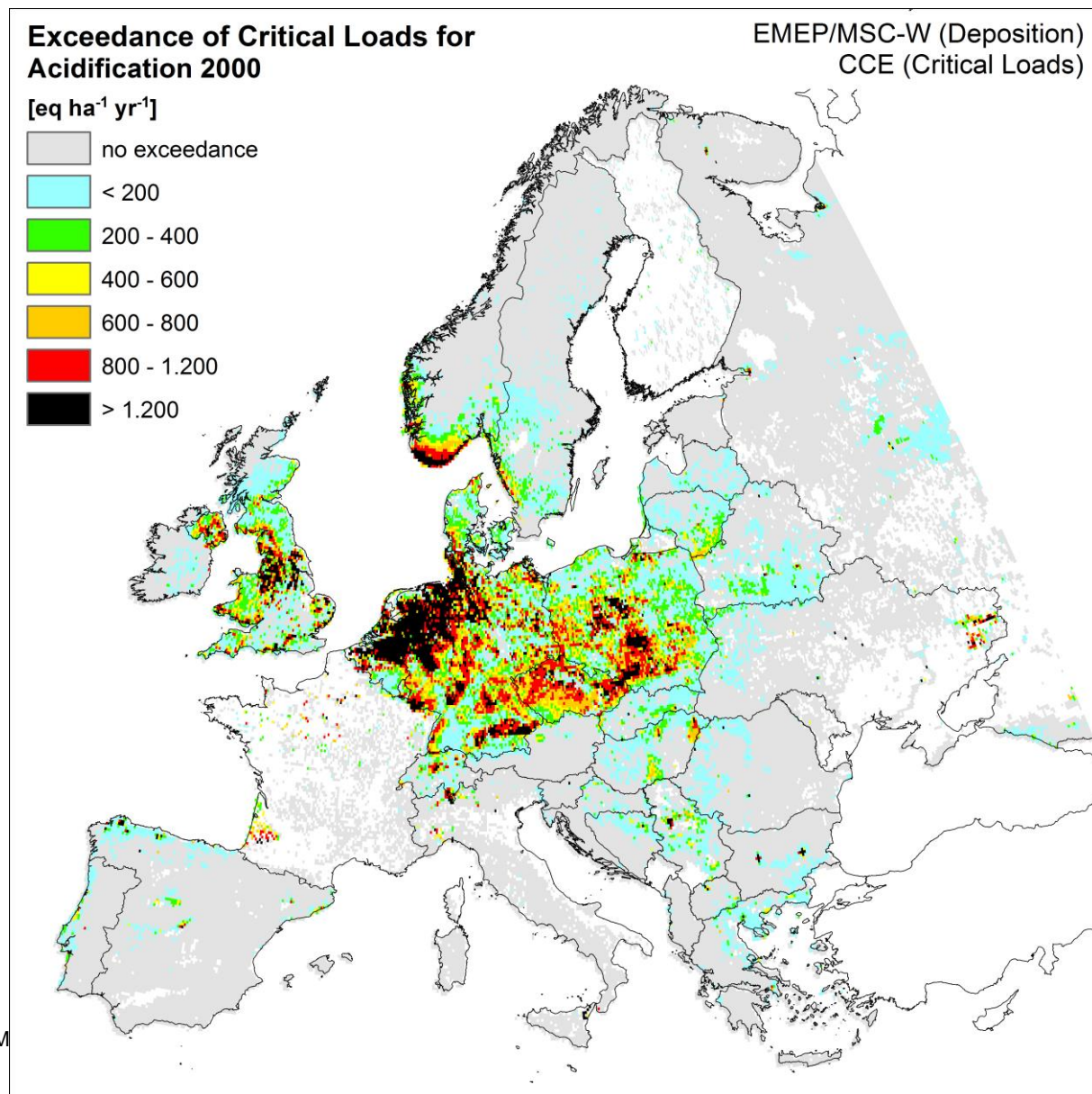
What has been calculated to assess eutrophication and acidification?

- » Average Accumulated Exceedance (AAE)
 - To summarize exceedances within one grid cell
 - In a first step, exceedances of all ecosystems within a grid cell are accumulated (AE)
 - In a second step, AE is related to the total ecosystem area in a grid cell (AAE)

- » Share of Ecosystem area where CL are exceeded
 - All ecosystems with exceedance in relation to the total ecosystem area

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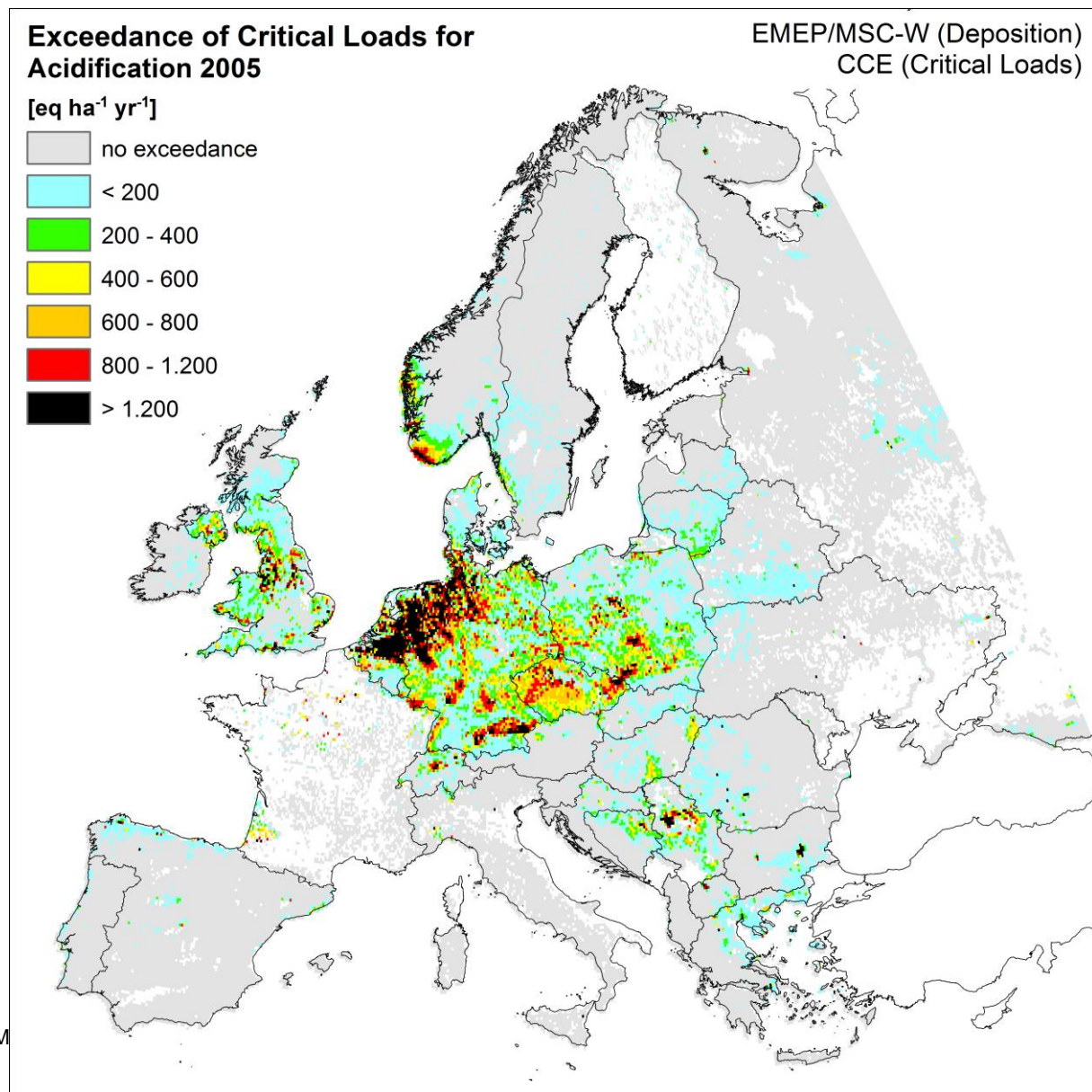
Results for risk of acidification



