Convention on Long-range Transboundary Air Pollution

Working Group on Effects

2025

ANNUAL REPORT

International Cooperative Programme on Modelling & Mapping of critical levels and loads and air pollution effects, risks and trends (ICP M&M)

Chair of the Programme Task Force: Alice James (INERIS, France)

Coordination Centre for Effects (CCE)
Hosted by the German Environment Agency (UBA, Dessau, Germany)
Headed by a team consisting of:
Markus Geupel, Thomas Scheuschner and Wiebke Galert

Centre for Dynamic Modelling (CDM)
Hosted by the IVL Swedish Environmental Research Institute
(IVL, Göteborg, Sweden)
Headed by a team consisting of:
Filip Moldan and Sara Jutterström

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Glossary

CCE	Coordination Centre for Effects
CDM	Centre for Dynamic Modelling
CfD	Call for Data
CIAM	Centre for Integrated Assessment Modelling
CL(s)	Critical Load(s)
CLempN	Empirical Critical Loads for Nitrogen
CLRTAP	Convention on Long-range Transboundary Air Pollution
EECCA	Eastern Europe Caucasus and Central Asia
EMEP	European Monitoring and Evaluation Programme
EUNIS	European Nature Information System
Gothenburg Protocol	Protocol to Abate Acidification, Eutrophication and Ground-level Ozone
ICP	International Cooperative Programme
IVL	Swedish Environmental Research Institute
M&M	Modelling and Mapping
MSC	Meteorological Synthesizing Centre
Ineris	French National Institute for Industrial Environment and Risks
NFC	National Focal Centre
SMB	Simple Mass Balance
TF	Task Force
TFIAM	Task Force on Integrated Assessment Modelling
UBA	German Environment Agency
WGE	Working Group on Effect
WGSR	Working Group on Strategies and Review

The ICP M&M

The International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends (ICP Modelling & Mapping, ICP M&M) is a programme under the Convention on Long-range Transboundary Air Pollution (CLRTAP), now generally called Air Convention (https://unece.org/environmental-policy-1/air).

Interest in the critical loads (CL) and levels approach for pollution control has gathered momentum over the past decades. To provide strategies for emission reductions as inputs to the negotiations of protocols to the Convention, the ICP M&M was established in 1988.

The programme is planned and coordinated by a Task Force (TF) under the leadership of France, located at the French National Institute for Industrial Environment and Risks (Institut National de l'Environnement Industriel et des Risques, Ineris), in collaboration with the Coordination Centre for Effects (CCE) hosted at the German Environment Agency (UBA, Germany) and with the Centre for Dynamic Modelling (CDM) hosted at the Swedish Environmental Research Institute (IVL, Göteborg).

The mandate of the ICP M&M is to provide the Working Group on Effects (WGE) and the Executive Body and other subsidiary bodies with comprehensive information on (i) critical levels and loads and their exceedances for selected pollutants, (ii) the development and application of other methods for effects-based approaches, and (iii) modelling and mapping of the present status and trends in impacts of air pollution. With this aim in mind, the CCE together with the Programme TF determine receptor-specific CL for (indirect) effects of the (long-term) deposition of various air pollutants and critical levels for direct effects of gaseous air pollutants; map pollutant depositions and concentrations which exceed critical thresholds and establish appropriate methods as a basis for assessing potential damage, e.g. *via* dynamic modelling. Moreover, various European databases on soil, land, climatic and other variables are used to calculate CL for those countries that do not provide national data. The maps are used for integrated assessment modelling by the Task Force on Integrated Assessment Modelling (TFIAM). Since its creation in January 2020, the CDM is the second designated centre to the ICP M&M, hosted by IVL Swedish Environmental Research Institute. Its main tasks mandated by the Executive Body are the development and promotion of methods for dynamic modelling (including consideration of effects on biodiversity, interactions with climate change and land use, to complement CLs with additional measures of the effects such as, e.g., target loads) and the development and maintenance of the common Working Group on Effects (WGE) website (https://www.unece-wge.org/).

The ICP M&M 2024 – 2025 workplan

In line with the priorities set out in the long-term strategy for the Convention for 2020 – 2030 and beyond, the Executive Body of the CLRTAP has adopted, in December 2023, the biennial workplan 2024 – 2025 for the Convention Workplan items. The main items where ICP M&M together with its designated centres constitute the main lead bodies are listed below. ICP M&M workplan items are summarised in Table 1. An advanced version of the full workplan is available at the following address:

https://unece.org/sites/default/files/2024-05/Advance%20Report%20Add.1.pdf

Table 1: Biennial ICP M&M workplan for 2024-2025

Workplan item	Activity description/objective	Expected outcome/deliverable	Lead body(ies)	Resource requirements and/or funding source
1.1.1.20	Define Dynamic Modelling indicators for protection ofbiodiversity and Dynamic Modelling outputs	Instructions for 24/25 CfD	ICP M&M, CDM	In-kind contributions from Sweden, Recommended contributions
1.1.1.21	Launch 24/25 CfD to: (a) update SMB CL; and (b) include dynamic modelling of biodiversity recovery and restoration	CfD: results to be included in CCE status report	ICP M&M, CCE, CDM	In-kind contributions from Sweden and Germany and recommended contributions
1.1.1.22	Empirical Critical Loads: Illustrate and map exceedance data, including CfD 23/24 outcome and updated 2023 receptor map	Included in CCE status report and brochure	ICP M&M, CCE	In-kind contributions from Germany and recommended contributions
1.1.1.23	Update policy relevant CL data sets and find ways to use these to assess risks of biodiversity loss on large geographic scale based on outcomes of items 1.1.1.21–1.1.1.22	Dataset: results to be included in CCE status report	ICP M&M, CCE	In-kind contributions from Germany
1.1.1.24	Critical Levels of NH3: map exceedance data	Included in CCE status report	ICP M&M, CCE	In-kind contributions from Germany
1.1.1.25	Update background database for EECCA and Türkiye (with, e.g., updated 2022 receptor map)	Included in CCE status report	ICP M&M, CCE	In-kind contributions from Germany

News from 2024, objectives of 2025 annual meeting and content of the present report

The work achieved by CCE and CDM and the national contributions to ongoing activities held since the last annual TF meeting (April 2024) were presented during the 2025 Annual Meeting of the ICP M&M, in Helsinki (Finland) from Tuesday 18 to Thursday 20 February 2025. This was the 41st TF, 32nd CCE meeting and 6th CDM meeting.

The presentations and discussions were mainly related to the previously defined main scientific challenges, grouped under the following items:

- Empirical Critical Loads,
- Steady state modelling, critical limits for simple mass balance models, critical levels for ammonia,
- Preparation of CL data to be provided to Centre for Integrated Assessment Modelling (CIAM) for the purpose of the Gothenburg Protocol revision,
- Dynamic modelling.

The next section of this report summarises the main tasks achieved by CCE and CDM and through the contribution of the ICP M&M TF gathering National Focal Centres (NFCs), since last ICP M&M report, published in 2024. Chapter 1 informs on the several contributions of the ICP M&M to the revision of the Gothenburg Protocol regarding several parameters which reflect risks for biodiversity through air pollution: Critical Loads for eutrophication, Critical Loads for acidification, as well as Critical Levels for ammonia. Chapter 2 reports the status of the work on development of dynamic modelling carried out by CDM. Chapter 3 reports on the possible contributions of ICP M&M to ongoing joint thematic issues of EMEP SB and WGE, i.e. open data access and uncertainties. Chapter 4 tackles capacity building actions under the umbrella of ICP M&M. Finally, the last section of this report lists the “Mapping Manual” updates achieved and foreseen subsequent to the above cited achievements and projects.

