United Nations ECE/EB.AIR/WG.1/2014/10

Economic and Social Council

Distr.: General
25 August 2014

English only

Economic Commission for Europe

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

Working Group on Effects

Thirty-third session
Geneva, 17–19 September 2014
Item 7 of the provisional agenda
Progress in activities in 2014 and further development of effects-oriented activities

Modelling and mapping

Report by the Coordination Centre for Effects and the Task Force on Modelling and Mapping

Summary

The present report contains a summary of the discussion and conclusions reached at the thirtieth meeting of the Task Force on Modelling and Mapping under the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends and the twenty-fourth workshop of the Coordination Centre for Effects, which were held back to back (Rome, 7–10 April 2014). The meetings focused on the progress achieved in modelling and mapping, inter alia, regarding methods and objectives for assessing air pollution effects on plant species diversity, and included a training session addressing modelling methods and input requirements for use by Parties under the Convention on Long-range Transboundary Air Pollution to enable the continuation of contributions to European databases on critical loads and air pollution effects for incorporation in integrated assessment modelling.

The present report is submitted for the consideration of the Working Group on Effects in accordance with the request of the Executive Body for the Convention in the 2014–2015 workplan for the implementation of the Convention (ECE/EB.AIR/122/Add.2, items 1.1.1, 1.1.10 and 1.2.1) and the Long-term Strategy for the Convention (ECE/EB.AIR/106/Add.1, decision 2010/18, annex).

GE.14-14544 (E)
1414544

Contents

I. Introduction

1. France is the lead country of the Task Force of the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends (ICP Modelling and Mapping). The Netherlands is the lead country of the programme centre of ICP Modelling and Mapping, the Coordination Centre for Effects (CCE). The Task Force is hosted by the French National Competence Centre for Industrial Safety and Environmental Protection (INERIS).[1] CCE is hosted at the Dutch National Institute for Public Health and the Environment (RIVM).[2] Over 100 participants in more than 30 Parties to the Convention on Long-range Transboundary Air Pollution participate in the activities of ICP Modelling and Mapping. National Focal Centres (NFCs) of ICP Modelling and Mapping contribute to methods and data to help compile and maintain the CCE database on European critical loads and novel thresholds for impacts on plant species diversity. ICP Modelling and Mapping results are also used in the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) integrated assessment activities in collaboration with the Meteorological Synthesizing Centre-West and Meteorological Synthesizing Centre-East. ICP Modelling and Mapping collaborates with all the International Cooperative Programmes (ICPs) under the Convention and the Joint[3] Task Force on the Health Aspects of Air Pollution.

II. Progress in the modelling and mapping activities

2. The thirtieth meeting of the Task Force on Modelling and Mapping and the twenty-fourth workshop of CCE were hosted by the National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) and held back to back in Italy (Rome, 7–10 April 2014).

3. Sixty-three delegates from the following 20 countries registered to attend the meeting: Austria, Belgium, China, Czech Republic, Denmark, Finland, France, Germany, Italy, Ireland, Netherlands, Norway, Romania, Russian Federation, Slovakia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland and United States of America. The ICP on Effects of Air Pollution on Natural Vegetation and Crops (ICP Vegetation), the ICP on Assessment and Monitoring of the Effects of Air Pollution on Rivers and Lakes (ICP Waters), the ICP on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), the ICP on Integrated Monitoring of Air Pollution Effects on Ecosystems (ICP Integrated Monitoring), the Joint Expert Group on Dynamic Modelling and CCE were also represented. The lack of available funding from the lead countries and from workplan-related funds prevented a number of country representatives from Eastern Europe, the Caucasus and Central Asia from attending.

4. Decisions by the Task Force on Modelling and Mapping were reviewed by the participants during the meeting. Presentations and posters were made available on the ICP Modelling and Mapping website.[4] Mr Giovani Vialletto welcomed the participants to the meeting on behalf of ENEA and the Italian Ministry of Environment.

[1] See http://www.ineris.fr/.

[2] See http://www.rivm.nl/.

[3] The Task Force is a joint body of the World Health Organization (WHO)/European Centre for Environment and Health (ECEH) and the Executive Body for the Convention.

[4] See www.icpmapping.org.

5. For the first time in a joint Task Force on Modelling and Mapping/CCE meeting, the ozone and nitrogen impacts on forest, biodiversity, as well as on ecosystems services and functions were discussed.

