



United Nations Economic Commission for Europe (UNECE)

**Convention on Long-range Transboundary Air Pollution Working Group on Effects (WGE)  
International Cooperative Programme (ICP) on Integrated Monitoring of  
Air Pollution Effects on Ecosystems**

Minutes of the thirty first Programme Task Force held on 9-11th May in Lunz, Austria

The meeting was organized jointly with the International Cooperative Programme on Assessment and Monitoring of the Effects of Air Pollution on Rivers and Lakes (ICP Waters). The meeting was attended by experts (32 in person and 27 online) from the following Parties to the Convention on Long-range Transboundary Air Pollution (CLRTAP): Armenia, Austria, Canada, Czech Republic, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Norway, Poland, Russian Federation, Spain, Sweden, Switzerland, and United Kingdom. The list of participants is attached as Annex I. The agenda is presented as Annex II. Detailed notes from the Joint TF meeting will be available in the meeting report of ICP Waters (to be included on web pages of ICP Waters, see <http://www.icp-waters.no>). Presentations from the thematic sessions are available from <https://www.slu.se/en/Collaborative-Centres-and-Projects/integrated-monitoring/meetings/>

Below are notes from the separate Task Force meeting of ICP IM.

**§ 1 Opening of the meeting**

Mr. Ulf Grandin opened the meeting and a moment of silence was held in memory of one of the founders of IM, Sven Bråkenhielm, who passed away earlier this year.

**§ 2 Approval of the agenda**

The TF approved the agenda

**§ 3 Approval of minutes from 30th IM TF**

The meeting approved the minutes of the previous TF meeting

**§ 4 The Programme Centre**

**§ 4a** Mr. Ulf Grandin presented the staff at the Programme Centre (PC):

Head of IM Programme Centre: Dr. James Kurén Weldon

Senior researcher: Associate Professor Martyn Futter

Data base: Dr. Pernilla Rönback and Dr. Hampus Markensten  
Expert on heavy metals: Associate Professor Karin Eklöf

**§ 4b** The new website at [www.slu.se/en/icp-im](http://www.slu.se/en/icp-im) was presented.

#### **§ 4c The Annual Report**

The annual report is now an SLU publication, in PDF format only. The PC suggested that annual reports in future will contain maps showing trends in data at IM sites for some key variables of interest, that will be updated in each edition of the report. These may also be published on the website. Ms. Ika Djukic suggested that it was important that some variable from each of the main compartments of the monitoring programme be represented. The next IM annual report will be available for the EMEP/WGE joint September meeting in Geneva. The PC noted that more material is needed, and particularly encourages all countries to submit a short update on their activities and any publications (although more extensive contributions are also most welcome).

#### **§ 5 The new IM database**

Mr. Hampus Markensten presented database issues. After a year of submissions and validations the process is now working mostly smoothly, and thanks were offered to all for their patience with the new procedure. Errors in validation codes are still found, but less frequently. It was noted that more information to and approval by the PC is needed before new flags, parameters or methods can be added to the database. Pre-treated excel files can be returned to data providers in request to help with future submissions.

#### **§ 5b Database/network status and data submission**

Ms. Pernilla Rönback reported on the current state of data reporting to the PC. There has been data submission for at least part of the last five years 2017-2021 from the following countries: Austria, Czech Republic, Estonia, Finland, Germany, Ireland, Italy, Lithuania, Norway, Poland, the Russian Federation, Spain, Sweden, and Switzerland. 10 countries have reported data for 2021 Austria, Czech Republic, Estonia, Finland, Germany, Italy, Norway, Poland, the Russian Federation, and Sweden.

The TF agreed that the data submission deadline for data from 2022 is 1<sup>st</sup> December 2023. The reporting format for submissions remains the same (xlsx or txt), please use only one Excel sheet per file submitted (or one table per file for txt files), with the first row as header and the second row onwards for data. It is possible to have data from several sites in the same report file, but only within the same subprogramme. Do not include more than one subprogramme in the same file.