Another section reports proposals made for the next biennial workplan 20026 – 2027.

The agenda and list of participants of the 2025 Annual Meeting of the ICP M&M are available as annexes, together with its proceedings (summaries of the presentations).

Main activities ongoing under ICP M&M since 2024 annual report

1. Contributions to the revision of the Gothenburg Protocol

The revision of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, so-called "Gothenburg Protocol", as amended in 2012, is ongoing since the Executive Body Decision 2023 / 5[1] to revise it was published in December 2023.

Regarding Empirical Critical Loads for Nitrogen (CLempN)

Based on the new updated empirical critical loads for nitrogen (CLempN) and on the updated receptor map, CCE in March 2024 reported CLempN data to CIAM at IIASA for the use in Integrated Assessment Modelling (IAM). The topic was discussed at the 10th Joint EMEPB SB and WGE session (Geneva, September 2024) and it was approved by the Working Group on Effects that the Integrated Assessment Modelling made by CIAM at IIASA for the Gothenburg Protocol revision purpose should integrate CLempN dataset as the best proxy to address the risk of biodiversity loss due to air pollution. The details of that discussion are reflected under ECE/EB.AIR/WG.1/2024/2 item 8.e and in the Policy Brief prepared by TFIAM (version 4[2]).

At the same time the Call for Data 23/24 to National Focal Centers (NFC) on CLempN was ongoing. Final results from NFC were accepted in October 2024. With the Call NFCs were requested to implement the recently reviewed and updated CLempN and to apply these new values to their national receptor maps. Following this call, CCE gathered updated national datasets from 13 countries (Austria, Belgium (Wallonia and Flanders), Bulgaria, Czech Republic, Germany, Italy, Poland, Norway, Spain, Sweden, Switzerland, The Netherlands United Kingdom).

During the 41st TF meeting and 32nd CCE workshop, the existing CLempN datasets including the results of the Call for Data and the data previously submitted by CCE to CIAM were summarized and discussed:

- Uniformly selected and applied CLempN data (for Europe and Eastern Europe Caucasus and Central Asia (EECCA) area), which was already submitted from CCE to CIAM in March 2024
    - The minimum end of the range of CLempN
    - The "mid-point" of the range of CLempN
- NFC reported CLempN data based on national receptor maps, national ecosystem lists and national assumptions on the application of CLempN ranges

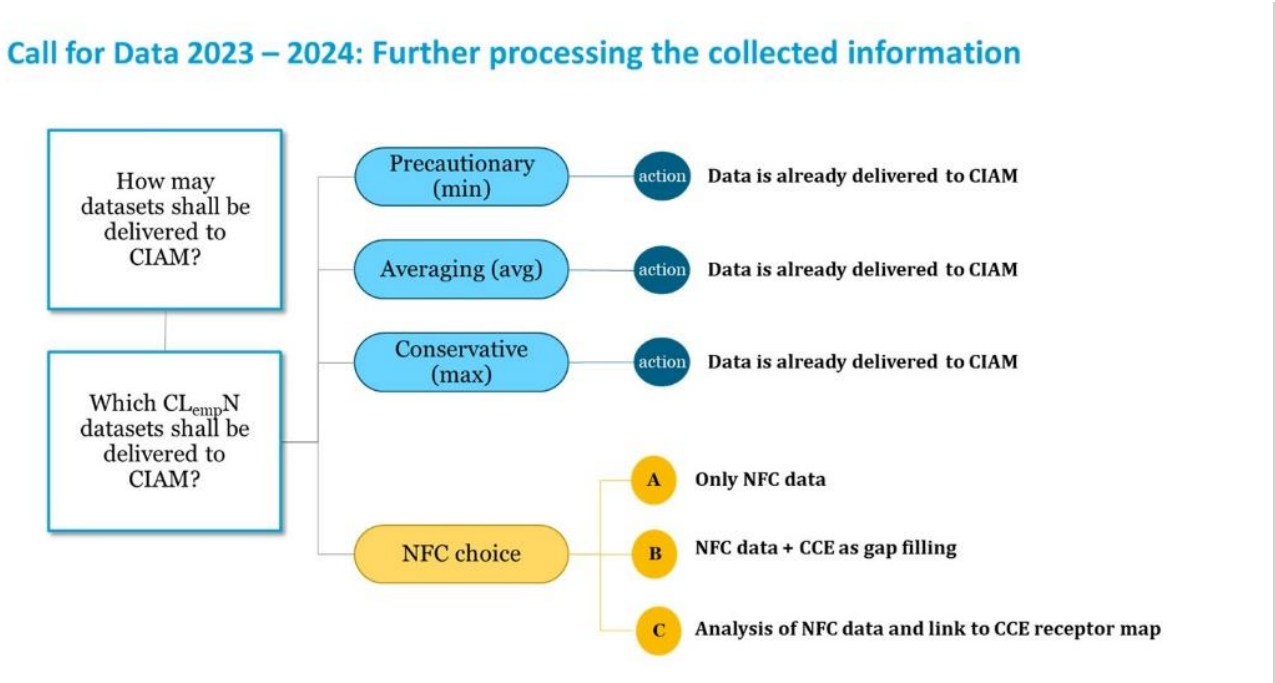
While the harmonized CCE data based on the European receptor map gives a uniform picture for Europe and EECCA, the NFC data reveals a patchy picture displaying national scientific knowledge and preferences. During the discussions, it has been shown that national data can be significantly different, more reliable (and sometime more precautionary although not always), than the uniformly prepared dataset by CCE. The shortcoming of the NFC reported CLempN data, that only 13 countries provided data, was overcome by CCE gap-filling for the rest of the European- and EECCA countries. The needed gap filling was either done with the minimum of the CLempN range or the average of the NFC choices of the CLempN range.

The discussion was launched among the participants, which of the datasets should be recommended for IAM purposes and NFCs were interviewed for their preferences.

1. how many CLempN dataset(s) should be provided to CIAM for IAM purposes?
2. which CLempN dataset(s) should be delivered to CIAM?
3. when NFCs are not providing national data, how should CLempN dataset be (gap)filled in?

[1] https://unece.org/sites/default/files/2024-05/Decision%202023_5%20%28E%29.pdf

[2] https://iiasa.ac.at/sites/default/files/2024-11/TFIAM-CIAM%20Policy%20Brief%20on%20targets%20to%20reduce%20risks%20for%20health%20and%20ecosystems_EN_V4_0.pdf



Following NFCs interview of preferences, ICP Modelling & Mapping TF recommended:

- to use NFC data for IAM, as most countries would like to see their national data included in the process,
- that if an NFC decides not to include national data, the dataset will be filled up with CCE-data and ICP M&M encourages CCE to use the averaged NFC-choices of the ranges for that.

At the end of the session the opportunity to prepare a European-wide research project gathering NFCs with the aim to extend CLempN dataset to other European Nature Information System (EUNIS) classes was presented by CCE and ICP M&M chair and welcomed by the participants. This action was identified by the organisers as a proposal for the next biennial workplan.