6. The objectives of the meetings included:

(a) To review the response to the call for data on indicators issued in 2012 by CCE with a deadline in 2014, following the request of the Working Group on Effects at its thirty-first sesssion (Geneva, 20–21 September 2012) aimed at developing and testing metrics for "no net loss of biodiversity" of sensitive ecosystems in Europe that could be suitable for use in integrated assessment of air pollution abatement strategies under climate change, as implied by the Long-term Strategy for the Convention (see ECE/EB.AIR/106/Add.1, decision 2010/18, annex);

(b) To hold a training session addressing NFC-specific issues on dynamic soil-vegetation modelling related to the assessment of "no net loss of biodiversity" in Natura 2000[5] areas and other sensitive ecosystems identified by Parties under the Convention, using the classification of the European Nature Information System (EUNIS)[6] as appropriate;

(c) To share national results related to field measurements and model assessments addressing plant species diversity;

(d) To consider the ICP Modelling and Mapping workplan and other Task Force issues under the 2012–2013 workplan for the implementation of the Convention (ECE/EB.AIR.109/Add.2), the 2014–2015 workplan, the Long-term Strategy for the Convention and the the Action Plan for the Implementation of the Long-term Strategy for the Convention (ECE/EB.AIR.109/Add.1, decision 2011/14, annex).

III. Workplan items relevant to the International Cooperative Programme on Modelling and Mapping of Critical Levels and Loads and Air Pollution Effects, Risks and Trends

A. Setting priorities for monitoring and collection of other data in view of policy needs and financial constraints (workplan item 1.1.1)

7. CCE issued a call for data to NFCs in autumn of 2012. The responses of the call were presented at the thirtieth Task Force meeting (see also para. 12).

B. Further implementation of the Guidelines for Reporting on the Monitoring and Modelling of Air Pollution Effects (workplan item 1.1.10 (a))

8. With regard to the development of envisaged reporting guidelines, following a possible adoption by the European Union of a New Clean Air Policy Package, CCE, in collaboration with ICP Vegetation, ICP Waters, ICP Forests and ICP Integrated Monitoring, compiled a contribution to a draft text in the process, led by the European

[5] See http://ec.europa.eu/environment/nature/natura2000/index_en.htm.

[6] See http://eunis.eea.europa.eu/habitats-code.jsp.

Union, of reviewing and revising the National Emission Ceilings Directive.[7] The input specifically relates to a draft of annex V, on monitoring requirements.

C. Enhanced involvement of countries in Eastern Europe, the Caucasus and Central Asia (workplan item 1.1.10 (b))

9. Representatives of several countries of Eastern Europe, the Caucasus and Central Asia have traditionally participated in CCE workshops and its training sessions, during which it was fruitful to have all NFCs collaborate and interact with each other. It has also been an opportunity for participants from those countries to familiarize themselves with modelling and mapping methods and data used at national and regional scales. The CCE workshop is integrated with the Task Force on Modelling and Mapping meeting in order to optimize the exchange of information.

10. In 2014, a lack of funding from the lead countries prevented a number of country representatives from travelling to and participating in the CCE workshop and in the Task Force meeting. A request to the Convention secretariat that it contribute to travel costs for participants as part of the funds for ICP Modelling and Mapping work in the 2014–2015 workplan (item 4.8) was not met. Therefore, it is highly challenging for ICP Modelling and Mapping to deliver on workplan items 4.8 and 1.1.10 (b), which both target the involvement of countries of Eastern Europe, the Caucasus and Central Asia in the work of ICP Modelling and Mapping, in the remaining time period.

D. Cooperation with programmes and activities outside the region (workplan item 1.1.10 (c))

11. In terms of cooperation with programmes outside the region, CCE collaborates with its Chinese counterparts on the development of methods and data to enhance critical load computations.

E. Analysis and compilation of the responses by National Focal Centres to the 2012 call for data (workplan item 1.2.1)

12. The results of the call for data constitute a milestone towards setting up biodiversity indicators related to air pollution impacts. Although further conceptual and methodological work is required, it is envisaged to develop a common biodiversity indicator, such as a "habitat suitability indicator". The habitat suitability indicator would be useful in addition to indicators that meet specific requirements for the protection of national ecosystems. These indicators will be calculated using characteristics of plant species in EUNIS habitats. National reports addressing their response to this call for data were presented at the ICP Modelling and Mapping/CCE meetings and have been compiled in the 2014 CCE status report 2014.

[7] See Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants.