2000

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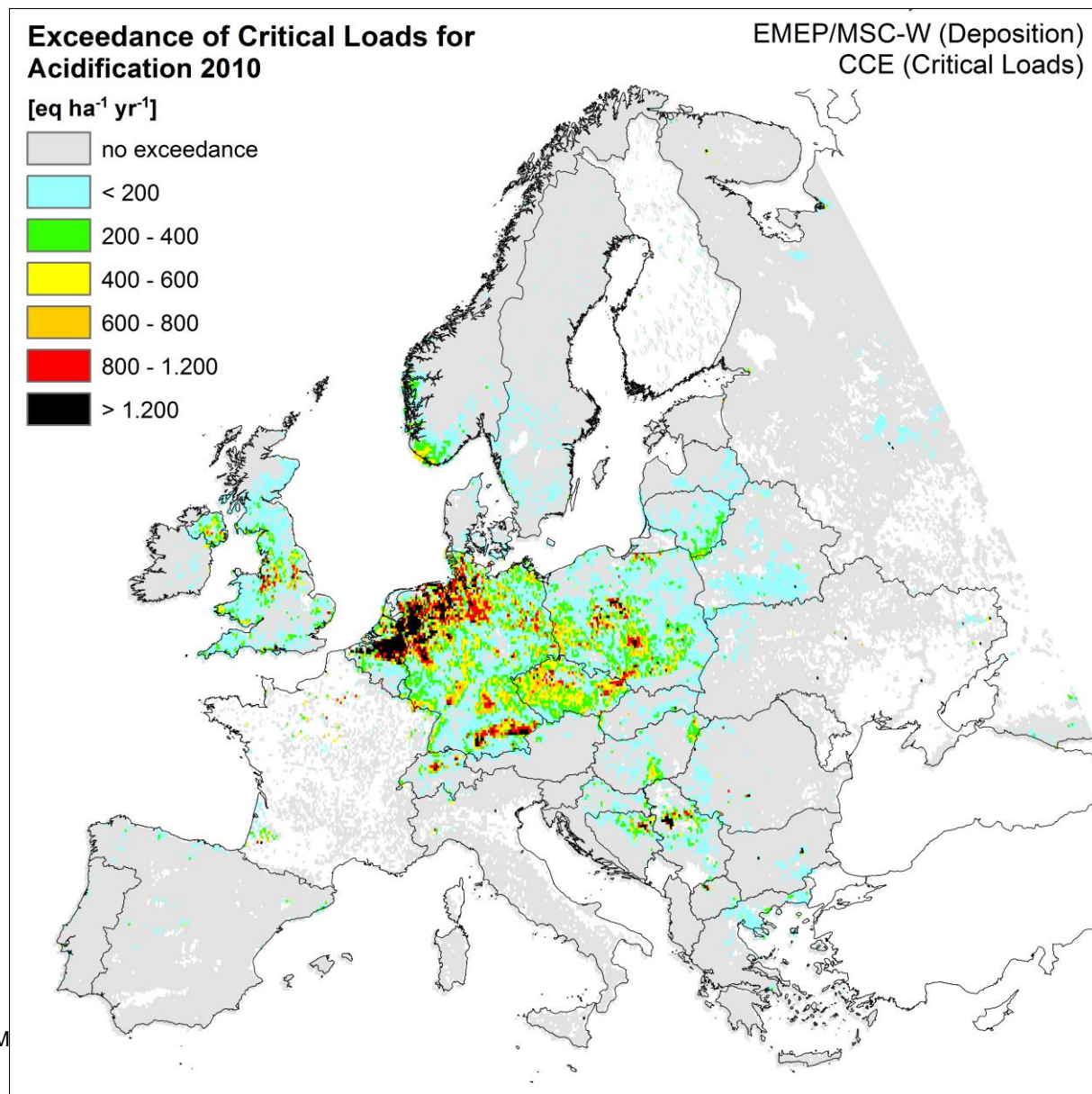
Results for risk of acidification