If possible, name the files:

countrycode/areacode\_subprogrammecode\_datayear (example SE\_RW\_2022.xlsx or SE14\_RW\_2022.txt)

Email address for submissions: [im-database@slu.se](mailto:im-database@slu.se)

## **§ 5c Discussion- Data availability.**

The Convention asked the Task Forces to discuss data availability in 2022, and to investigate possibilities for making the data freely available. The 2022 TF meeting found no fundamental issue with this and decided to look further at the possibilities. The PC suggested the open publication of the international database according to FAIR ([www.fair.org](http://www.fair.org)) principles and under an appropriate “by attribution” licence, in connection with a published data paper with all data providers as co-authors, which would be cited whenever our data are used. The PC noted that this is a voluntary process, and if parties want to abstain either with part or all of their data, they are free to do so (assuming their national and EU regulations permit this of course).

Mr. Pavel Krám suggested that the first step could be to make the data open internally so that everyone may check what is included, both data they and others have provided. Mr. Thomas Dirnböck said that Austria are already doing this, and confirmed that a separate DOI would be available for the Austrian (or other national) data and the international data. Mr. Martin Forsius said that Finland is positive to the suggestion, and that there is an ongoing discussion in Finland about synchronising this with the national LTER network. Mr. Martyn Futter agreed that opening the data internally would be a good first step. Mr. Thomas Scheuschner stated that Germany can and should share data openly, and agreed that NFCs being able to freely check their own data is a useful tool that would also be a consequence of doing so. It would also make more visible what is available and what is missing in the database. As an example, he noted that the Forellenbach site have decided that levels of S deposition are now so low that there is no need to continue monitoring this. Mr. Pavel Krám thought this was a mistake, as forests need some S as a nutrient, which could be missing, and that measurements are anyway inexpensive. Mr. Thomas Dirnböck asked if nomenclature is included in submission checks of biological data. The PC replied that there is a species list that is used to match on, however this may need updating as it has not been revised in recent years.

The conclusion of this section was that all NFCs should check what is possible for them in opening their data and inform the PC as soon as possible. The PC will work on drawing up a roadmap for implementation and suitable agreements and send this out to NFCs.

## **§ 6 IM manual**

Mr. Ulf Grandin presented some issues with the current manual. There are some outdated or incomplete sections regarding methodology. Some chemical analysis methods have no references, and the alkalinity section in particular was noted as needing attention. It was suggested that an ad-hoc group led by the PC be formed to address these issues, coming back to the TF meeting with suggested changes. Mr. Thomas Scheuschner and Mr. Martin Forsius agreed with this proposal. Mr. Thomas Dirnböck noted that ICP Forests have recently updated their manual and it may be possible to adopt some of their changes. Harmonising with other ICPs is generally a desirable outcome. Mr. Ulf Grandin’s proposal was agreed.

Another issue presented was the problem of overly aggregated data. Some variables (e.g., meteorological) are reported only as monthly averages for example, which make some analyses impossible. NFCs were asked if in principle it would be possible to re-reporting old raw data, and continue with raw data in future. Mr. Martin Forsius informed that the history behind aggregation not just storage limitations but also that raw data could be used by others without agreement or recognition. Open data and a data paper is a way around this. Mr. Ulf Grandin concluded that this needs to be discussed and harmonised with other ICPs e.g., ICP Forests. Mr. Martyn Futter asked if NFCs can report raw data and the PC automatically generate aggregated data alongside? Mr. Ulf Grandin replied that this is no problem, and would just need the application of an automated script.

Measure agreed – Change is needed, and the Chairs and PC to come back with concrete suggestion of how to proceed.

### **§ 7a Long term strategy 2020-2030**

Mr. Ulf Grandin outlined the long-term strategy from the Working Group of Strategy and Review (WGSR), covering the strengths and successes of the Convention, the remaining challenges, and the strategic priorities of the Convention.

### **§ 7b Saltsjöbaden workshop recommendations**

The Saltsjöbaden workshop was held in Gothenburg in April 2023, and IM was represented by Mr. Salar Valinia. Relevant outcomes for IM to consider were from the Nitrogen session (#7 Strengthen key indicators of damage to terrestrial biodiversity across the UNECE region to set critical loads and levels for nitrogen deposition and ammonia concentrations) and the Biodiversity session: (#8 Prioritize the protection and maintenance of nature types and areas still in good condition over restoration of already damaged areas. #9 Increase the number of indicators used to show the impacts of air pollution on vegetation (crops and ecosystems). These were noted by the meeting. Mr. Martyn Futter thought that #7 and #9 could be seen as partly in tension- do we want better indicators or more indicators?