IV. Expected outcomes/deliverables over the next period and in the longer term (workplan item 1.2.1)

13. Among expected outcomes and deliverables over the next period and in the longer term, a call for data was proposed for adoption at the thirty-third session of the Working Group on Effects (Geneva, 17–19 September 2014) (see the CCE pre-announcement of 17 April 2014 (informal document No. 1)). Provided that CCE resources remain sufficiently available, the proposed call for data can be issued, including the following elements:

(a) To convert data to a new 0.10° x 0.05° longitude-latitude grid to adapt the critical load database to the new 0.5° x 0.25° longitude-latitude EMEP grid;

(b) To enable NFCs to update critical loads;

(c) To tentatively provide critical loads data based on selected (national) biodiversity endpoints, as discussed at the CCE workshop and adopted at the thirtieth meeting of Task Force on Modelling and Mapping.

14. New (draft) indicators, i.e., a "habitat suitability indicator" for the assessment of impacts of air pollution on plant species diversity have been reviewed for tentative use in the Greenhouse Gas and Air Pollution Interactions and Synergies (GAINS)[8] model and integrated assessment under the Task Force on Integrated Assessment Modelling.

15. An update of the *Manual on Methodologies and Criteria for Modelling and Mapping Critical Loads and Levels and Air Pollution Effects, Risks and Trends*[9] (Mapping Manual) will be prepared by INERIS in collaboration with CCE and participants of ICP Modelling and Mapping, as appropriate, for review at the thirty-third session of the Working Group on Effects and the thirty-first meeting of the Task Force on Modelling and Mapping (Zagreb, 20–23 April 2015).

16. Possible reasons for the differences between critical load exceedances using the former and the latest EMEP model computations of nitrogen depositions and the critical load database of 2011 need to be reviewed in collaboration with EMEP.

17. EMEP is requested by ICP Modelling and Mapping participants to make land-use-specific deposition data available on its website so that NFCs may carry out national assessments.

18. A joint session with ICP Vegetation on impacts of ozone and nitrogen interactions on plants and ecosystems will be held during the thirty-first meeting of the Task Force on Modelling and Mapping in 2015.

V. Policy-relevant issues, findings and recommendations

19. Observations show that biodiversity is affected by atmospheric depositions of nitrogen on specific sites across Europe.

20. Calculations show that the risk of high nitrogen deposition to vegetation remains in Western, Central and South-Eastern Europe. More stringent nitrogen pollution abatement measures beyond those in the amended Protocol to Abate, Acidification, Eutrophication and

[8] See http://gains.iiasa.ac.at/models/.

[9] Task Force on Modelling and Mapping (Berlin: Federal Environmental Agency (Umweltbundesamt), 2004). Available from http://www.icpmapping.org/Mapping_Manual.

Ground-level Ozone (Gothenburg Protocol)[10] are required to achieve "no net loss of biodiversity".

21. Effects-based integrated assessment of air pollution abatement policies, and related economic assessments, could benefit from knowledge on targeting deposition levels that meet requirements for "no net loss of biodiversity and ecosystem services" in air, waters, soils and vegetation as an explicit endpoint.

22. Work is ongoing under ICP Modelling and Mapping to establish common and country-specific indicators to assess the change of biodiversity caused by air pollution under climate change, with inputs from other ICPs and benefiting from the project "Effects of climate change on air pollution and response strategies for European ecosystems" (ECLAIRE)[11] under the European Union's Seventh Framework Programme for Research and Technological Development.[12]

23. NFCs under ICP Modelling and Mapping are encouraged to update their inputs to the European critical load database with most recent data, while meeting the spatial resolution according to the latest EMEP grid.

24. Countries in Eastern and South-Eastern Europe, the Caucasus and Central Asia are encouraged to assist participation of their experts in ICP Modelling and Mapping, especially for calculation and mapping of critical loads.

25. CCE led the compilation of a contribution to draft text for the process of reviewing and possibly revising the National Emission Ceilings Directive (see para. 8 above).

26. CCE produced an update of the core set indicator on eutrophication for the European Environment Agency (EEA).[13]

VI. Issues for the attention and advice of other groups/task forces or subsidiary bodies, notably with regard to synergies and possible joint approaches or activities

27. Among issues of joint concern with other groups and task forces is a common indicator for biodiversity, the habitat suitability index, to be based on lists of species that are characteristic to EUNIS habitats. These lists are to be defined as well as a reference situation chosen, from which the indicator-evolution, subject to alternative emission abatement scenarios, could be assessed.

28. An indicator, common to all Parties, could be useful for the valuation of ecosystem services and biodiversity as a possible input to work by the Task Force on Integrated Assessment Modelling.

29. The impacts of ozone and nitrogen on vegetation in a future climate are subject to further investigation in the ECLAIRE project (see para. 22 above). ECLAIRE includes collaboration with ICP Vegetation, ICP Forests, the Task Force on Reactive Nitrogen, the

[10] Available from http://www.unece.org/env/lrtap/status/lrtap_s.html.

[11] See http://www.eclaire-fp7.eu/.

