

3 July 2023

English only

Economic Commission for Europe

Executive Body for the Convention on Long-range
Transboundary Air Pollution

**Steering Body to the Cooperative Programme for
Monitoring and Evaluation of the Long-range
Transmission of Air Pollutants in Europe**

Working Group on Effects

Ninth joint session

Geneva, 11–15 September 2023

Item 9 (b) (v) of the provisional agenda

**Progress in activities and workplan for 2024–2025 of effects-oriented activities:
air pollution effects on materials, the environment and crops:
integrated monitoring of air pollution effects on ecosystems**

Integrated monitoring on air pollution effects on ecosystems

**Report by the Programme Centre of the International Cooperative
Programme on Integrated Monitoring of Air Pollution Effects on
Ecosystems**

Summary

The present report is submitted to the Working Group on Effects as requested by the Executive Body for the Convention on Long-range Transboundary Air Pollution in accordance with the 2022–2023 workplan for the implementation of the Convention (ECE/EB.AIR/2021/2, items 1.1.1.25 and 1.1.1.26) and the Revised mandate for the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (Executive Body decision 2019/18).

The report of the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems presents the results of the activities undertaken since its 2022 report (ECE/EB.AIR/GE.1/2022/15– ECE/EB.AIR/WG.1/2022/8).

I. Introduction

1. The present report of the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (ICP Integrated Monitoring) is submitted to the Working Group on Effects in accordance with the 2022–2023 workplan for the implementation of the Convention (ECE/EB.AIR/2021/2, items 1.1.1.25 and 1.1.1.26) and the Revised mandate for the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (Executive Body decision 2019/18).¹ The report presents the results of the activities carried out between May 2022 and June 2023.
2. The Programme, which involves some 100 scientists and 48 active sites in 15 countries, has a Task Force led by Sweden and a Centre hosted by the Swedish University of Agricultural Sciences (SLU) in Uppsala.²
3. During the reporting period, ICP Integrated Monitoring held one meeting: the thirty first Task Force meeting, and a scientific workshop jointly with ICP Waters (hybrid meeting held at Lunz, Austria, and online, 9 -11 May 2023).
4. Key topics discussed at the 2023 meeting included making the database open, the need to begin a process of revising the manual, the reports to be prepared under the Convention's workplan, cooperation with other bodies with a particular focus on eLTER, and the future workplan (2024-25) of ICP Integrated Monitoring. The scientific workshop focused on current work on the key scientific topics of the Programme (see section IV below). The minutes of the meetings are available from the programme website at SLU.³

II. Outcomes and deliverables during the reporting period

5. In 2022–2023, ICP Integrated Monitoring produced or contributed to the following reports/work:
 - (a) Integrated monitoring of air pollution effects on ecosystems (ECE/EB.AIR/GE.1/2022/15–ECE/EB.AIR /WG.1/2022/8);
 - (b) Scientific information for the review of the Gothenburg Protocol (ECE/EB.AIR/GE.1/2022/3–ECE/EB.AIR/WG.1/2022/3);
 - (c) The 2022 ICP Integrated Monitoring annual report;⁴
 - (d) Work on extending co-operation with the eLTER network, as requested by the Eighth Joint Session of the EMEP Steering Body and Working Group on Effects;
 - (f) A scientific paper on trends in heavy metal concentrations;⁵
 - (g) Operationalisation of the Extended IM monitoring program continued.

III. Expected outcomes and deliverables over the next period and in the longer term

6. In the second half of 2023, ICP Integrated Monitoring will contribute to or produce the following deliverables, as indicated in the Convention workplan:
 - (a) A report on modelling and assessment of biodiversity and ecosystem impacts, in cooperation with CDM;

¹ Available at www.unece.org/env/lrtap/executivebody/eb_decision.html.

² See www.slu.se/en/icp-im.

³ See www.slu.se/en/icp-im.

⁴ James Kurén Weldon, ed., *31st Annual Report 2022: Convention on Long-range Transboundary Air Pollution. International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems*, ICP IM Annual Reports, No. 31/2022 (Uppsala, SLU, 2022). Available at <https://pub.epsilon.slu.se/id/eprint/29785/contents>.