### **§ 8 National reporting, Tour de table**

**Note: short written reports were also requested for the annual report. Please submit if not already done!**

- Germany- Two site managers are retiring so a transition period. PC noted that contact persons should be updated when known. Stable funding for the two sites, and hoping to extend scope by bringing in soil experts. Noted that there is potentially data available from other agencies that could fit with the IM data, this possibility is being explored.
- Finland- Stable, activity is heavily integrated into NECD reporting. Trying to integrate IM into the eLTER process on a national scale by aligning protocols etc., and a national discussion is ongoing.

- Austria- Celebrating 30 years of monitoring at Zöbelboden, but referred to the extensive presentation of IM activity in Austria given at the joint session of this meeting.
- Sweden- 4 sites, monitoring continues but Stefan Löfgren is retiring and responsibility for soils is passing to Magnus Simonsson. Passive mercury samplers installed in co-operation with Canadian led project. Data reported to NECD this spring. The budget has been cut by ca. 8%. If this is the same (or worse) next year then cost cutting measures will be necessary, such as reduced frequency for some parameters.
- Spain- A storm damaged the IM site, causing interruptions in some subprogrammes. After long negotiations, a new agreement with the ministry was signed, securing funding for the 5 years to repair and maintain the site
- Estonia- No major changes, monitoring work continues at the 2 sites.
- Poland- Approval given by ministry to launch two new sites, with reporting from these starting at the end of this year.
- Czechia- 2 sites, but Mr. Pavel Krám was present and can only discuss Lysina fully. Monitoring there continues, with funding at least until the end of the year. Some new equipment has been installed (auto dendrometers on spruce trees). Currently working on a mercury paper together with another institution, but noted that mercury levels are very high.

## **§ 9 The WGE – eLTER co-operation**

The PC reminded the meeting of the key points in the agreed MOU between WGE and eLTER. Many IM sites are also eLTER sites and there is much potential for co-operation and mutual benefits. A session on this issue was held at the eLTER consortium meeting in Frankfurt in April. One key point that emerged from this was that gap analysis of the eLTER network showed that there is a lack of coverage in Eastern Europe and northern Scandinavia that IM may be able to help fill (and given that similar protocols are likely to be adopted in eLTER, the eLTER network can also improve the IM coverage). Open question to NFCs, especially with sites in the above-mentioned areas, is there interest in closer co-operation with eLTER? If so, please contact the PC and we can take this further together with you and eLTER.

## **§ 10. Activities during 2022/23 – Information**

Mr. Ulf Grandin informed about the most relevant ICP IM activities since the last Task Force meeting:

- ICP IM participated or was represented at 11 international meetings directly related to the IM core activities.
- Revision of the 20/21 WGE work plan – one item cancelled due to illness
- Participation in the global Hg monitoring experiment
- Participated in eLTER consortium meeting
- Work on the revision of the Gothenburg protocol

- Participated as expert in NEC Directive meetings
- Represented at the Saltsjöbaden meeting

### § 10a The 2022/2023 WGE Work plan

There are two items remaining on the current workplan:

1: Operationalise and advertise “IM light” as an attractive monitoring protocol, aiming at adding more ecosystem types in the IM monitoring

2: Scientific paper or report on modelling and assessment of biodiversity and ecosystem impacts, in cooperation with e.g., CDM.

These are on track, although Extended IM will be a longer process that will continue beyond the current workplan.