After the 41st ICP M&M TF meeting, discussion have been ongoing on the Gothenburg Protocol revision process, including on which CLempN dataset should be used for IAM purpose in view of optimization scenarios toward revision of the Gothenburg Protocol, or in view of ex-post analysis:

- at the Extended bureaux meeting of the EMEP SB and WGE (Ljubljana, Slovenia, 24 – 26 March 2025), the Chair of the IPC M&M TF conveyed the decision of the TF taken at the 41st ICP M&M TF meeting that NFCs had recommended to use NFC data for optimization scenarios
- at the TFIAM annual meeting (Laxenburg, Austria, 3 – April 2025), the TFIAM stated the following : "*With respect to biodiversity modelling, the TF considers that the harmonised data set of the CCE on the empirical critical load of the biodiversity loss due to nitrogen deposition (CLempN) should be used for target setting, whereas the set based on choices by National Focal Points is useful for sensitivity and ex-post analysis*."
- at its 63rd meeting (Geneva, Switzerland, 26 – 28 May 2025), the WGSR noted the following:
    - "*a number of delegations favoured a harmonized critical loads data set for optimization and national focal centre data for ex-post analysis, while others preferred using harmonized data for both and use the national focal centre data only for sensitivity analysis*"
    - "*some delegations recommended that issues related to the critical loads database to be used and the method how to set biodiversity goals should be discussed by the Working Group on Effects and the EMEP Steering Body*"

Regarding modelled Critical Loads for eutrophication and acidification (CLeutN and CLac)

The current Call for Data 24/25 aims at updating the national contributions to the policy-relevant databases on Steady State and Simple Mass Balance (SMB) critical loads for terrestrial and/or aquatic ecosystems, in combination with empirical critical loads with time-constraints linked to the Gothenburg Protocol revision. The Call for Data had been launched during autumn 2024 after it was approved by the Working Group on Effects at the 10th joint EMEP SB/WGE session. The announced deadline had been fixed to March 2025 following discussions at the 40th ICP M&M TF meeting in Oslo in 2024.

In February 2025, 3 out of 51 Parties to the Convention had provided data and associated reports describing the dataset, while 48 Parties had not answered the Call for Data. For those 48 Parties remaining with no dataset provided, CCE will proceed to gap filling with the CCE background database.

In this regard, ICP Modelling & Mapping TF concluded:

- to invite NFCs to provide their most up to date CLeut and CLac data, or to confirm former dataset, as soon as possible in view of their use for the Gothenburg Protocol revision process. The deadline for Call for Data was extended to 1st May 2025.
- that while the Call for data is progressing, so does the update of the CCE background database for modelled Critical Loads. CCE stated, that there were still some input data of the EECCA region to be checked and re-implemented. The completion of this update, as listed in the current workplan, had been scheduled for May/June 2025.

After the 41st ICP M&M TF meeting, discussion have been ongoing on the Gothenburg Protocol revision process timeline, and it was decided at the Extended bureaux meeting of the EMEP SB and WGE (Ljubljana, 24 – 26 March 2025) that most up to date data provided until 1st May 2025 would be used in ex-post analysis only.

Regarding Critical Levels for ammonia

In 2009, the UNECE proposed adjusting the Critical Levels for ammonia (NH_3) to 3 µg m^{-3} for nitrogen-sensitive, higher plant species and 1 µg m^{-3} for lower plant species. After the confirmation of the more protective Critical Levels for vascular and non-vascular plants, main results were transferred to a revised version of the respective chapter on NH_3 Critical Levels in the Mapping Manual (Texte 123/2024 – Chapter 3.2.3). After methodological updating of the Chapter 3 Manual, CCE lead a mapping exercise in the workplan 2024/2025 to visualize the distribution of the sensitive ecosystems across the ECE region. For documentation and mapping issues a table was derived to structure EUNIS class and to decide about indicator species leading to the decision of assignment of 1 µg m^{-3} to the receptor. In this table, either the corresponding factsheet to the EUNIS class describing a receptor and the existing species according to the EEA Web app was provided or the typical species description according to the Habitats Directive.

- with the help of the structured data, this information was mapped using the receptor map.
- 219 EUNIS classes at level 3 were applied. With this receptor map a full coverage of semi-natural ecosystems on the EMEP grid of 0.1°x0.1° is achieved. With this basis the decision was mapped of either 1 µg m^{-3} or 3 µg m^{-3}.
- As a result, 40 ecosystems from the 219 were found to be more sensitive to NH_3 (1µg m^{-3}). This is about 24% of the receptor area.

Draft exceedance calculations were carried out to provide an initial visual overview of the NH_3 pollution status. These exceedance calculations were carried out with EMEP concentration data (CCE /MSC-West) from the year 2022. Two approaches were made. The first approach is showing the Average Accumulated Exceedance (AAE) for the NH_3. The second mapping approach shows the ratio of exceedance for the NH_3 Critical Level for all ecosystems according to the receptor map.

Finally, it was concluded, that CCE would share the assignment table with interested NFC once more for review purpose. CCE stated that the final results of exceedance calculation would be used within ex-post analysis for the revision of the Gothenburg Protocol and published within the CCE Status Report 2025 to be launched at the 11th joint WGE/EMEP session in September 2025.

2. Current status of the work on development of dynamic modelling

On the 5th CDM meeting held in Copenhagen in August 2024, the role of Dynamic Models within the work of the WGE and the Convention was discussed. The meeting had concluded that dynamic modelling could provide input for scenario assessment, including impact on biodiversity. Furthermore, specification of the Dynamic Modelling part of the Call for Data was discussed and specified as two separate tasks.

In the first part of the dynamic modelling part of the CfD, NFCs were kindly asked to provide information on national usage of DM of ecosystem effects, including effects on biodiversity, and the data used.

Secondly, NFCs were asked for ex-post analysis of the scenarios for gap closures developed by CIAM for the Gothenburg Protocol review. This was done without prescribing which models or what ecosystem parameters should be in focus. As an example, if there is one country with an active modelling group interested in effects of air pollution on terrestrial biodiversity, CDM encouraged to use the existing models to assess the CIAM scenarios with respect to the effects on biodiversity. If in another country the national interest and available models focus on surface water chemistry, it would be equally interesting to use the model already in place to evaluate the same CIAM scenarios with respect to surface water chemistry.

After the CfD the CDM plan is to synthesize the national answers in a report to WGE, to provide a synthesis of dynamic models use which will help us to shape up future modelling strategy.

3. Contribution to joint EMEP SB and WGE activities

Regarding the topic of open data, the following conclusions were made during the 41st ICP M&M TF meeting, 32nd CCE and 6th CDM workshops:

- ICP M&M TF encourages the *ad hoc* group to inform ICPs on which data types should be made public or not, following Aarhus Convention recommendation to guarantee to every person “the rights of access to information, public participation in decision-making, and access to justice in environmental matters in accordance with the provisions of this Convention”.
- ICP MM TF decided that data would then be made available
    - CL exceedance data are already accessible from CCE website
    - CL data will be given to third parties upon request to CCE, with policy-relevant CL data (for GP revision) to be made accessible after collation of NFCs consent by CCE

Regarding uncertainties, NFCs were informed during the 41st ICP M&M TF meeting, 32nd CCE and 6th CDM workshops about the ongoing (EMEP SB/WGE, September 2024) and future discussions on this topic (Extended Bureaux meeting, March 2025)

4. Training: introducing ICP M&M activities to EECCA and Western Balkan countries

A workshop introducing ICP Modelling and Mapping activities to EECCA and Western Balkan countries was organised by CCE back-to-back with the 41st TF meeting and its 32nd workshop. For this workshop, the organiser CCE had offered to support travel and accommodation expenses of one expert per country.

The broad objective of the workshop was to follow the long-term objective to broaden ICP M&M, CCE and CDM networks in EECCA and WB countries and to reduce uncertainties for the CLRTAP science-policy approach.

Mrs Stela Drucioc, representing Moldova, attended this meeting. Moldova is a Party to the Convention since 1995 and is a granted candidate for EU Membership since June 2022.

In practice, the workshop consisted in presentation from CCE and the ICP M&M chair of the activities under CCE mandate within ICP M&M (e.g. Critical Loads and Levels methodologies) and took the form of discussions. Information was given about the global Convention history and context, as well as about methods and data needs.