⁵ Karin Eklöf et al., in preparation

(b) Continue to operationalise and advertise the extended IM as an attractive monitoring protocol, aiming at adding more ecosystem types in the IM monitoring;

(c) The thirty second annual ICP Integrated Monitoring report (covering activities in 2022/23), forthcoming in August 2023.

IV. Cooperation with other groups, task forces and subsidiary bodies, including synergies and possible joint approaches or activities

7. ICP Integrated Monitoring has established useful cooperation with the following bodies under the Working Group on Effects: the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends (ICP Modelling and Mapping) – on critical load calculations; the Centre for Dynamic Modelling – on changes in biodiversity; the International Cooperative Programme on Assessment and Monitoring of the Effects of Air Pollution on Rivers and Lakes (ICP Waters); and the International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) – on long-term trends, calculations and effects indicators. ICP Integrated Monitoring also uses emission scenario data from the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe.

V. Strengthening the involvement of countries of Eastern and South-Eastern Europe, the Caucasus and Central Asia in work under the Convention

8. Two participants from the Russian Federation participated in the ICP Integrated Monitoring Task Force meeting in 2023.

VI. Scientific and technical cooperation activities with relevant international bodies

9. ICP Integrated Monitoring cooperates closely with the European Long-term Ecosystem Research in Europe network (eLTER)⁵. Many sites are common to both bodies and key personnel are active in both networks. With the approval of two projects with funding from the European Union Horizon 2020 programme totalling €14 million for eLTER, the development of a permanent research infrastructure (RI) for long-term ecosystem, critical zone and socioecological research in Europe will advance greatly. At the Geneva meeting 2022, a Letter of Understanding expressing the aim of increasing co-operation with eLTER was agreed, and ICP Integrated Monitoring was tasked with furthering this process. ICP Integrated Monitoring hosted a session at the eLTER Consortium meeting in Frankfurt 17-21 April 2023 where one key discussion was the potential for identifying and filling gaps in network coverage between eLTER and the relevant ICPs. Another key area of synergy is related to the move towards open data – where data are openly available they may be linked to and made available through the rapidly developing and ambitious digital infrastructure of the eLTER RI. Discussions are ongoing around these issues, but it is already clear that there is potential for mutually beneficial co-operation between eLTER and the WGE.

VII. Highlights of the scientific findings: policy-relevant issues

10. The following findings of ICP Integrated Monitoring are of particular scientific relevance: Trend analyses of concentrations of mercury (Hg), lead (Pb), and cadmium (Cd) in watercourses of natural or semi-natural catchments within the ICP Integrated Monitoring

⁵ See www.elter-ri.eu.

network (complemented with data from the Swedish environmental monitoring program) were performed. When using seasonal Mann-Kendall tests for the full period of evaluation, decreasing trends were observed in 35% (Hg), 41% (Pb) and 70% (Cd) of the watercourses. However more flexible modelling (using generalized additive mixed models, GAMMs) showed that when decreasing trends were observed, the decline was mainly during the years 2000-2005 for Hg and during the years 2000- 2015 for Pb and Cd. Towards the end of the evaluated time period, from 2015-2020, more watercourses showed significant increasing, rather than decreasing trends in Hg, Pb and Cd concentrations, and the reasons for this somewhat surprising finding need further investigation. The overall concentration trends could be driven by declining deposition of heavy metals over Europe, which is especially strong for Pb and Cd. Also, other changes related to metal transport and chemistry may contribute, such as processes related to the aqueous recovery from acidification in northern latitudes, and the ongoing browning of surface waters in the northern hemisphere. It is, however, noteworthy that most catchments have upward trends in dissolved organic matter, which would potentially counteract the decline in Hg and Pb since these are strongly complexed with organic matter.

11. The results indicate the importance of continuing long-term monitoring in detecting ecosystem impacts, especially where changes counter to long-term trends may occur.

VIII. Publications

12. A list of ICP Integrated Monitoring publications and references for the present report has been posted on the Swedish University of Agricultural Sciences/ICP Integrated Monitoring website.⁶

⁶ See <https://www.slu.se/en/icp-im/>