



CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

WORKING GROUP ON EFFECTS

INTERNATIONAL COOPERATIVE PROGRAMME ON EFFECTS OF AIR POLLUTION ON NATURAL VEGETATION AND CROPS (ICP VEGETATION)

Minutes of the 26th Task Force Meeting

The twenty-six meeting of the Programme Task Force was held from 28-30 January, 2013 in Halmstad, Sweden. The meeting was hosted by IVL Swedish Environmental Research Institute and the Department of Biological Sciences, University of Gothenburg, with financial support from the Swedish Environmental Protection Agency.

1. The meeting was attended by 63 experts from 21 countries, including 17 Parties to the LTRAP Convention: Albania, Belgium, Croatia, Finland, France, Germany, Italy, Latvia, Norway, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom and USA. Participation included the Chair of the Working Group on Effects of the LTRAP Convention, the chair from ICP Integrated Monitoring, a representative from EMEP/MS-Center and guests from Brazil, China, Japan and Pakistan.
2. The Programme Task Force adopted the agenda of the meeting.
3. Welcome addresses were given by Mr Tytus Kyrklund (Swedish Environmental Protection Agency) and Mr John Munthe (vice president research at IVL).
4. In the first plenary session, Mr Harmens (Chair of ICP Vegetation, UK) gave an overview of the activities and achievements of the ICP Vegetation in 2012. An important deliverable was the report on 'Ozone pollution: Impacts on carbon sequestration in Europe'. He also reported on i) progress with ozone biomonitoring using snapbean, ii) participation from EECCA/SEE¹ countries and outreach to regions outside the UNECE, iii) dissemination of results to the LTRAP Convention and in the scientific literature. He referred to progress with important deliverables for 2013: i) the report on 'Impacts of ozone pollution on biodiversity and ecosystem services (see paragraph 8), and ii) the final report on the European moss survey 2010/11 for heavy metals and nitrogen and a pilot study on persistent organic pollutants (see paragraph 9). Further details can be found reports published on these items (<http://icpvegetation.ceh.ac.uk>). Finally, Mr Harmens stressed the importance of the contributions of countries and their experts to the work of the ICP Vegetation.
5. Mr Simpson (representative of EMEP/MS-Center, Norway) described the recent changes in the EMEP/MS-Center model and plans for the future. He discussed model validation and performance, improvements in modelling the growing season for vegetation, results of a scaling exercise (56, 28, 14 and 7 km², comparing four chemistry transport models),

¹ Eastern Europe, Caucasus, Central Asia/South-Eastern Europe

the role of EMEP/MSWEE in EU Framework Programme 7 project ECLAIRE², and future considerations. He emphasised the need for model-measurement evaluation, including ozone fluxes and concentrations, and biomass/growth reductions due to ozone.

6. Mr Lars Lundin (Chair ICP Integrated Monitoring, Sweden) gave an overview of the activities of ICP Integrated Monitoring in 2012 and plans for 2013. Priority areas of work include i) heavy metals, ii) dynamic modelling, iii) nitrogen critical loads and effects, iv) biodiversity indicators, v) budgets and trends at the catchment scale of sulphur, nitrogen, hydrogen cations and base cations, vi) air pollution and climate change interactions. Mr Lundin described links with EU projects and the Long Term Ecological Research (LTER) Network.
7. Mr Ludwig De Temmerman (Belgium) gave a presentation on future considerations about the deposition of nanoparticles (NP) from long-range transport. Due to their size and properties, NP can cross biological membranes (e.g. enter the blood stream) and be toxic. Their toxicity not only depends on their concentration but also on their size distribution, shape and chemical nature. Mr De Temmerman will further develop the methodology of the analysis of NP, including cadmium and lead oxides, originating from wet deposition, and will screen the moss samples from 2010 for NP.
8. In the second plenary session, progress with two important deliverables of the ICP Vegetation in 2013 was presented: i) glossy report on 'Ozone pollution: impacts on ecosystem services and biodiversity'; ii) glossy report on 'Heavy metals and nitrogen in mosses: spatial patterns in 2010/2011 and long-term temporal trends in Europe'. Ms Gina Mills (Head of Programme Coordination Centre ICP Vegetation, UK) provided an outline of the glossy report on 'Ozone pollution: impacts on ecosystem services and biodiversity', due to be published by the end of March. She discussed impacts on supporting, provisioning, regulating and cultural services and how this might affect human well-being. At the European scale, attempts to place an economic value on effects have been limited to e.g. crop and timber production. Mr Jürgen Bender (Germany) gave an introduction of a study that assesses the impacts of ozone on biodiversity in terrestrial ecosystems. He described the ongoing database review and analysis of methods and uncertainties in current risk assessment approaches.
9. Mr Harmens (UK) gave an overview of the preliminary results of the European moss survey 2010/11, including maps showing the spatial patterns and overall changes in elemental concentrations in mosses since the previous survey in 2005/6. The focus was on the heavy metals cadmium, lead and mercury and on nitrogen. Examples of the pilot study on persistent organic pollutants (POPs) were also presented. The glossy report on heavy metals and nitrogen is due to be published by the end of March, whilst the results of the pilot study on POPs will be included in the annual ICP Vegetation report in September. Mr Eiliv Steinnes (Norway) discussed whether terrestrial moss is a useful substrate for assessment of the atmospheric deposition of POPs, providing results from the 2010 moss survey in Norway. The observed geographical distributions of POPs concentrations in mosses in Norway reflect their atmospheric deposition patterns quite well, with concentrations declining with increase in latitude.
10. In the third plenary session, Mr Peringe Grennfelt (Chair Working Group on Effects) gave an update on recent work under the LRTAP Convention. He highlighted the support of the WGE to the revision of the Gothenburg Protocol (agreed in May 2012), in particular via the Guidance Document on health and environmental improvements and the