- **CCE and Moldova mutually confirmed interest to follow-up on the Helsinki workshop with a bilateral online workshop. Mrs Drucioc offered to set up a Moldovian group of experts in the fields of biodiversity-, water-, vegetation- and forest science and administration**
- **Following the fruitful discussions with the expert attending and given the low participation of experts to the meeting, it is proposed that a new similar workshop is organised online, through the next biennial workplan.**

5. Manual updates

In 2024, CCE achieved an important phase of editing and updating the "Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends". Regarding the content, the main updates were:

- Chapter 3: update of Critical Levels for NH3;
- Chapter 5: update of the text regarding the UNECE receptor map and the background database for Critical Load modelling used for gap filling.

The current version of the Mapping Manual is available at the following link :

https://www.umweltbundesamt.de/en/cce-manual

- **It is proposed that a new round of updates is organised in 2026 and 2027 through the next biennial workplan, especially regarding the review of outdated content and the update of literature and associated references.**

Proposals for the next biennial workplan 2026-2027

ICP M&M TF, CCE and CDM discussed follow-up actions on their current work and made proposals for the future at the 41st annual meeting of the TF, CCE and CDM. These were discussed at the Extended Bureaux meeting in March 2025 and are to be proposed to the next Joint session of EMEP Steering Body and WGE in September 2025 before adoption by the Executive Body.

Workplan item	*Activity*	*Expected deliverable*	*Lead body(ies)*	*Resource requirements and/or funding source*
1.1 Improving tools to assess air pollution and its effects in the United Nations Economic Commission for Europe region				
1.1.1 Monitoring and modelling tools				
1.1.##	Report with conclusion of Dynamic Modelling part of the 2024-2025 Call for Data	Report	ICP M&M, CDM	In-kind contributions from Sweden, recommended contributions
1.1.##	2026-2027 Call for Data to: (a) update national CL databases; and (b) include dynamic modelling of biodiversity recovery and restoration	CCE status report	ICP M&M, CCE, CDM	In-kind contributions from Sweden and Germany and recommended contributions
1.1.##	Extension of CLempN dataset to other EUNIS classes: preparation of a research project with voluntary ICP M&M NFCs	Communication Brief on the project	ICP M&M, CCE	In-kind contributions from Germany and recommended contributions
1.1.##	Training on dynamic modelling	Workshop and associated outcome brief	ICP M&M, CDM	In-kind contributions from Sweden, Recommended contributions
1.1.##	Second informative workshop for EECCA and Western Balkan countries (online)	Workshop and associated outcome brief	ICP M&M, CCE	In-kind contributions from Germany and recommended contributions
1.1.##	Revised Modelling and Mapping Manual		ICP M&M, CCE	In-kind contributions from Germany, recommended contributions
1.1.##	Assessment of reduction options for the Gothenburg Protocol revision and development of further scenarios	Participation to meetings discussions tackling analysis and interpretation of data for their inclusion into Gothenburg Protocol revision	TFIAM, CIAM, TFMM, MSC-W, CCC, TFHTAP, CCE, CDM, WGE centres, CEIP	EMEP budget, recommended contributions

Annexes

Annex I - Agenda of the meeting

Convention on Long-Range Transboundary Air Pollution
Working Group on Effects

International Cooperative Programme on Modelling and Mapping of Critical Levels & Loads and Air Pollution Effects, Risks and Trends (ICP M&M)

41st ICP M&M Task Force meeting,

32nd CCE and 6th CDM workshops

Tuesday 18th, Wednesday 19th and Thursday 20th February 2025

Hosted in Helsinki (Finland)

DRAFT AGENDA (January 2025)
All times EET

Please note the meeting will be recorded for reporting purpose.
Should you have any objection regarding the recording of your contribution, please contact us.

TUESDAY 18 FEBRUARY (13.30 – 17)

Opening session (13.30 – 15.30)
– Chairs: Alice James & Torsti Schulz
"Chapeau" session including policy relevant questions and WGE framework/activities

- Recent development under the Convention (Carolin Sanz-Noriega, UNECE Air Secretariat)
- Ongoing activities under Working Group on Effects (Jesper Bak, WGE Chair)
- Overview on CCE ongoing and new activities (CCE)
- Overview on CDM ongoing and new activities (CDM)

Coffee Break (15.30 – 16.00)

Contributions from other bodies of the Convention to effect-oriented activities (16.00 – 17.00)
– Chairs: Sara Jutterström & Wiebke Galert

- Recent developments at CIAM (Max Posch)
- Update on ICP Forests (Anne-Katrin Prescher)
- Update on ICP Integrated Monitoring (James Kurén Weldon)
- Update on ICP Waters (Kari Austnes)
- Update on ICP Vegetation (Felicity Hayes & Katrina Sharps)

Closing of the meeting at 17.00

WEDNESDAY 19 FEBRUARY (9.00 – 16.00)

NFCs' contributions to effect-oriented activities (9.00 – 10.30), including the Tour de table

– Chairs: Thomas Scheuschner & Filip Moldan

- Is plant species diversity response to atmospheric nitrogen deposition controlled by bedrock? (Tomas Chuman, CZ)
- NFR, IIR and Grid emission under CLRTAP (Stela Drucioc, MD)
- UK National Focal Centre activities in relation to air pollution effects on ecosystems (Ed Rowe, UK)
- NFCs "Tour de table"

Coffee Break (10.30 – 11.00)

Call for Data 23/24 on Empirical CLs and implication towards Gothenburg Protocol revision (11.00 – 12.30)

– Chairs: Markus Geupel & Thomas Scheuschner

- Overview of the EMEP MSC-W model configuration for producing the GP revision data (Willem von Caspel)
- Comparing vegetation maps, consequences for critical loads and exceedances (Kari Austnes)
- Progress in the Doren project, estimation of response curves for nitrogen deposition for habitat types (Wieger Wamelink)
- EUNIS habitats response to nitrogen deposition in the Mediterranean region (Tania Carrasco Molina)
- Discussion on scenarios to be used (NFCs choice, harmonized on average, etc.)

Lunch Break (12.30 – 13.30)

Information from CCE (13.30 – 14.30)

– Chairs: Thomas Scheuschner & Alice James

- Ammonia Critical Levels
- Mapping manual

Current Call for Data 24/25 on Steady-state CL (14.30 – 16.00)

– Chairs: Markus Geupel & Wiebke Galert

- Introduction
- Steady-State CL Data

Closing of the meeting at 16.00

The sightseeing tour – at 5.30 PM
Our host suggests a tour of sights close to the Helsinki city centre.
It will end close to the place of the dinner at 7 PM.
The **meeting point** is the Aleksis Kivi memorial on the square facing the Main Railway Station and the National Theatre.

The dinner – from 7 PM
The dinner is organized at the restaurant Sea Horse.
The address: Kapteeninkatu 11, Helsinki
All practical details for these side events are available in a separate document

Agenda_41st_ICP-MM_2025-vfinal

THURSDAY 20 FEBRUARY (9.00 – 17.00)

Current Call for Data 24/25 on Dynamic Modelling (9.00 – 12.30)

– Chairs: Filip Moldan & Sara Jutterström

Coffee Break included

- DM part of the Current Call for Data (CDM)
- Effects of N pollution on species abundance (Kasia Sawicka)
- MAGIC modelling on Norwegian lakes – plans and progress (Kari Austnes)

Lunch Break (12.30 – 13.30)

Topics to bring to the Extended Bureau meeting (13.30 – 14.30)

– Chairs: Wiebke Galert & Filip Moldan

- Uncertainties regarding Critical Loads (CCE)
- Open data issues

This year, we would like to gather your contributions about two special items: uncertainties regarding Critical Loads, and the issue of Open data to outside the Convention. These issues arose during our last WGE/EMEP SB joint meeting in Geneva in September 2024, with two dedicated thematic sessions (see presentations of the Agenda items 7 and 11 in the presentation documents of the 10th Joint session of EMEP SB and WGE).
We are looking forward to hearing your feedback on this.

