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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

Tenth joint session

Geneva, 9–13 September 2024

Item 4 (c) (iv) of the provisional agenda

Progress in activities in 2024 and further development of effects-oriented activities: air pollution effects on materials, the environment and crops: integrated monitoring of air pollution effects on ecosystems

Integrated monitoring of 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 2024–2025 workplan for the implementation of the Convention 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 2023 report (ECE/EB.AIR/GE.1/2023/INF.11–ECE/EB.AIR/WG.1/2023/11).

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 2024–2025 workplan for the implementation of the Convention (ECE/EB.AIR/154/Add.1) 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 2023 and June 2024.
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 second Task Force meeting, and a scientific workshop jointly with ICP Waters (hybrid meeting held in Prague, Czechia and online, 28-30 May 2024).
4. Key topics discussed at the 2024 meeting included the revision of the Gothenburg Protocol, open publication of IM data, the revision of the manual, the reports to be prepared under the Convention’s workplan, cooperation with other bodies with a particular focus on eLTER, and suggestions for next workplan (2026-27). 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 2023–2024, ICP Integrated Monitoring produced or contributed to the following reports:
 - (a) Integrated monitoring of air pollution effects on ecosystems (ECE/EB.AIR/GE.1/2023/INF.11–ECE/EB.AIR/WG.1/2023/11);
 - (b) Joint progress report on policy-relevant scientific findings (ECE/EB.AIR/GE.1/2023/3–ECE/EB.AIR/WG.1/2023/3);
 - (c) The 2023 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 report on dynamic modelling of vegetation;⁵
 - (g) Collaborated with researchers from the Canadian EPA to install passive mercury samplers at IM sites as part of a global project.

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

6. In the second half of 2024, ICP Integrated Monitoring will contribute to or produce the following deliverables, as indicated in the Convention workplan:

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 Weldon, J. ed., *32nd Annual Report 2023: Convention on Long-range Transboundary Air Pollution. International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems*, ICP IM Annual Reports, No. 32/2023 (Uppsala, SLU, 2022). Available at: <https://doi.org/10.54612/a.29v7hp6rk6>.

⁵ Weldon, J., Report / Sveriges lantbruksuniversitet, Institutionen för vatten och miljö 2024, number: 2024:2 Available at: <https://res.slu.se/id/publ/129153>

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- (a) Open publication of the IM database and an accompanying data paper;
 - (b) The thirty third annual ICP Integrated Monitoring report (covering activities in 2023/24), forthcoming in August 2024.

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. One participant from the Russian Federation participated virtually in the ICP Integrated Monitoring Task Force meeting in 2024. One participant from Armenia participated in-person in the scientific part of the joint IM and Waters Task Force meeting in 2024.

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). 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 participated in the eLTER Consortium meeting in Sofia on 3-7 June 2024 where a key discussion was integrating ICP manuals into the standard observations of the eLTER RI and making use of the work done in developing standard vocabularies and metadata to assist in the open publication of the IM and Waters databases.

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

10. The following findings of ICP Integrated Monitoring are of particular scientific relevance: With the renewed interest in biodiversity focussed work under the Convention the Programme Centre revisited the dynamic modelling work done in 2018. The four Swedish IM sites were used as a test, and the model chain integrated in VSD+ studio ⁵, incorporating

a meteorological-hydrological pre-processor (MetHyd) a forest growth estimator (GrowUp) and the VSD+ (Very Simple Dynamic Model) dynamic model was used, with updated data where available. The outputs of VSD+ were in turn input to the vegetation model PROPS, and the by-species modelled probability of occurrence was compared to the frequency of occurrence in the observed data. A key finding was that many species are underestimated by PROPS, notably the non-vascular parts of the vegetation community (mosses, liverworts and lichens, the latter of which are of course not plants but are often included in vegetation surveys). This was a general pattern found across all four sites. An explanation for this pattern is that PROPS is based on a large body of data which is concentrated in certain regions (the Netherlands, the United Kingdom, Ireland, Denmark and Austria are heavily featured). Bryophytes, lichens and liverworts are an important and often dominant part of boreal and boreo-nemoral forest understorey vegetation, which will not be reflected in probabilities of occurrence based on central or north-west European data. This is a reflection of the data that were available for developing the models, but this should be borne in mind as dynamic modelling focussed on biodiversity is once again a key interest, particularly when modelling sites in areas where non-vascular vegetation is a more important part of the vegetation community than is typically the case in western/central Europe. ⁶

VIII. Publications

11. 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. ⁷

⁵ Bonten, L. T. C., Reinds, G. J. & Posch, M. (2016). A model to calculate effects of atmospheric deposition on soil acidification, eutrophication and carbon sequestration. *Environmental Modelling & Software* [online], 79, pp. 75–84.

⁶ Weldon, J. Report / Sveriges lantbruksuniversitet, Institutionen för vatten och miljö 2024, number: 2024:2 Available at: <https://res.slu.se/id/publ/129153>

⁷ www.slu.se/en/icp-im