### § 10b The 2024/2025 WGE Work plan

The PC suggested the following items be included in the work plan for 2024-25

Suggested IM activities in the WGE 2024-25 Work Plan	Time frame
Scientific paper on the effects from deposition on vegetation community stability over time.	2024
Scientific paper on trends in heavy metal fluxes across ICP Integrated Monitoring sites	2024-25
An assessment of the mercury data gathered by the newly installed passive samplers	2024
As far as possible, making the ICP IM database accessible, under a “by attribution” licence, and aiming to meet <a href="#">FAIR</a> principles, and by publishing a data paper to explain the IM monitoring infrastructure in more detail.	2024-25
Scientific paper or report - Update in long-term changes in the atmospheric deposition and runoff water chemistry of sulfate, inorganic nitrogen and acidity (last analysis used data up to 2015).	2024-25
Given that we get funding: Proof of concept for development of above ground vegetation monitoring in ICP IM sites using drone remote sensing.	2025

Depending on the outcome of the discussion at the TF meeting: Initiate a revision and update of the IM manual	2024-25
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Mr. Pavel Krám asked if can we include organic N, and which heavy metals are to be included? He noted that his site gathers data on more metals than are usually used in analyses. Ms. Karin Eklöf answered that some elements are prioritised, others are indeed useful data but one step at a time. Mr. Pavel Krám wondered which other sites measure “less popular” heavy metals? Mr. James Kurén Weldon answered that this is another example of why an open database is useful, also for internal use.

Mr. Martin Forsius- eLTER has a need to show proof of concept, and it will take a long time before “new” data come from the Research Infrastructure once launched – there is a clear need for “legacy” data as well. It would be good to mention this eLTER connection in the workplan and the deliverables.

Mr. David Elustondo asked about the open data item, if the aim is to publish a data paper and open the database in the next work plan period, what is the road map? Mr. Ulf Grandin answered that the next step is precisely for the PC to produce a roadmap.

Mr. Thomas Scheuschner commented that Germany potentially also has heavy metals data “sleeping” somewhere, and a data call for each of the planned deliverables would be good. Mr. Ulf Grandin- contributions and participation in all planned items from the network is very welcome. The meeting agreed the proposed items, with minor adjustment by the PC to take account of the discussion.

### **§ 11 Other scientific and networking activities – on the long-term wish list and according to the long-term strategy**

Cooperation with external organisations when appropriate, especially eLTER according to the recently signed MoU between WGE and eLTER and as pointed out by Mr. Martin Forsius during the discussion over the 2024/25 work plan.

### **§ 12 Continued joint meetings with ICP Waters**

The TF took the unanimous decision that we want to continue with joint meetings.

### **§ 13 Other business**

Mr. Thomas Scheuschner mentioned the recent acid rain conference in Nigata, Japan. The next one will be in Europe, and maybe the ICPs could play a role in organising this. This would only be in ca. 5 years’ time, but it is good to consider the possibility already

Mr. Martin Forsius asked the meeting to formally note that it appreciates the efforts of the new PC since taking over from SYKE. Agreed.

### **§ 14 End of meeting**

Mr. Ulf Grandin thanked all for their participation and closed the meeting.





# APPENDIX 1 – ATTENDEES OF ICP IM TF MEETING

## **In person attendance**

Cornelius Oertel  
David Elustondo  
Hampus Markensten  
Ika Djukic  
Inken Krüger  
James Kurén Weldon  
Johannes Kobler  
Karin Eklöf  
Martin Forsius  
Martyn Futter  
Pavel Krám  
Pernilla Rönback  
Thomas Dirnböck  
Thomas Scheuschner  
Ulf Grandin

## **Online attendance**

Aleksandr Minin  
Barabara Albiniaik  
Jussi Vuorenmaa  
Kairi Lõhmus  
Krzysztof Skotak  
Maciej Major:  
Rafal Ulanczyk  
Reet Talkop  
Robert Kruszyk:  
Sergey A. Gromov

## APPENDIX II – AGENDA

### UN ECE CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

#### International Cooperative Programmes on Integrated Monitoring of Air Pollution Effects on Ecosystems

#### 31<sup>st</sup> ICP IM Task Force Meeting, 9-11 May 2023

Lunz, Austria

#### Wednesday May 10 – ICP Integrated Monitoring Task Force meeting

##### Suggested agenda, with annotations

##### 1. Opening of the TF meeting

Including a moment of silence

##### 2. Approval of the agenda

##### 3. Approval of the minutes from the 30<sup>th</sup> ICP IM Task Force meeting, 2022

The minutes were distributed by mail to all participants in May 2022, and are available on the ICP IM web site at the programme centre:

<https://www.slu.se/globalassets/ew/org/centrb/im/minutes-im-tf-meeting-2022.pdf>

##### 4. The ICP IM Programme Centre

###### a) The staff

Head of IM Programme Centre: Dr. James Kurén Weldon

Senior researcher: Associate Professor Martyn Futter

Data base: Dr. Pernilla Rönnback and Dr. Hampus Markensten

Expert on heavy metals: Associate Professor Karin Eklöf

###### b) The web site

The new international ICP IM web page is found at [www.slu.se/en/icp-im](http://www.slu.se/en/icp-im).