Coffee Break (14.30 – 15.30)

Summary and outlook session (15.30 – 17.00)

– Chairs: Alice James & Markus Geupel & Filip Moldan

- Wrap-up session, with inputs from NFCs and others
- Preparation of Workplan 26/27

Closing of the meeting at 17.00

Meeting documents available to all participants are to be downloaded from the CCE-cloud, here: https://clous.uba.de/index.php/s/5R5pK2MyxiGSuf9

For further details on the meeting: Alice James – alice.james@ineris.fr
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CDM – cdm@ivl.se

For further details on logistics: Torsti Schulz – torsti.schulz@syke.fi
Copy to Alice James – alice.james@ineris.fr

Agenda_41st_ICP-MM_2025-vfinal

Annex II – List of participants

Civility	Family name	First Name	NFC	CLRTAP Body	Presentation title
Mr	Aazem	Khalid			
Mrs	Austnes	Kari	Norway		- Update from ICP Waters - Comparing vegetation maps, consequences for critical loads and exceedances - MAGIC modelling in Norwegian lakes
Mr	Bak	Jesper Leth	Denmark	WGE Chair	Ongoing activities under WG on Effects
Mr	Bleeker	Albert			
Mrs	Carrasco Molina	Tania			EUNIS habitats response to nitrogen deposition in the Mediterranean region
Mr	Chuman	Tomas	Czech Republic		Is plant species diversity response to atmospheric nitrogen deposition controlled by bedrock?
Mrs	Drucioc	Stela			NFR, IIR and Grid emission under CLRTAP
Mr	Duan	Lei			
Mrs	Dury	Marie			
Mrs	Evstafeva	Elena			
Mrs	Fornasier	Maria Francesca			
Mr	Forsius	Martin			
Mrs	Galert	Wiebke		CCE	CCE presentations
Mr	García Gómez	Héctor			
Mr	Georgi	Georgiev	Bulgaria		
Mr	Geupel	Markus		CCE	- Overview on CCE ongoing and new activities - Uncertainties regarding Critical Loads - Open Data
Mr	Gromov	Sergey			
Mrs	Hayes	Felicity		ICP Veg	Update from ICP Vegetation

Civility	Family name	First Name	NFC	CLRTAP Body	Presentation title
Mrs	James	Alice		Chair	
Mrs	Jutterström	Sara		CDM	CDM topics
Mr	Kurén Weldon	James			Update from ICP Integrated Monitoring
Mrs	Manninen	Sirkku			
Mr	Moldan	Filip	Sweden	CDM	Overview on CDM ongoing and new activities
Mr	Posch	Maximilian			Recent developments at CIAM
Mrs	Prescher	Anne-Katrin			Latest developments in ICP Forests
Mr	Reinds	Gert Jan			
Mr	Rowe	Ed	United Kingdom		UK National Focal Centre activities in relation to air pollution effects on ecosystems
Mrs	Sanz-Noriega	Carolin		UNECE Sec.	Recent development under the Convention
Mrs	Sawicka	Katarzyna (Kasia)	United Kingdem		Effects of N pollution on species abundance
Mr	Scheuschner	Thomas	Germany	CCE	- CLempN – Results of CfD (2023/24) and next steps - Current CfD 2024/2025 – Steady state CL
Mr	Schulz	Torsti	Finland	*Host*	
Mrs	Sharps	Katrina		ICP Veg	
Mrs	Steingruber	Sandra			
Mr	Steinparzer	Matthias			
Mr	van Caspel	Willem		MSC-W	Overview of the EMEP MSC-W model configuration for producing the GP revision data
Mr	van Hinsberg	Arjen			
Mr	Wamelink	Wieger			Progress in the Doren project, estimation of response curves for nitrogen deposition for habitat types

Annex III – Proceedings of the 41st ICP M&M Task Force meeting

The abstracts of the presentations made during the meeting outside of work properly achieved by CCE and CDM are available in the present document below.

The presentations themselves are available on the CCE website, providing consent for such dissemination has been given to CCE by their authors:

Feedback on ongoing activities and recent meetings under and outside CLRTAP

Recent development under the Convention (Carolin Sanz-Noriega, Air Secretariat)

Carolin Sanz-Noriega from the UNECE Secretariat, presented an overview of the activities ongoing under the CLRTAP, including a summary of the main points discussed at the 10th Joint session of EMEP Steering Body and Working Group on Effects in Geneva in September 2024, a summary of the main points discussed at the 44th session of the Executive Body in Geneva in December 2024. Carolin Sanz-Noriega also drawn the main lines of work for the upcoming Extended Bureaux meeting session and the 11th Joint session of EMEP Steering Body and Working Group on Effects to be held in Ljubjana in March 2025 and in Geneva in September 2025, respectively. Also, she listed the associated deadlines for inputs from ICPs into, e.g. the Joint progress report on policy-relevant scientific findings, the technical report of the ICP M&M. Finally, she recalled the e-learning courses launched by the Convention in 2022 and 2023 on "The Convention and its protocols" [3] as well as on "The Convention emission inventories" [4] and she introduced the new e-learning course on "Monitoring effects under the Convention, to be launched in autumn 2025 after the 11th Joint session of EMEP Steering Body and Working Group on Effects.

Ongoing activities under Working Group on Effects (Jesper Bak, WGE Chair)

Jesper Bak, the new chair of the Working Group on Effects (WGE), presented what he identified as the main strategic discussions to be held under the WGE:

Ongoing and new activities

CCE (Markus Geupel, Wiebke Galert)

Markus Geupel (CCE) informed about recent activities of the CCE, starting with agreements made at the last Joint EMEP SB and WGE session about involvements of ICP M&M and CCE regarding the Gothenburg Protocol, with provision of several critical loads dataset to be considered within data analysis into Integrated Assessment Modelling exercise: (i) empirical critical loads for further consideration of biodiversity risks, (ii) modelled steady state critical loads of acidification and eutrophication, and (iii) ammonia critical levels for the purpose of ex post analysis specifically. He then made a recap of the achievements made since the last ICP M&M Task Force meeting: integration of the new receptor map and of an extended soil map within the existing CCE background database and further updates of the receptor map, planned use under the Gothenburg Protocol revision process and current developments under steady-state critical loads as well empirical critical loads dataset, planned approach to map critical levels of ammonia with the UNECE receptor map. Markus Gueupel also informed on several tasks and cooperation ongoing with EMEP (contributions to e.g. EMEP Status Report, Air Quality Model Evaluation International Initiative in its 4th phase). Markus Geupel also presented the planned chapters for the future CCE status report 2025 foreseen to be launched by September 2025. Finally, he presented current projects to which CCE contributed such as the preparation of the e-learning course Monitoring effects under the Convention.

Wiebke Galert (CCE) informed about the recent publication of the brochure on empirical critical loads of nitrogen for Europe published by CCE. She also informed about the plan to publish a complement to the existing brochure showing effects of air pollution, e.g. ozone, on vegetation. Following this objective,

[3] https://unccelearn.org/course/view.php?id=150&page=overview

[4] https://unccelearn.org/course/view.php?id=166&page=overview

she encouraged participant to send any contribution in the form of reviews and photos. Wiebke Galert also presented recent updates made on the CCE website regarding for example maps and data available.