2005

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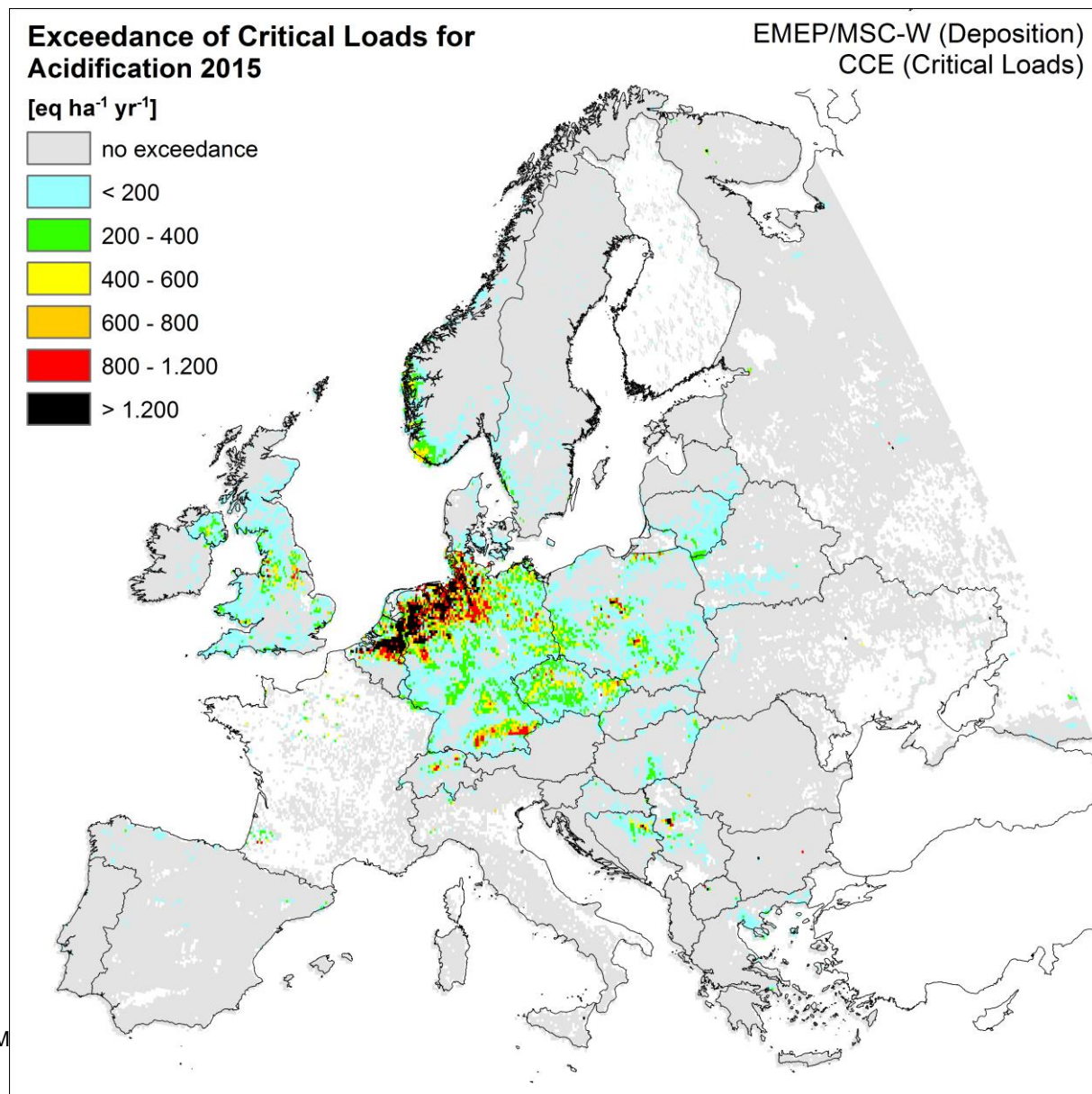
Results for risk of acidification



2010

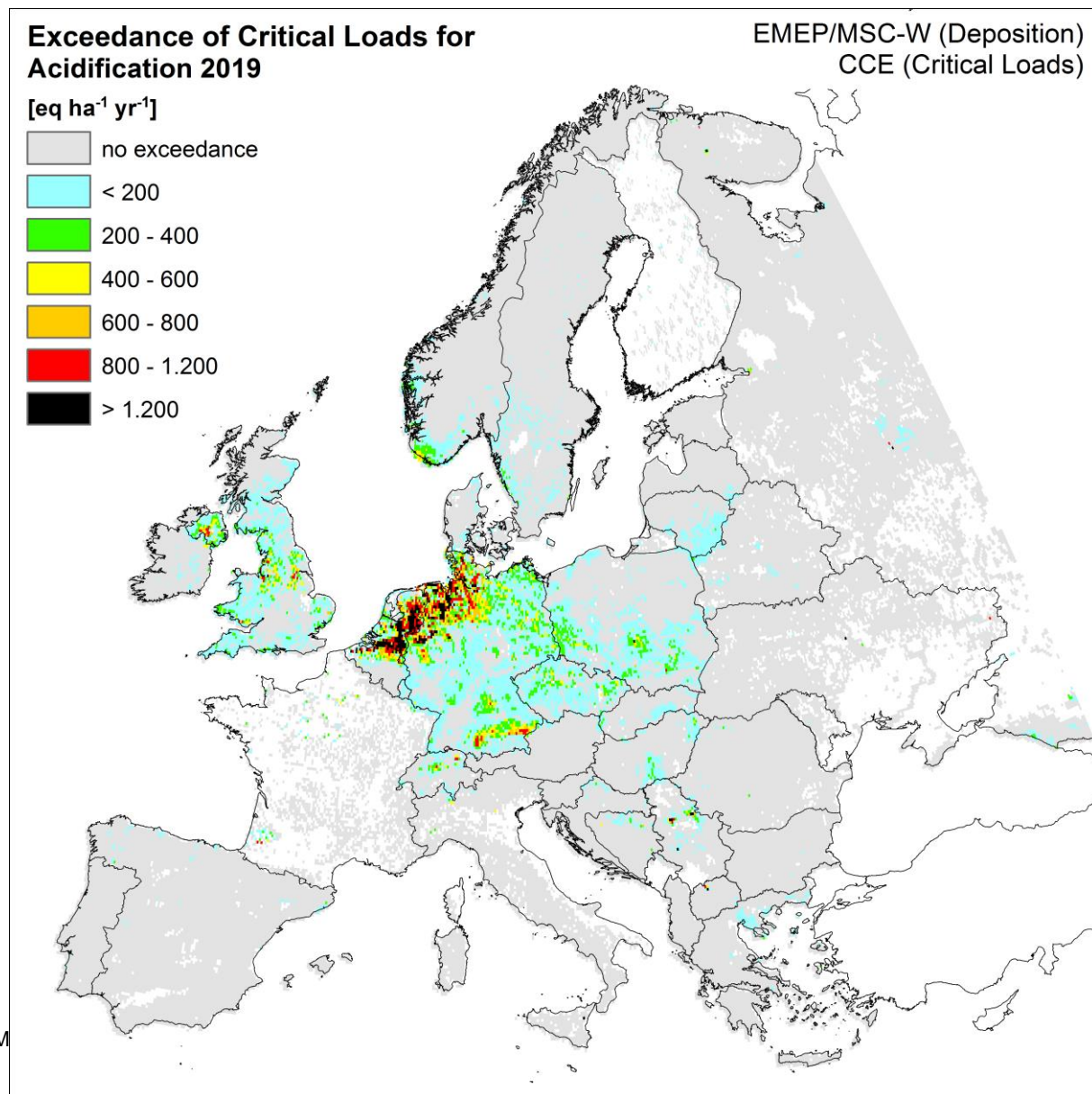
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Results for risk of acidification