###### c) The Annual Report

- Now published only as pdf, but with ISSN number
- National reports from each country. At least some sentences.
- Graphical presentation of trends in IM data, e.g.:
  - Throughfall S and N,
  - Runoff S and N.
  - What more? – **Discussion**
  - For many variables, the reported data are too aggregated and cannot easily be summarised – see agenda point 6.

## 5. The IM database

The international IM database is up and running. The automatic data validation seem to work very well, even if it meant some additional work for some National Focal Points the first year.

Submission of data should be to [im-database@slu.se](mailto:im-database@slu.se).

### a) Structure, data submission and error reports

### b) Data submission and migration of the database

A detailed description is given in the 31<sup>st</sup> Annual Report 2022. Most of the National Focal Points have submitted data from 2021 to the Programme Centre.

### c) Data availability and data requests – Discussion and decision

#### **Suggestion for decision**

Each NFP signs a letter of agreement for making ICP IM data from their country in the international IM database publicly available, under a [Creative Commons](#) licence and aiming to meet [FAIR](#) principles.

#### **Background**

There is an increasing awareness of the need for sharing research and monitoring data, with all kinds of stakeholders. There is also a request from WGE to make data more available. The IM TF meeting in 2022 discussed this and found no major obstacle to making the database available. Here we suggest a way forward for this, including a data paper to explain the IM monitoring infrastructure and data in more detail. This would be cited whenever our data are used. We also suggest data availability according to [FAIR principles](#) and under an appropriate [Creative Commons](#) licence. Note that the IM data are not yet stored on a public server. Thus, still a requirement to request data. However implementing FAIR principles would involve allowing open access via e.g. API.

## 6. The IM manual

During the last revision (2022) and especially during the preparation of the new data validation routines, we discovered some inconsistencies and outdated methods in the manual. The outdated methods are mainly chemical analyses, for example alkalinity. We also noted that several methods for chemical analyses have no reference.

#### **Suggestion:**

- Ad hoc group to suggest revisions on the chemistry sub-programmes.
- Lead by the Programme Centre
- Every change to be decided by the Task Force meeting

To minimise the size of the database when the original IM manual was prepared, some variables should be reported as highly aggregated mean values instead of the measured data at much higher resolution. Several of these aggregated values in the database are not useful in any up to date research. The change of format and re-report of vegetation raw data in 2010 lead to the important paper by Dirnböck et al., showing negative effects of high N deposition on vegetation.

#### **Overly aggregated data - Suggestion**

- Start a gradual revision of the reporting format, to raw data whenever applicable and feasible.

- Same columns as now, but redefine content
- Re-reporting of old data in the new format
- For some variables, report in both new and old format
- Priority variables:
  - Temperature and other meteorological variables
  - Some vegetation variables
- Lead by the Programme Centre and chairs
- Every change to be decided by the Task Force meeting

## 7. The CLRTAP long term strategy

A summary of 2020-2030 long term strategy

### Strengths and successes of the Convention

- The effects-oriented approach
- A pioneer role in addressing heavy metals, persistent organic pollutants and black carbon
- The Convention as a flexible and adaptable mechanism

### Remaining challenges

- Ozone and its precursors
- Particulate matter and its precursors
- Nitrogen and sulphur
- Persistent organic pollutants and heavy metals
- From the long-range transboundary to the urban scale
- Monitoring challenges
- Links between air pollution, ecosystems and climate change
- Need for communication on the need for further action

### Strategic priorities of the Convention

- Maximizing the impact of the Convention
- Improving the scientific and technical basis for work under the Convention
- Enabling Sound Policy
- Communication, outreach and cooperation

## 7b. The Gothenburg protocol

- TBC. Information point. Current status of the revision of the Gothenburg protocol.