CDM (Filip Moldan)

Filip Moldan informed about current CDM activities which are focussed on the dynamic modelling part of the current (2024/25) CfD (separate presentation). Apart from CfD, CDM reflected on joint thematic session of the 10th Joint meeting of the WGE and EMEP SB which had been focussing on Nature restoration and air pollution. In this respect, Parties to the Convention were encouraged to make national biodiversity monitoring data available to the ICPs and recommended use of the biodiversity data. This process is likely to benefit if the national experts involved in the work of ICP M&M actively will seek cooperation with national biodiversity experts who are involved in the work with Nature Restoration Regulation. Apart from experts' interactions, it might also beneficial to promote and encourage information exchange between the involved national authorities or agencies responsible for work of Convention and work with Nature Restoration Regulation on the national level.

Another important issue in work with dynamic modelling of impacts on ecosystems including biodiversity, are the interactions between air pollution and climate change effects. In that respect, further national co-ordination between national representatives involved in the work of UNFCCC, IPCC and CCAC might be mutually beneficial, cost efficient and scientifically inspiring.

Session on "Contributions from other bodies of the Convention to effect-oriented activities"

ICP Waters (Kari Austnes)

The revised ICP Waters manual has just been published and is available from our website: www.icp-waters.no. The next thematic report from ICP Waters is on biological recovery from acidification, analysing parallel time series on benthic invertebrates and water chemistry on lag times and chemical thresholds. ICP Waters runs chemical and biological intercomparisons every year. The web site has a new data exploration feature for chemical data. The biological database is being transferred to a new system. ICP Waters works on open data, and plan to publish data in repository, supported by a data paper. ICP Waters will contribute to the GP revision with scenario modelling using the MAGIC model.

The next ICP Waters Task Force meeting will be held jointly with ICP Integrated Monitoring Task Force meeting in Dessau, Germany, 23 – 25 April 2025.

ICP Integrated Monitoring (James Kurén Weldon)

ICP Integrated Monitoring (IM) presented its network status, active projects, and upcoming initiatives. Twelve countries submitted data from 40 active monitoring sites in 2024.

A global mercury monitoring project led by Canada's EPA which has installed passive samplers at many IM sites will release data for analysis later this year. IM published a study last year showing significant reductions in mercury (and lead and cadmium) concentrations in streams since 2000 (Eklöf et al. 2024).

IM is engaged in a rolling revision of the manual. The curent focus is on harmonising taxonomy with GBIF standards and increasing data resolution in some subprogrammes, e.g. from monthly to daily temperature reporting. Preliminary analyses of daily temperature data revealed a one-month extension of the vegetation period at a Swedish IM site over 30 years.

Dynamic modeling efforts combining geochemical soil models (VSD+) with plant response models (PROPS) to predict biodiversity outcomes at Swedish sites are underway as part of the current call for data.

The open data initiative is progressing, with almost all participating countries agreeing to make their data publicly accessible under CC BY licenses. We aim to align with eLTER database formats as much as possible to minimise duplicate submission work. A data paper published in a suitable journal will accompany the database release later this year and act as the focus for the attribution required by the CC BY licence.

The next ICP Waters Task Force meeting will be held jointly with ICP Integrated Monitoring Task Force meeting in Dessau, Germany, 23 – 25 April 2025.

ICP Vegetation (Felicity Hayes)

ICP Vegetation provided a summary of activities for 2024-5 and outlined the ongoing workplan for 2024-25. The ICP Vegetation Taskforce Meeting was held in Tirana (Albania) this year, with 62 participants. Felicity Hayes presented current major topics under the ICP, with current and future scenarios studied for crops, tres and semi-natural vegetation to assess ozone impacts. She also recent progress of the ongoing NOx critical levels review. Initial data from the MADAME project has shown that airborne microplastics are found throughout the UNECE region, with 31 samples processed across 20 countries. Finally, the 2020 moss survey results were also presented for lead (82,5% decrease in moss), mercury (10% decrease, with a recent increase from 2015) and nitrogen (3,13% decrease, with a recent increase from 2015).

ICP Forests (Anne-Katrin Prescher)

Anne-Katrin Prescher from PCC of ICP Forests presented the latest progress on the 2024/2025 workplan. The ICP Forests Technical Report 2024 was published including data/ maps of tree condition in 2023, throughfall deposition in 2022, and meteorological conditions in 2022 (https://www.icp-forests.net/reports-and-briefs/technical-reports). For beech plots, it was shown that 21% of the plots show a significant increase in defoliation between 2014 and 2023, and in spruce plots, even 36% of the plots. Main damage agents across all tree species were insects and abiotic agents, in particular drought. Regarding ICP Forests deposition measurements, inorganic Nitrogen throughfall deposition was low (0.0 – 10.0 N kg ha-1 yr-1) at 72% of the plots. Throughfall deposition of sea-salt corrected SO42--S was low (0.0 – 3.0 S kg ha-1 yr-1) at even 95% of the plots. Further the publication “The fingerprint of tropospheric ozone on broadleaved forest vegetation in Europe” by Ferretti et al. was introduced (https://doi.org/10.1016/j.ecolind.2023.111486). At the end, the TF was invited to join the ICP Forests 40th Anniversary, FORECOMON and 41st Task Force Meeting of ICP Forests in Dresden, Germany (19 - 23 May 2025). The next ICP Forests Task Force meeting will be held jointly with FORECOMON[5] 2025 in Dresden, Germany, 19 May – 23 May 2025.

Centre for Integrated Assessment and Modelling (Maximillian Posch)

Maximillian Posch, representing the Centre for Integrated Assessment Modelling (CIAM), presented the latest results regarding the revision of the Gothenburg Protocol. This included CIAM’s first optimization results using health targets only, and compared some to biodiversity exceedances, represented by the CLempN data received in 2024. Biodiversity will soon be included in the optimization targets, but this will be preliminary until the ‘final’ version of the CLempN data (as well as the east-extended data set for CLaci and CLeut) are received from CCE. Also under investigation are the formulation of the biodiversity targets, e.g., a reduction of the exceedance for all ecosystems in the whole region (simplest case, i.e. a single constraint) or a reduction for every ecosystem individually in every country (hundreds of constraints).

Session on “NFCs’ contributions to effects-oriented activities, Tour de table”

Is plant species diversity response to atmospheric nitrogen deposition controlled by bedrock? (Tomas Chuman, CZ)

Using extensive data from the United States and the Czech Republic, we looked for soil differences arising from base-rich and base-poor bedrock, and we hypothesised that the increased nitrogen deposition on cation-poor bedrock will have a weaker effect on species diversity changes than on cation-rich bedrock. Our results show the effect of nitrogen deposition on species richness across broad environmental gradients for open and closed canopy vegetation and that the species richness response

[5] FORECOMON : Forest Ecosystem Monitoring Conference

differs by bedrock. The species richness increases at low N deposition loads and decreases above 10-15 kg N ha^{-1} yr^{-1} for both vegetation canopy types in the US. A slight species richness increase at low N deposition could be seen only in the open canopy vegetation in the Czech dataset, and species richness starts to decrease above 12 kg N ha^{-1} yr^{-1}. The species richness in closed canopy vegetation shows a linear response to N deposition and decreases across the entire gradient in the Czech Republic. Overall, the results agree with the empirical critical loads defined for the US ecosystems by (Pardo et al., 2019, 2011) and European ecosystems by (Bobbink et al., 2022); thus, our results support the validity of their setting.