2015

Results for risk of acidification



2019

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Acidification Country	Eco area [km ²]	Exceedance of CL acid									
		Share of the Eco Area in [%]					AAE in [eq ha ⁻¹ yr ⁻¹]				
		2000	2005	2010	2015	2019	2000	2005	2010	2015	2019
Austria	38.957	2	1	<1	<1	<1	4	4	1	0	0
Belgium	15.337	67	55	42	35	31	1220	911	564	350	253
Bulgaria	32.479	3	4	1	<1	<1	76	93	26	6	0
Croatia	23.001	3	5	4	2	<1	12	19	13	3	1
Czech Republic	23.831	92	87	80	67	33	689	524	344	177	51
Denmark	5.054	49	29	5	7	3	229	78	11	21	9
Estonia	20.819	<1	<1	<1	<1	<1	3	1	2	0	0
Finland	286	2	1	<1	<1	<1	2	1	1	0	0
France	177.006	11	10	8	4	4	67	44	21	9	7
Germany	106.972	70	61	50	40	32	678	484	341	237	157
Greece	50.216	4	5	2	<1	<1	17	27	6	2	1
Hungary	17.890	21	10	9	7	6	126	59	48	22	16
Ireland	16.195	3	2	<1	<1	<1	14	5	1	1	1
Italy	100.976	3	<1	<1	<1	<1	68	6	2	4	1
Latvia	28.278	13	5	6	2	<1	21	6	8	2	0
Lithuania	17.545	33	28	28	22	17	169	90	92	46	20
Luxembourg	839	22	20	17	14	2	288	193	107	56	2
Netherlands	2.308	83	82	80	79	78	3032	2270	1639	1381	1146
Poland	91.706	63	43	37	20	15	418	208	158	62	37
Portugal	24.897	6	2	<1	<1	<1	22	3	1	0	0
Romania	66.477	2	3	1	<1	<1	9	23	6	1	1
Slovakia	17.341	12	7	6	5	4	79	30	29	11	8
Slovenia	8.749	1	<1	<1	<1	<1	11	0	0	0	0
Spain	149.107	2	1	<1	<1	<1	24	12	1	1	1
Sweden	395.226	14	6	5	4	4	26	7	3	3	2
EU 27	1.431.493	19	14	11	8	6	292	204	137	96	69
Albania	11.671	1	<1	<1	<1	<1	3	0	0	0	0
Belarus	48.055	16	7	8	2	<1	49	13	12	1	0
Bosnia and Herzegovina	24.501	7	11	9	7	2	23	68	63	37	5
Liechtenstein	77	46	37	36	4	24	166	146	84	11	20
Moldova	2.584	<1	<1	<1	<1	<1	2	1	0	0	0
Norway	320.450	21	17	11	11	8	91	55	21	23	13
Republic of Macedonia	10.430	10	14	5	2	1	43	81	34	10	10
Russia	495.914	2	1	<1	<1	<1	6	4	2	1	1
Serbia	22.351	19	29	17	9	5	102	254	142	57	34
Switzerland	9.191	30	23	18	12	11	233	128	96	52	41
Ukraine	68.162	4	1	<1	<1	<1	23	4	4	1	1
United Kingdom	68.040	36	26	17	13	14	272	146	71	42	51
Total	2.512.919	16	12	9	7	5	125	80	52	34	24

Results for risk of acidification

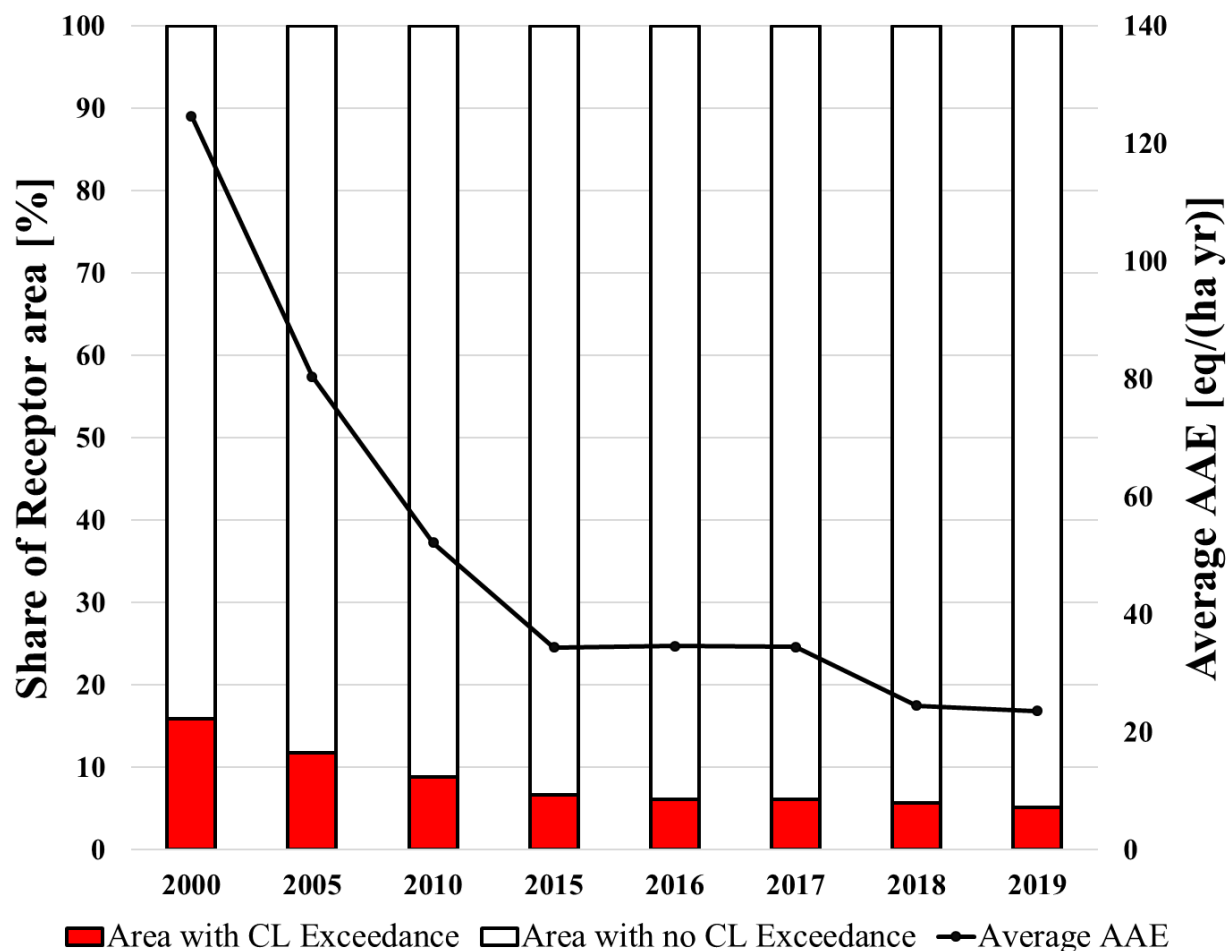
region	Area at risk [%]		AAE [eq ha ⁻¹ yr ⁻¹]	
	2000	2019	2000	2019
EU 27	19	6	292	69
Total area	16	5	125	24

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Results for risk of acidification