² Effects of Climate Change on Air Pollution and Response Strategies for European Ecosystems

Impacts report of the WGE (full technical document and brochure). He commented on the need for the WGE and its subsidiary bodies to improve its communication and visibility to the policy side of the LRTAP Convention. He reported on the conclusions and recommendations from the ad-hoc expert group on the implementation of the long-term strategy of the Convention, particularly the recommendation to review the ICPs, for which a new ad-hoc expert group was established. This ad-hoc expert group will report on the outcome of the review to the Executive Body in December 2013. Subsequently, Mr Harmens (UK) presented the draft medium-term (2014-2016) workplan of the ICP Vegetation, emphasising how it fits in with the implementation of the long-term strategy of the LRTAP Convention. He encouraged the Task Force to take the medium-term workplan into consideration during further discussions at the meeting and to finalise the workplan in the final plenary session.

11. Mr Patrick Bükér (UK) gave a presentation on the collaboration with the Task Force on Hemispheric Transport of Air Pollution (HTAP) and the assessment of HTAP effects on vegetation for ozone and aerosols. He encouraged the ICP Vegetation to contribute to a planned HTAP workshop (autumn 2013, India?) focussing on the methodology of impact assessments, including outreach and capacity building. HTAP is planning their next assessment reports (focussed and thematic) in 2015, to which the ICP Vegetation was invited to contribute too. Mr Antonio Ballerin-Denti (Italy) informed the Task Force about the scope and obligations of the Alpine Convention and suggested ways of how the LRTAP Convention could cooperate in the future on the effects of air pollution on alpine vegetation. Mr Per Erik Karlsson (Sweden) provided preliminary results on a simplified index (S-POD: Simplified Phytotoxic Ozone Dose) to assess the risk for negative ozone impacts on vegetation at the national level. This method is simpler than the POD metric, requires inexpensive equipment, is responsive to climate change and can be applied easily by local authorities. It is a promising index, at least for application in Sweden.
12. The next three sessions consisted of two parallel sessions considering the ozone and heavy metals (HM)/nitrogen (N)/persistent organic pollutants (POPs) sub-programmes. The topics of oral presentations and discussions in the parallel sessions are provided below. For further details on the content of oral presentations and posters we refer to the book of abstracts and powerpoint files, both available on the ICP Vegetation web site (<http://icpvegetation.ceh.ac.uk>). The posters covered similar topics as discussed during the oral presentations and provided valuable additional information. Posters were on display throughout the meeting.
13. In the first ozone session, Mr Silvano Fares (Italy) reported on the effect of ambient ozone on carbon assimilation in trees as estimated from continuous flux measurements. Mr Zhaozhong Feng (China) described how leaf mass per unit area can explain ozone sensitivity of woody species. Ms Alessandra De Marco (Italy) confirmed in her presentation that the phytotoxic ozone dose performs well in Mediterranean forests. Subsequently, Ms Sabine Braun (Switzerland) reported back from a working group discussion on further flux based developments and mapping validation, held during the afternoon of 28 January 2013. It was shown that i) ozone concentrations modelled by EMEP are in good agreement with measured concentrations at EMEP stations; ii) EMEP modelled AOT40 is generally higher than measured AOT40; iii) epidemiological data from Switzerland suggests that the current flux-response relationship for beech/birch is valid for mature trees too; iv) new parameterizations for the DO₃SE model are available for rain-fed wheat in the Mediterranean. Finally, Mr Patrick Bükér (UK) discussed a re-analysis of forest ozone flux-response relationships and some consideration for their application. For example, would flux-response relationships for tree growth rates be more

useful than for total biomass? This discussion continued in the evening for interested participants, in particular with respect to estimating the impacts of ozone on carbon sequestration in the living biomass of trees, for which flux-response relationships for relative growth rate are required rather than for total biomass. The ozone session ended with a discussing of the future workplan of the ozone work from 2014 to 2016. In the evening there was also a separate group discussing how participation of countries in Eastern Europe, Caucasus and Central Asia (EECCA) and south-eastern Europe (SEE) could be increased and how ICP Vegetation could contribute to outreach activities outside the UNECE region (see Annex I and II).