NFR, IIR and Grid emission under CLRTAP (Stela Drucioc, MD)

Stela Drucioc, from the Institute of Chemistry of the Republic of Moldova, gave a presentation of the activities undertaken in her countries towards air quality improvement. She gave an overview of the Moldovian laws into force and the Government decisions as well as the national programmes and strategies ongoing in her countries which are dealing with ambient air quality. She informed on how Moldova was reporting under CLRTAP as a country party to the Convention regarding emissions and inventories. Stela Drucioc also presented the institutional structures and administrative capacities responsible for this reporting and all the work ongoing behind regarding air quality.

UK National Focal Centre activities in relation to air pollution effects on ecosystems (Ed Rowe, UK)

The UK National Focal Centre has been active recently in presenting and publicizing atmospheric pollution effects to decision makers, including the UK House of Lords, and the Welsh Government's Clean Air Advisory Panel. Nitrogen and sulphur deposition in the UK continue to decline, but ammonia concentrations have remained fairly constant in recent years. Monitoring work to meet obligations under the UK National Emissions Ceiling Regulations is being reviewed, in particular improving how plot-level biodiversity data is related to site-level atmospheric data. Site monitoring methods for air pollution and ecosystem condition are also being refined in a set of pilot studies. A restricted set of measurements and records are taken, focusing on the results most likely to reveal pollution impacts and recovery: NH_3 and NO_2 concentrations; bulk deposition of N and S; co-located terrestrial quadrats in which all species of vascular plants, lichens and bryophytes are recorded, also algae, bare peat, and necrotic *Sphagnum*); epiphyte floristics & bark pH; terrestrial biogeochemistry (moss %N and soil-solution pH, NO_3 and NH_4); bioacoustic recording for birds and Orthoptera; and automated moth identification and recording. UK and Devolved-Administration governments are increasingly engaged with atmospheric pollution effects on ecosystems, and empirical research continues, focused on monitoring ecosystems in relation to pollution gradients, and on ecosystem recovery in old N-addition experiments and on sites near emissions sources that are closing.

Call for Data 23/24 on Empirical CLs and implication towards Gothenburg Protocol revision

Overview of the EMEP MSC-W model configuration for producing the GP revision data (Willem von Caspel)

Willem van Caspel presented the basic EMEP chemistry-transport model configuration used for producing the GP revision data. The overview included a short factsheet of the relevant model settings, for example with regards to the employed boundary conditions, model resolution, and meteorological years. Moreover, a brief overview of the input emission scenarios was given, in addition to a high-level overview of modelled changes in SOx, OXN, and RDN deposition across the EMEP modelling domain. The presentation also included links to the relevant model (output) download and description pages

Comparing vegetation maps, consequences for critical loads and exceedances (Kari Austnes)

Comparing vegetation maps, consequences for critical loads and exceedances: The suggestion to use the harmonised empirical critical loads (empCLs) map instead of a map with nationally submitted empCLs and gap filling is a new approach. In the past, national critical loads have always been used when available. Comparing the map using national contributions with the harmonised map using minimum empCLs shows that country borders are sometimes visible. In some cases national empCLs are higher, in other cases they are even lower than the minimum. The latter is the case for Norway, and the difference is most evident in the part of the country with largest deposition. A detailed analysis

identified the main explanations for the differences: 1) An unreasonably large share of the area has been assigned to the EUNIS class T31 Temperate mountain Picea forest, which has minimum empCL 10 kg N/ha/yr, in contrast to the T3 classes used in the Norwegian map, all having minimum empCL 3 kg N/ha/yr or lower. 2) The class T1C Temperate and boreal mountain Betula and Populus tremula forest on mineral soils, with no official empCL, has been assigned the same empCL as the general T1 (minimum 10 kg N/ha/yr) in the harmonised map, while in the Norwegian map it has been assigned the same empCL as the general T3 class (minimum 3 kg N/ha/yr), as it is considered equally sensitive. Using the harmonised map will give lower exceedance for Norway. It also undermines the activities of the NFCs.

Progress in the Doren project, estimation of response curves for nitrogen deposition for habitat types (Wieger Wamelink)

The Doren project continues. This first topic addressed was the number of degrees of freedom for the applied spline function. This was now standard 2 df but that is very limited. More df were tested. Especially for the underlying species this led to more reliable curves for some species. An automated procedure to select the optimal number of degrees of freedom will be implemented. The second topic was whether or not separating mosses and lichens and higher plants would lead to different response curves for habitat types. Three habitat types with many mosses and lichens were tested but separating them did not lead to significant different curves. The third topic addressed was using the sum of nitrogen deposition since 1880 till the vegetation plot was made instead of the five-year average of the nitrogen deposition before the plot was made. In theory we expected an s-shaped curve of which we possibly could identify a tipping point. Would the deposited amount come above the tipping point then we would expect a decrease of species number. However, for only three out of 60 evaluated habitat types this was the case, for all the other types a similar curve as for the five-year average was found.

Spanish receptor map for the use of empirical critical loads; methodologies and exceedances (Tania Carasco-Molina)

Using the methodology proposed by Wamelink et al. (2024), the response of EUNIS habitats to nitrogen deposition was assessed in the three biogeographical regions present in the Iberian Peninsula (Alpine, Atlantic, and Mediterranean). This analysis is based on presence/absence data at the European level from the European Vegetation Archive plots. A total of 41, 46, and 47 response curves were generated for coastal habitats, wetlands, grasslands, heathlands, and forests within the EUNIS classification across the three biogeographical regions. In the Atlantic region, the effect of using either a 5-year or a 20-year average for nitrogen deposition at each plot was analysed, revealing very similar response patterns in both cases. In the Mediterranean region—the biogeographical region with the fewest data points—unexpected responses were observed for some oligotrophic species due to gaps in nitrogen deposition data across the studied range. To address this limitation, a future step will be to expand the dataset for this region to generate more reliable response curves.

Results of the Call for Data 23/24 for Empirical Critical Loads and next steps (Thomas Scheuschner)

The previous CfD contained the request to NFCs to submit information about application of new updated empirical critical loads to their national territories. The NFCs were asked to take decision on which value should be applied in their countries among the lower or the upper end of the range. Following this call, CCE gathered updated national datasets from 13 countries (Austria, Belgium (Wallonia and Flanders), Bulgaria, Czech Republic, Germany, Italy, Poland, Norway, Spain, Sweden, Switzerland, The Netherlands United Kingdom). It had been decided at the 10th Joint EMEPB SB and WGE session (Geneva, September 2024) that the Integrated Assessment Modelling made by CIAM at IIASA for the Gothenburg Protocol revision purpose should integrate empirical critical loads dataset as the best proxy to address the risk of biodiversity loss due to air pollution. Whether and how to aggregate such data was however still under discussion. Thomas Scheuschner explained that the aim of this session was also to discuss this issue. He recalled which dataset had already been provided to CIAM (e.g. minimum end of the range and “mid-point” of the range) and explained the nature of the different possible datasets (e.g. minimum end of the range, “mid-point” of the range, “NFC choices”. Thomas Scheuschner finally launched the discussion with the Task Force to decide how data should be merged between data already stored at CCE and data selected and provided by NFCs to CCE during the Call for Data 23/24. The discussion was launched through the presentation of a flow chart with questions to which NFCs were invited to answer.

Information from CCE on mapping manual and ammonia critical levels

This session was cancelled to favour discussions on data provision towards Gothenburg Protocol revision.