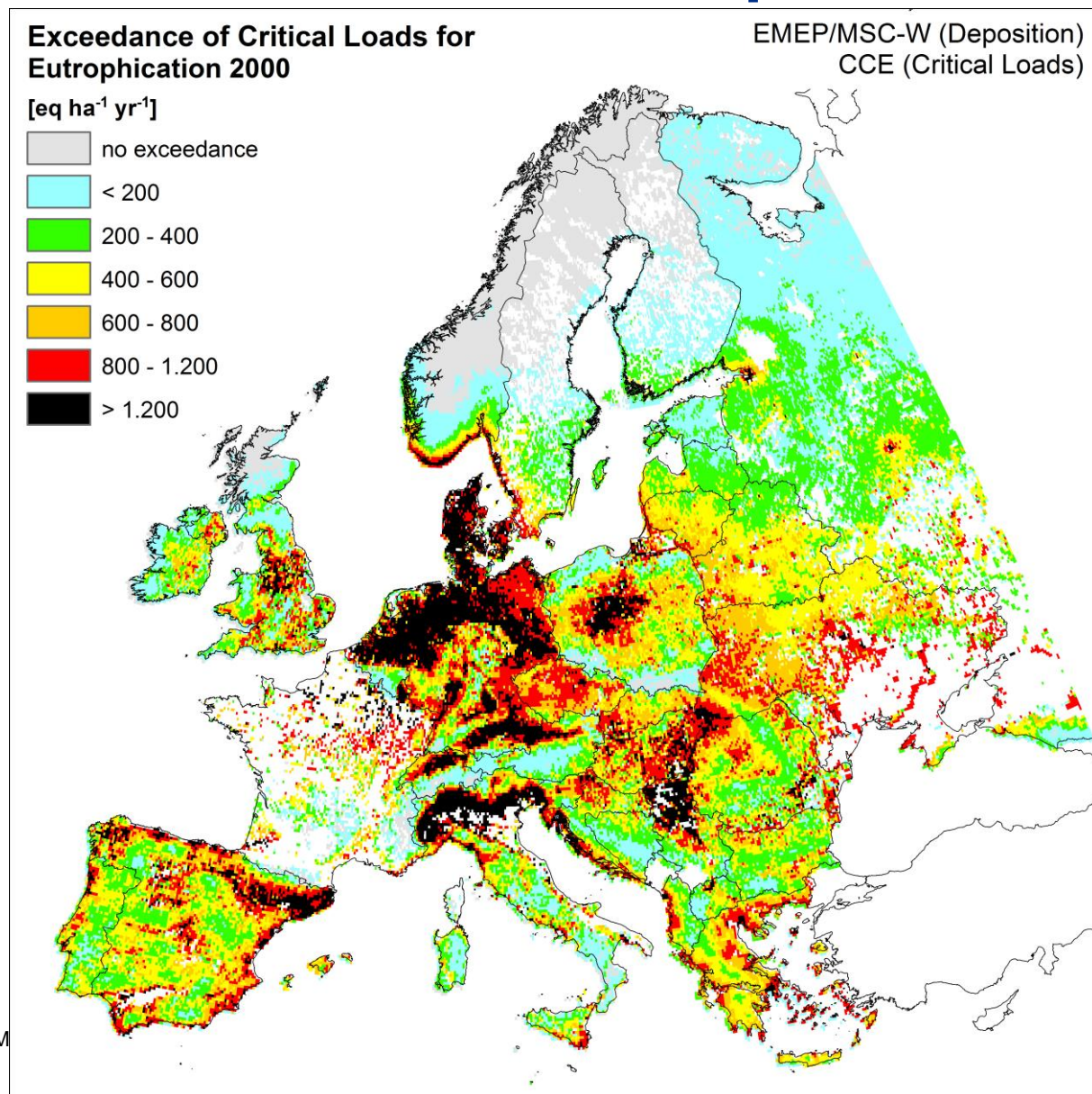
Total area

Exceedance of CL for Acidification



region	Area at risk [%]		AAE [eq ha ⁻¹ yr ⁻¹]	
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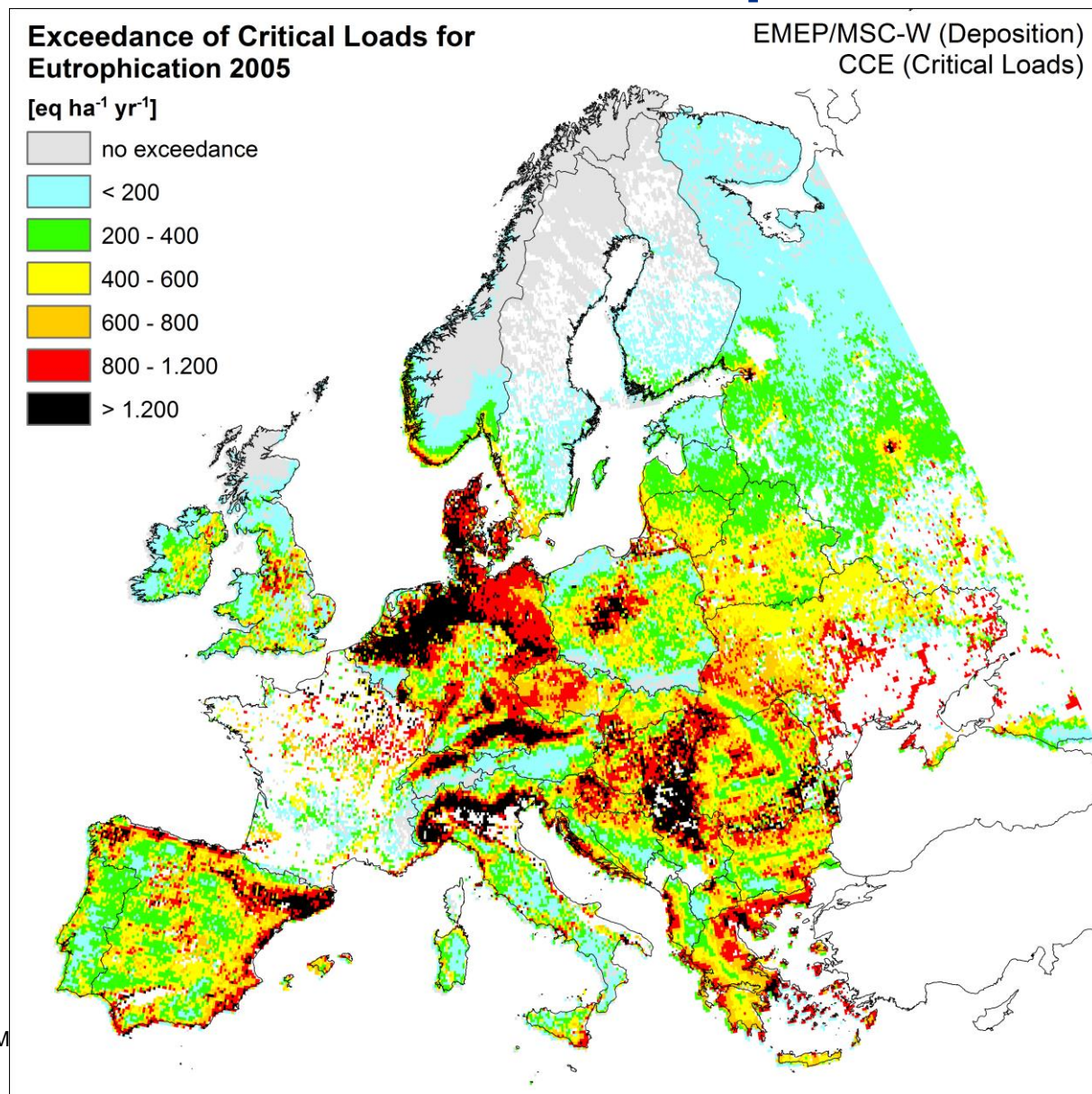
Results for risk of eutrophication