[12] See http://ec.europa.eu/research/fp7/index_en.cfm

[13] European Environment Agency, *Effects of air pollution on European ecosystems: Past and future exposure of European freshwater and terrestrial habitats to acidifying and eutrophying air pollutants*, EEA Technical report No. 11/2014 (Luxembourg: Publications Office of the European Union, 2014). Available from http://www.eea.europa.eu/publications/effects-of-air-pollution-on.

Task Force on Integrated Assessment Modelling/Centre for Integrated Assessment Modelling and the Meteorological Synthesizing Centre-West.

30. As agreed at earlier sessions of the Working Group on Effects, ICP Forests makes preparations to share its data with NFCs under ICP Modelling and Mapping that could complement national inputs to the European critical loads database held by CCE.

31. EMEP is requested to consider possibilities for making land-use-specific deposition data available on its website so that ICP Modelling and Mapping NFCs may carry out national assessments and better understand causes of significant changes in computed critical load exceedances.

VII. Scientific and technical cooperation activities with relevant international bodies

32. Among scientific and technical cooperation activities, the impacts of nitrogen and ozone on biodiversity in the context of climate change have been assessed within the ECLAIRE project in order to resolve the comprehensive assessment of the combined effects of ozone and nitrogen in integrated assessment modelling.

33. Furthermore, approaches for economic valuation of ecosystems services are under development by the Task Force on Integrated Assessment Modelling. This work includes estimates for the economic value of maintaining biodiversity (no net loss of biodiversity), to which new ICP Modelling and Mapping indicators could contribute.

34. Further developments of biodiversity indicators may benefit from work carried out under the Assess the biodiversity impacts of your policy option (BioScore) project[14] and other European scientific projects in which ICPs participate.

VIII. Relevant scientific findings: highlights

35. Several metrics are under review by CCE and ICP Modelling and Mapping to assess no net loss of biodiversity (habitat suitability, Red List[15] species, species cover, species abundance, functional diversity, ecosystem services, etc.).

36. The development of a habitat suitability index is under development under ICP Modelling and Mapping and in collaboration with components 4 and 5 of the ECLAIRE project. This indicator is proposed for use by all NFCs, in addition to country-specific indicators, as appropriate. Results require NFC activities and assessments following the intended call for data 2014–2015 (assuming that the call is adopted at the thirty-third session of the Working Group on Effects).

37. A temporal and spatial reference situation for a country-ecosystem-specific “state of biodiversity”, and its selected indicator threshold, requires further work including results of the 2014-2015 call for data.

38. Progress in the identification of indicators for plant species diversity are also aimed at helping scenario analysis under the Task Force on Integrated Assessment Modelling to include contributions to economic assessments of the trade-offs between the cost of

[14] See http://www.bioscore.eu/.

[15] Red List of Threatened Species from the International Union for Conservation of Nature, see http://www.iucn.org/about/work/programmes/species/our_work/the_iucn_red_list/.

mitigation strategies and benefits in terms of impacts on plant species diversity and ecosystem services.

IX. Additional comments and lessons learned

39. Emissions of nitrogen cause damage as well as benefits to the environment along different lines and at different time scales. Experiments carried out within the ECLAIRE project clearly demonstrate that elevated levels of ground-level ozone from high nitrogen oxides emissions will damage vegetation, while more nitrogen deposition will increase plant productivity, at least in the short run. At the same time, the resulting growth of nitrogen-affine species might crowd out other species, and thereby reduce biodiversity. In addition, excessive nitrogen input modifies soil chemistry, compromising productivity, carbon storage capacity and plant composition/biodiversity in the long run. [16]

40. When assessing economic benefits of measures to reduce nitrogen emissions in a holistic way, it is important to balance the short-term benefits from higher productivity of economically important species (that can be readily quantified) against the value of biodiversity protection and the long-term need for maintaining soil chemistry at sustainable conditions. Although these latter aspects receive considerable attention in environmental and nature protection policy, their quantification and monetization is still immature. Thus, limited quantitative benefit analyses (e.g., the ecosystems services concept) that count more certain quantifications of short-term benefits on plant productivity against a more uncertain monetization of biodiversity and long-term sustainability, might deliver incomplete and potentially misleading results.[17]

X. Publications

41. For a list of CCE and ICP Modelling and Mapping publications and references for the present report, please visit the CCE website[18] and see informal document No. 2.

[16] See ECLAIRE Annual Report 2013 (forthcoming), contributions for components 3, 4 and 5. The finalized report will be available from http://www.eclaire-fp7.eu/node/81.

[17] Ibid.

[18] See http://wge-cce.org/Publications.