Current Call for Data 24/25 on Steady-State Critical Loads

Update on the Current Call for Data 24/25 for Steady-State Critical Loads (Thomas Scheuschner)

Thomas Scheuschner recalled the goals of the current Call for Data 24/25 regarding modelled critical loads which are to update the national contribution to the policy-relevant databases on critical loads for terrestrial and/or aquatic ecosystems (steady-state critical loads) with time-constraints linked to the Gothenburg Protocol revision. The Call for Data had been launched during autumn 2024 after it was approved by the Working Group on Effects at the 10th joint EMEP SB/WGE session. The announced deadline had been fixed to March 2025 following discussions at the last Task Force meeting in Oslo in 2024. Thomas Scheuschner recalled how important it was that NFCs follow the instructions and template provided by CCE for data management by the CCE. Following the Call for Data, for the Helsinki meeting only 3 out of 51 Parties to the Convention had provided data and associated reports describing the dataset. Therefore the deadline for Call for Data was extended to 1st May 2025 and NFC were urged to present their data and reports.

Current Call for Data 24/25 on Dynamic Modelling

Dynamic Modelling Part of the Call for Data (CDM – Filip Moldan)

The DM part of the current CfD consists of three parts:

1. Information sharing: what modelling of air pollution effects on ecosystems are undertaken nationally, within or outside NFCs. Which groups are involved and what is the focus of the work. Is the model output used nationally for policy purposes.
2. Information sharing: which models are in use, what datasets are used nationally in the modelling work, both from national and international sources, are there national time series data that could be of interest to the community.
3. To use the existing model set-ups to assess the impact of air pollution scenarios developed by CIAM, on biodiversity or on other parameters modelled nationally.

Format and extent of the anticipated NFCs response to the Cfd has been discussed. CDM stressed, that input on the points 1 and 2 above should in principle be able to deliver by all 21 active NFCs, of which 11 were present at the meeting. It is expected that response to the third point (above) will only be possible for those NFCs where such activities are undertaken nationally. That, however, is not an obstacle for addressing points 1 and 2. The response to the CfD will be further discussed at the 11th session WGE and EMEP in September 2025.

Effects of N pollution on species abundance (Kasia Sawicka)

In the UK there are the taxom groups with good abundance data monitoring year by year. These are put together to make all species trend over time which is declining. The government wants to know how future land use changes and other factors like atmospheric pollution affect this trend. We build models to simulate taxa response to different environmental change. From that generate ‘theoretical abundance index’ that is equivalent to the real one and check how well is agrees with the real one back in time and we can see how well it will perform in the future scenarios.

We are trying to predict effects of Nitrogen deposition on species abundance so first we predict effects on soil pH. Available N and biomass and use simple functions to convert these to trait means and predict habitat suitability for different species. These indicators are used in the Plant4pop model that uses spatial dispersal and habitat suitability to predict species cover which we interpret as abundance.

The comparison of data used for the UN scenarios and data used in exceedance calculations at a national level revealed that EMEP systematically underestimate deposition in the UK, especially in the

wet mountains. Therefore, we are not certain we should be using the data provided by the CDM for the scenario modelling directly, but we could use the scenarios as scaling factors to the UK deposition estimates from CBED. As the data was provided at short notice, we did not have time to implement this, and instead we run analysis for “simple” scenarios of half, double and current legislation emissions based N deposition between 2020 and 2030.

We model key biodiversity indicators such as Canopy height, Ellenberg N and Ellenberg pH for 2252 plots across UK, across different habitats. Results for adic grassland have been presented as an example. The results suggest that while additional N deposition has mostly fertilising effect, there are some areas where it would hinder the plant growth possibly due to the acidifying effect.

Example MADOC results aggregated to a single SC square (1km2) showed increase in canopy height score strongest in acid grassland for double of the N dep (unsurprising) because acid grassland respond with herbaceous biomass increase, opposite to woods which have already a lot of biomass and hight. This affects habitat suitability a lot because height score is often the indicator that most affects habitat suitability for species.

MADOC outputs are used to predict habitat suitability using MultiMOVE – a set of species niche models trained on UK vegetation data. Results for one selected site were shown. Holcus lanatus a very common grass which can thrive in a range of open conditions, so as we can see the woodland habitat has a low suitability score. The tall growing species benefits from increased fertility and is likely to shade out the more distinctive species in acid grassland. Succisa pratensis is typical for nutrient poor grassland and shows a decline in higher pollution scenario as expected.

The results of applying the MultiMOVE outputs in a dynamic species abundance model plant4pop showed that two species of grasses that both show little change or positive response to N depostion if CLE sustained, but dwarf shrub and wild flower species will be in decline even in the baseline scenario. This does not only use the species or habitats presented so far, but all species in local species pools and all habitat types.

In conclusion, (i) by including landscape dispersal processes we are expanding capacity of modelling those kind of background global change drivers like pollution, but also how management interventions can kind of mitigate those effects, (ii) we are not sure the scenario data are correct for the UK, (iii) the model simulates grater effects of N deposition in open habitats, (iv) we have been provided with a list of species of interest but these may not include sensitive species.

MAGIC modelling on Norwegian lakes – plans and progress (Kari Austnes)

MAGIC modelling on Norwegian lakes – plans and progress: As contribution to the GP revision, NIVA will model a set of acid-sensitive Norwegian lakes with MAGIC and run scenarios provided by EMEP. ICP Waters also encourages other countries to run MAGIC on their sites and arranges workshops to assist in this. MAGIC is now set up in the modelling platform Mobius2 and includes several new features, including multi-point calibration, control of organic matter solubility and manipulation of weathering rates. The Norwegian lakes have been calibrated successfully, but there is still ongoing work related to the coupling between sulphate concentration and organic matter solubility. There are no current plans to model biodiversity, but in theory it could be possible to design a model chain similar to VSD-PROPS.

Topics to bring to the Extended Bureau meeting

Uncertainties regarding Critical Loads (CCE)

Markus Geupel recalled that at the WGE & EMEP SB Extended Bureaux meeting (Geneva, 28 February – 1 March 2024) “it was agreed that a thematic session on Managing uncertainties was to be organized at the 10th joint EMEP SB/WGE meeting in September 2024”. There, it was concluded by the EMEP SB Body and the WGE, that all task forces and centres had worked extensively to understand and handle different types of uncertainties in science based support for policy including integrated assessment modelling, and that this work needs to continue, in particular improving communications with different stakeholder groups. With his presentation Markus Geupel summarizes how the Mapping Manual prescribes how to deal with uncertainties. Uncertainties of Empirical Critical Loads are displayed through “value-ranges” (indicating the variability between measurement sites, the differences between treatment concentrations during experiments or site-specific uncertainties). The ranges can be accounted for in large-scale assessments. Also, the reliability of CLempN is indicated with each value-range (##: reliable: when a number of published papers of various studies show comparable results; #: quite reliable: when the results of some studies are comparable; (#): expert judgement: when no (robust

or reliable) empirical data are available for this type of ecosystem). For modelled CL he summarizes that most of the aspects contain uncertainties, which are typically not quantifiable: the steady state is a theoretical situation (containing uncertainty of coefficients and functions); critical limit derivation (link between soil chemistry an biological impact) includes uncertainties due e.g. differing results from lab or field observations; the choice of critical limits contains a personal view; the quality of input data influences the quality of uncertainty. Last but not least he summarizes the uncertainties related to the mapping of CL and their exceedance.

Open data issues

Markus Geupel with his presentation recalls that at the 10th joint session of EMEP/WGE in Geneva, the Steering Body and the Working Group recommended on the issue of open data policy to establish an ad-hoc group of experts to assess what type of data should be open access and to develop recommendations for clear guidelines on what data can be open access and what procedure to follow. Further, he informed participants about the need to fulfil the Aarhus Convention[6]. He also recalled and summarizes how ICP Waters and ICP Integrated Monitoring deal with open data policy and mentions the CCE Webserver on exceedance data[7].

[6] https://unece.org/environment-policy/public-participation/aarhus-convention/introduction

[7] https://datahub.uba.de/server/rest/services/Lu/Critical_Load_Exceedance_2021/MapServer