## 8. The IM network

**Tour de table.** Short oral report from each represented country about ongoing activities. Send more elaborated reports to the Programme Centre (James) for inclusion in the Annual Report.

## 9. The WGE - eLTER RI Memorandum of Understanding

LTER Europe is currently building up a formalised European Research Infrastructure (eLTER RI) for long term ecosystem research and monitoring. The RI will consist of ca. 200 highly equipped field stations that will be recruited from the current European LTER network comprising about 460 stations. A majority of the IM sites are also LTER sites and may be selected for the eLTER RI. In 2022 WGE and eLTER signed a Memorandum of Understanding for cooperation and mutual benefits.

Discussion to invite strategic IM sites to be part of the eLTER RI. Need to be mutual benefits.

## 10. Activities during 2021/22 – Information

All activities are listed in the 31<sup>st</sup> Annual Report from IM, soon available from the new ICP IM web site: [www.slu.se/en/icp-im](http://www.slu.se/en/icp-im). Below a summary.

- ICP IM participated or was represented at 11 international meetings directly related to the IM core activities.
- The Programme Centre received the 2021 data from most IM sites, data are now stored in the ICP IM database; see also agenda item 5.
- One item on the WGE 2020-2021 work plan has been cancelled. “Scientific paper on impacts of internal catchment-related nitrogen parameters to total inorganic nutrient nitrogen (TIN) leaching.”
- Participation in the global Hg monitoring experiment
- The chairs and Programme centre has contributed to a WGE report on the revision of the Gothenburg protocol, see also agenda item 7b.
- Participated as expert in NEC Directive meetings
- IM was represented at the Saltsjöbaden meeting.

### a) The current Work Plan (2022-2023)

IM activities in the WGE 2022-23 Work Plan	Time frame	Responsible	Status
Operationalise and advertise “IM light” as an attractive monitoring protocol, aiming at adding more ecosystem types in the IM monitoring	2022	IM Chairs and Programme Centre	Ongoing
Scientific paper on modelling and assessment of biodiversity and ecosystem impacts, in cooperation with e.g. CDM	2023	IM Chairs and Programme Centre	Ongoing

### b) The 2024-25 work plan

Draft to be submitted to the secretariat on May 15, 2023.

Suggested IM activities in the WGE 2024-25 Work Plan	Time frame	Responsible
Scientific paper on the effects from deposition on vegetation community resilience over time.	2024	IM Chairs and Programme Centre
Scientific paper on trends in heavy metal fluxes across ICP Integrated Monitoring sites	2024-25	IM Chairs and Programme Centre
An assessment of the mercury data gathered by the newly installed passive samplers	2024	IM Chairs and Programme Centre

As far as possible, making the ICP IM database accessible, according to FAIR and Creative Common principles and by publishing a data paper to explain the IM monitoring infrastructure in more detail.	2024-25	IM Chairs and Programme Centre
Scientific paper or report - Update in long-term changes in the atmospheric deposition and runoff water chemistry of sulfate, inorganic nitrogen and acidity (last analysis used data up to 2015).	2024-25	IM Chairs and Programme Centre
Given that we get funding: Proof of concept for development of above ground vegetation monitoring in ICP IM sites using drone remote sensing.	2025	IM Chairs and Programme Centre
Depending on the outcome of discussion at the TF meeting: Initiate a revision and update of the IM manual	2024-25	IM Chairs and Programme Centre

#### **11. Other scientific and networking activities – on the long-term wish list and according to the long-term strategy**

- Cooperation with other ICPs, particularly regarding dynamic modelling (all ICPs), cause-effect relationships in terrestrial systems (ICP Forests, ICP Vegetation), and surface waters (ICP Waters).
- Develop concepts for multi pollutant – multi effect relationships (NO<sub>x</sub>, O<sub>3</sub>, acidity, heavy metals, POPs, etc).
- Cooperation with external organisations when appropriate.

#### **12. Next Task Force meeting, 2024**

Do we want to continue to have joint meetings with ICP Waters?

#### **13. Other business**

#### **14. End of meeting**