2000

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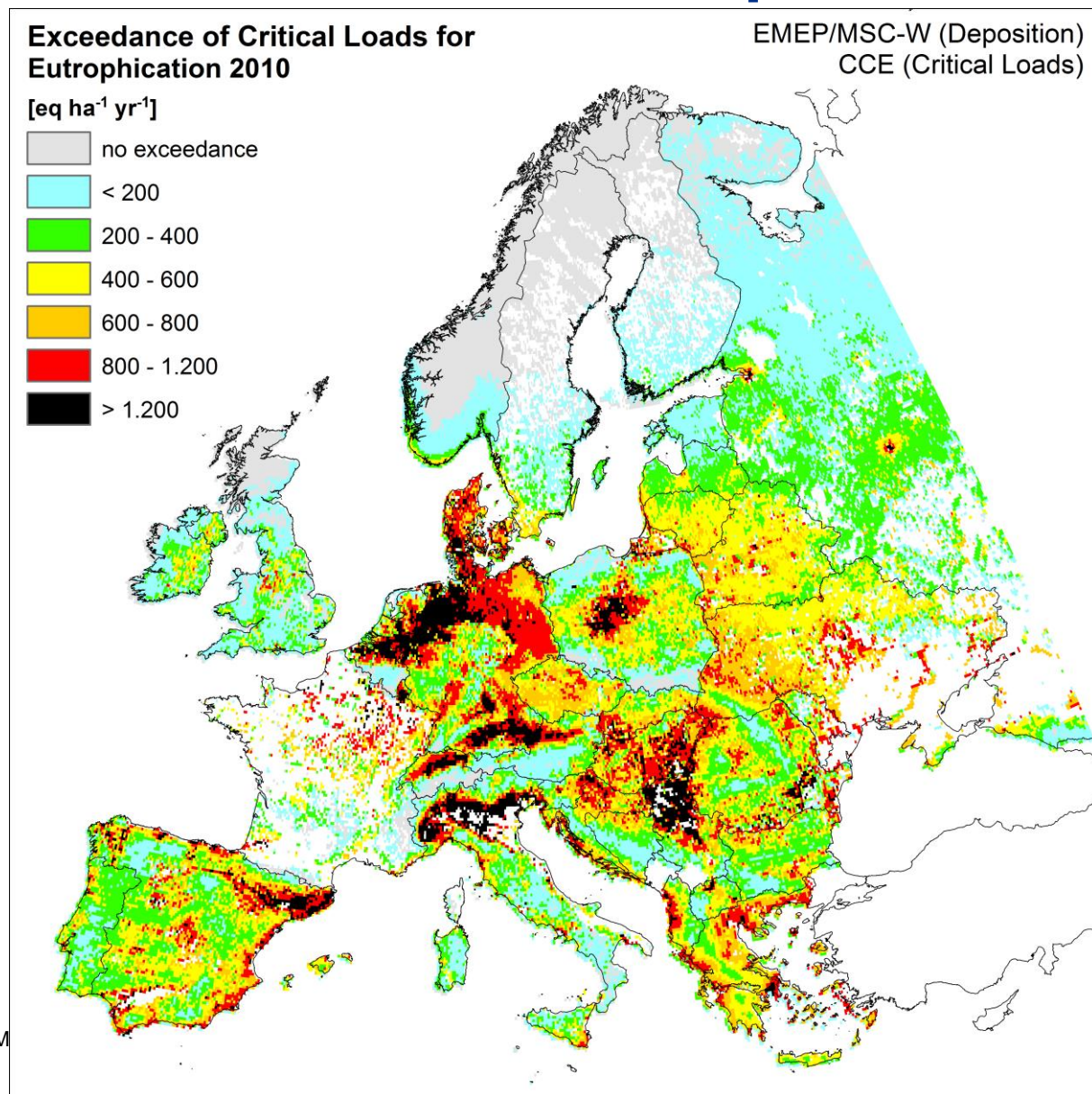
Results for risk of eutrophication



2005

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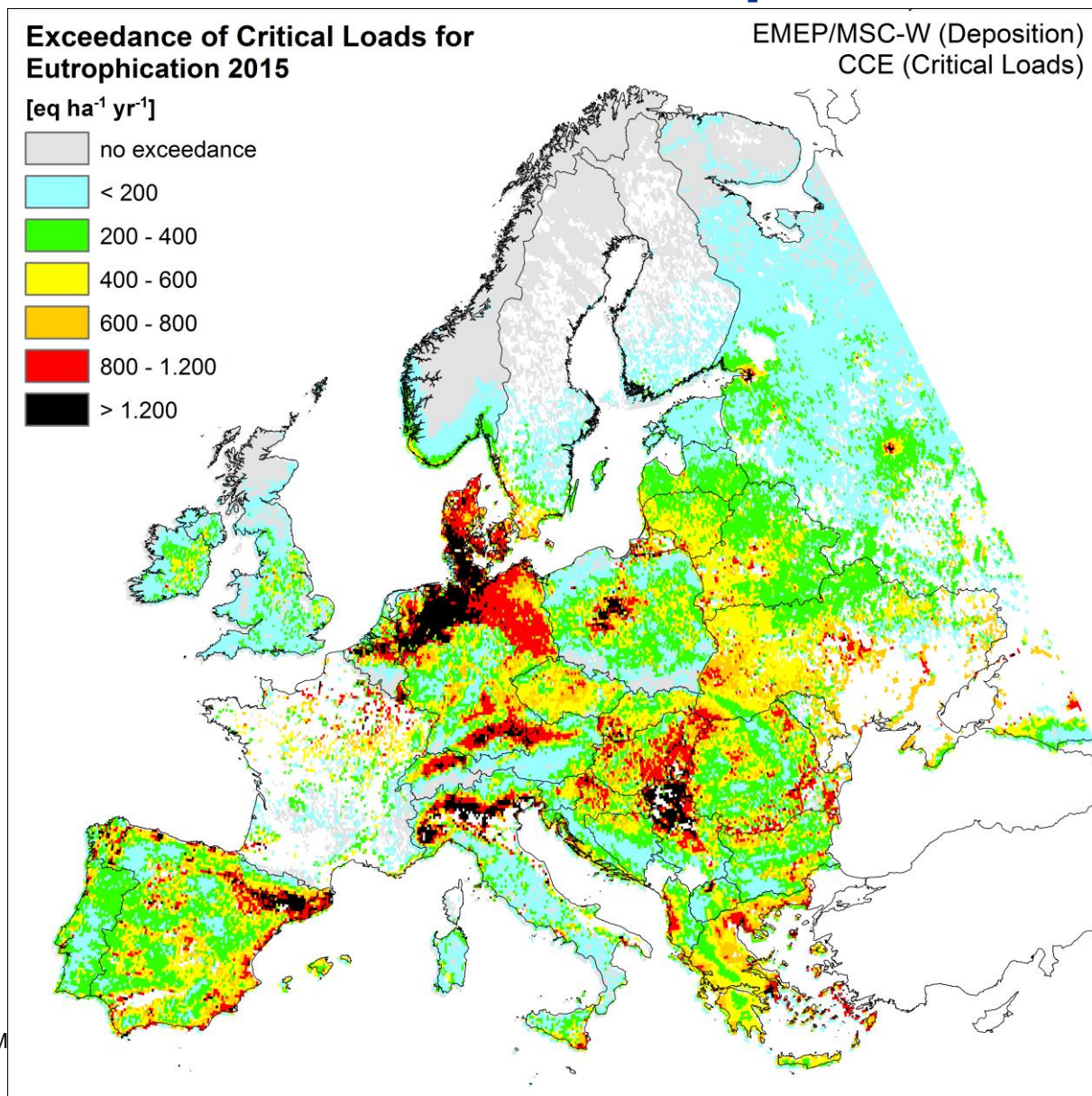
Results for risk of eutrophication



2010

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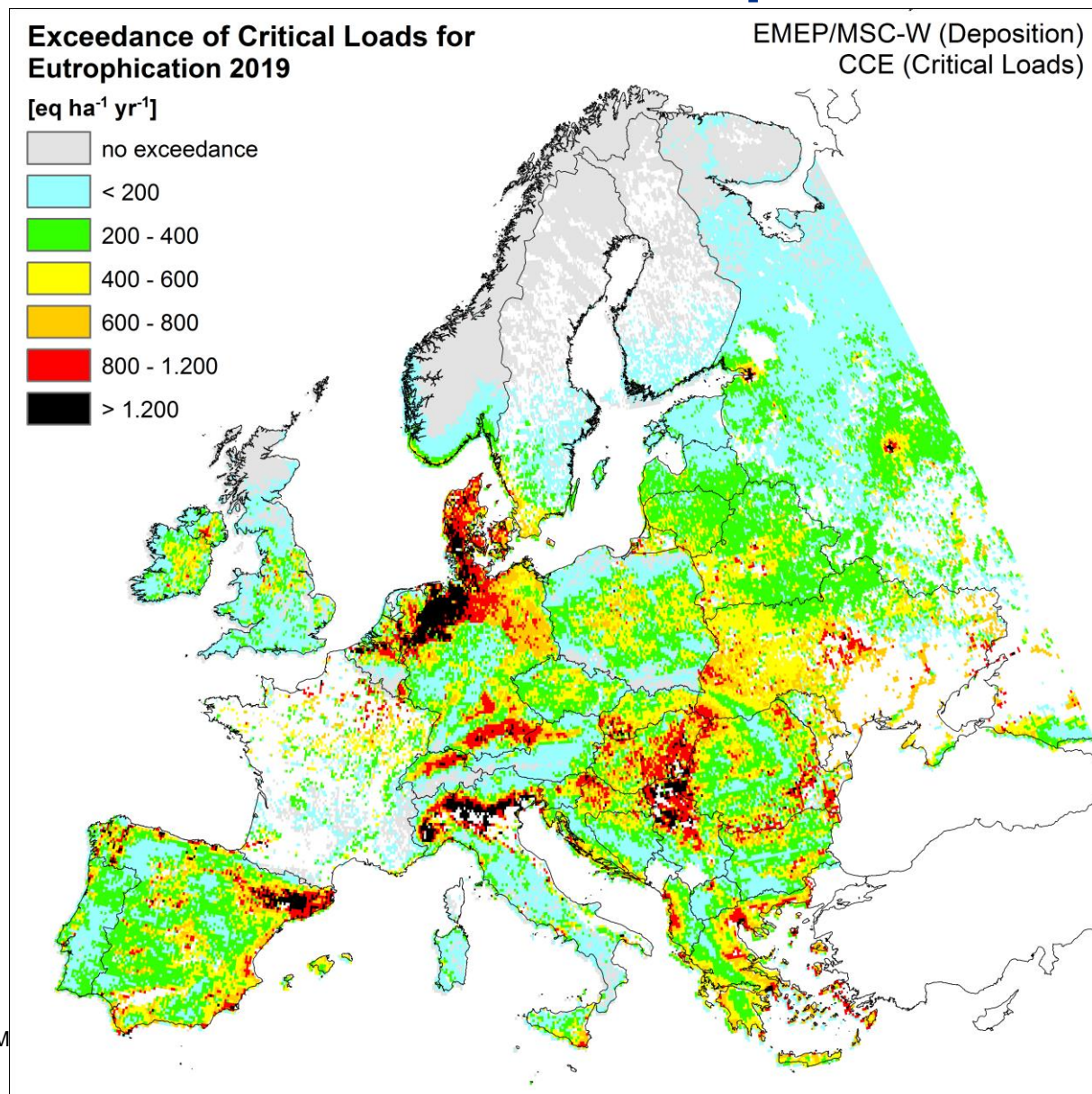
Results for risk of eutrophication



2015

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Results for risk of eutrophication



2019

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Eutrophication Country	Eco area [km ²]	Exceedance of CL eut									
		Share of the Eco Area in [%]					AAE in [eq ha ⁻¹ yr ⁻¹]				
		2000	2005	2010	2015	2019	2000	2005	2010	2015	2019
Austria	50.587	78	72	67	65	53	339	315	284	226	157
Belgium	12.573	82	67	61	54	54	1089	848	676	479	412
Bulgaria	32.408	92	97	90	82	75	326	439	296	256	221
Croatia	22.993	91	95	90	79	85	632	671	570	407	435
Czech Republic	23.639	99	98	97	95	90	739	644	547	446	297
Denmark	5.026	100	100	100	100	100	1366	1124	851	966	865
Estonia	20.744	62	56	51	46	43	168	141	126	111	106
Finland	41.141	17	15	14	11	10	21	13	10	6	5
France	176.870	84	84	81	67	67	487	427	376	247	222
Germany	106.974	87	84	82	77	74	987	840	748	644	522
Greece	49.532	100	100	100	100	100	628	709	607	544	487
Hungary	17.809	92	91	90	84	80	701	761	708	580	551
Ireland	16.767	65	61	51	48	62	268	226	168	151	225
Italy	105.893	85	84	79	66	65	667	521	431	318	294
Latvia	28.232	95	94	94	92	88	352	315	325	295	247
Lithuania	17.497	99	98	99	98	97	568	485	522	451	364
Luxembourg	839	100	100	100	100	100	1684	1428	1284	1079	865
Netherlands	667	92	86	81	79	77	1753	1270	944	792	628
Poland	91.453	81	76	74	68	66	511	379	371	260	227
Portugal	24.654	87	81	81	76	67	437	322	301	254	205
Romania	65.901	93	94	92	92	91	481	571	434	376	354
Slovakia	17.330	99	98	97	96	96	671	600	557	483	478
Slovenia	8.737	93	93	84	76	80	715	579	504	399	425
Spain	147.447	96	94	91	89	86	635	572	503	448	395
Sweden	58.658	17	16	15	14	15	62	39	33	35	34
EU 27	1.144.369	82	80	77	71	70	651	570	487	410	361
Albania	11.644	93	95	94	90	90	489	535	559	435	434
Belarus	48.046	100	100	100	100	100	501	450	503	371	337
Bosnia and Herzegovina	24.435	71	76	70	68	69	282	386	293	244	260
Liechtenstein	77	96	96	96	96	95	918	944	842	679	707
Moldova	2.585	88	96	91	83	85	576	645	560	449	487
Norway	304.027	24	22	16	15	14	88	62	30	28	25
Republic of Macedonia	10.351	76	80	77	71	65	345	414	366	286	225
Russia	495.696	74	74	67	57	60	158	145	124	97	112
Serbia	22.278	91	94	91	89	87	590	823	633	523	462
Switzerland	7.493	85	83	80	76	74	774	728	694	504	447
Ukraine	68.156	100	100	100	100	100	702	617	573	499	497
United Kingdom	54.357	49	38	28	22	27	246	154	83	54	74
Total	2.193.514	72	71	67	61	60	435	391	341	284	262

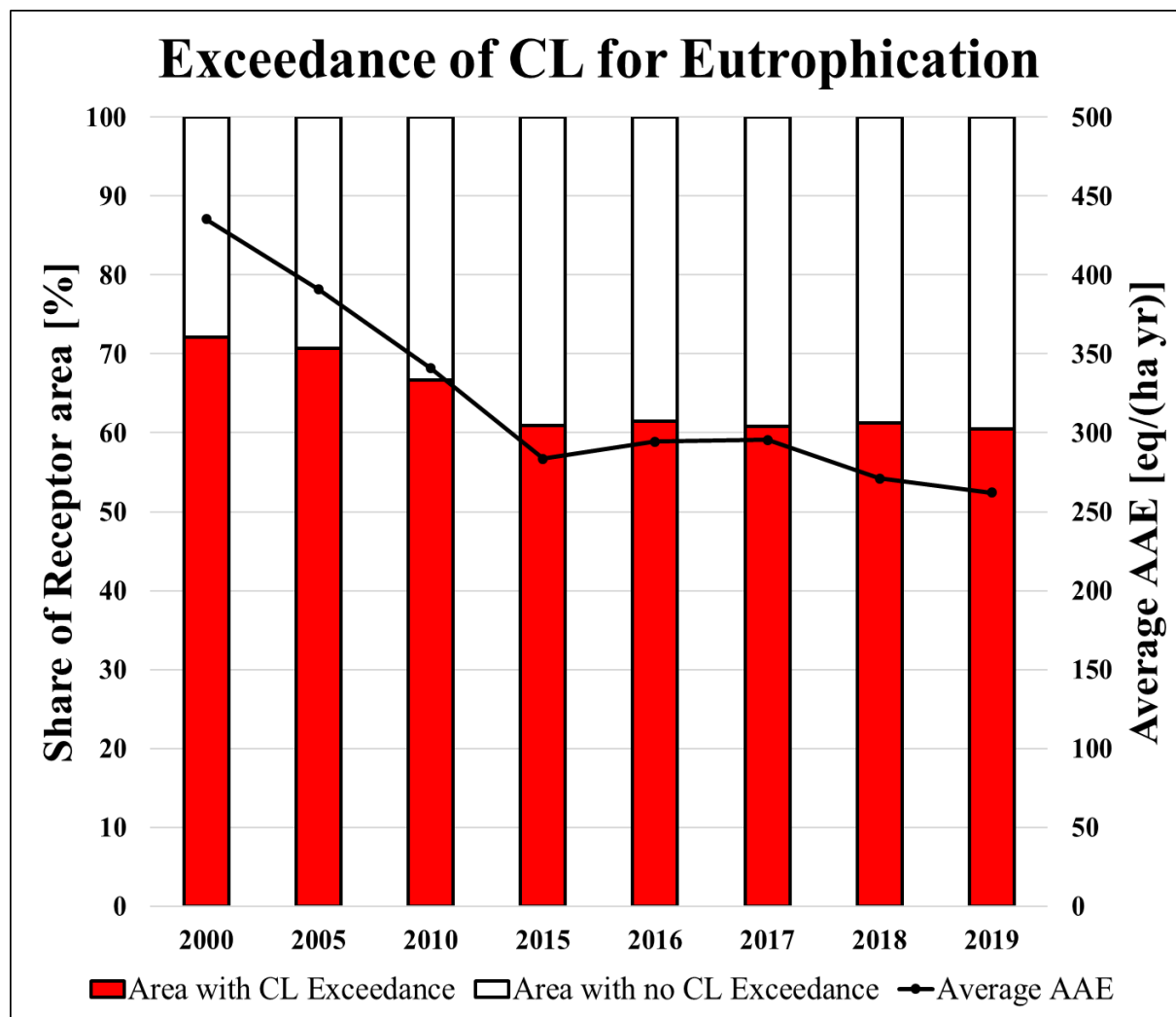
Results for risk of eutrophication

region	Area at risk [%]		AAE [eq ha ⁻¹ yr ⁻¹]	
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EU 27	82	70	651	361
Total area	72	60	435	262

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Results for risk of eutrophication

Total area



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	2000	2019	2000	2019
EU 27	82	70	651	361
Total area	72	60	435	262

Review of the Gothenburg Protocol

- » Question 2.8 “What are the expected impacts of new scientific findings on environmental and health effects assessments on critical loads”
- » Additional question “How and where do updated Critical Loads values affect the exceedances?”
 - details and answers will be delivered with the second draft of CCE contribution
 - Cooperation with CIAM on CL currently implemented in GAINS?

Thank you for your attention



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