14. In the second ozone session, Ms Seraina Bassin (Switzerland) reported on the combined effects of elevated ozone and nitrogen deposition on species composition of a sub-alpine grassland. Mr Ignacio González-Fernández (Spain) provided an update on progress in modelling annual pasture ozone flux. Mr Jean-Francois Castell (France) described the bio-economic assessment of ozone impacts on French farming systems, followed by a presentation from Mr Sheikh Saeed Ahmad (Pakistan) on assessing spatial and temporal variability of tropospheric ozone concentration in areas of different scales. Finally, short presentations were given on the ozone discussions on Tuesday evening, followed by a general discussion on the medium-term workplan.
15. The third ozone session focused on the impacts of ozone on crops. First, Mr Kent Burkey (USA) described that soybeans from Fiskeby, Sweden, are a potential source of tolerance genes for ozone and a broad range of other abiotic stresses. Then Mr Yoshiaki Ueda (Germany) discussed genetic approaches to increase tolerance to ozone in rice. Ms Anne Repellin (France) reported on the impacts of ozone on leaves and grain yield in maize from a controlled field fumigation experiment and Ms Deborah Moura Rebouças (Brazil) reported on effects of combined ozone and water stresses on the physiology and membrane lipids of two tropical cowpea cultivars. The session ended with a general discussion on the decisions and recommendations regarding the medium-term workplan from the ozone sub-group (see Annex 1 and II).
16. In the first moss survey session (heavy metals, nitrogen and POPs), Mr Jesus Santamaria (Spain) reported on progress with ¹⁵N analyses of mosses collected in 13 countries during the 2005/6 survey and proposed a schedule for the submission of a paper. Subsequently, Mr Mitja Skudnik (Slovenia) discussed the influence of sampling location on nitrogen and trace element concentrations in mosses. Ms Lotti Thöni (Switzerland) showed preliminary results of the analysis of the relationship between site-specific nitrogen/sulphur concentrations in mosses and atmospheric nitrogen/sulphur deposition rates measured in selected European countries. Further data and analysis requirements were discussed in the evening in a small group for the submission of a paper later in the year. At the end of the session the group discussed in detail the results and maps of the 2010/11 survey and the final content of the glossy report was agreed, including short country-specific reports.
17. In the second moss survey session, Mr Zdravko Spiric showed the preliminary results of the Croatian moss survey 2010, followed by presentations from Ms Pranvera Lazo (Albania) and Ms Flora Qarri (Albania) on elemental atmospheric deposition in Albania and biomonitoring studies in the Vlora-Fier area of Albania, respectively. Mr Sebastien Leblond (France) discussed the outcome of analyses on the uncertainty of element concentrations in mosses. Ms Gunilla Pihl-Karlsson and Ms Helena Danielsson (Sweden) discussed whether there would be any advantages in increased sampling density at county level in Sweden for the determination of heavy metal concentrations in mosses.

18. In the third moss survey session, Mr Roland Pesch (Germany) presented the outcome of a study on landscape-specific correlation between atmospheric deposition of cadmium, lead, mercury, nitrogen and their concentrations in mosses across Europe. Ms Erika Hiltbrunner (Switzerland) described how enhanced nitrogen availability due to increased atmospheric nitrogen deposition and expansion of N₂ fixing plants had affected alpine and montane ecosystems. Ms Stefanie Boltersdorf (Germany) reported on the comparison of the spatial distribution of nitrogen concentrations and stable isotope signatures for bryophytes and lichens across Germany. Ms Hilde Uggerud (Norway) discussed the spatial distribution of polycyclic aromatic hydrocarbons (PAHs) in mosses in Norway and compared this with the spatial distribution of heavy metal concentrations in mosses. In the final presentation of this session, Mr Ludwig De Temmerman (Belgium) reported on the accumulation of airborne arsenic, cadmium and lead in beans.

19. In a plenary session, Ms Gina Mills reported on progress with the European Framework 7 project ECLAIRE (Effects if climate change on air pollution impacts and response strategies for European ecosystems), in which several bodies of the LRTAP Convention participate. Subsequently, Mr Gerosa (Italy) presented the result of the first year experimental work under the ECLAIRE project, particularly on the photosynthetic response of oak and European hornbeam saplings to ozone exposure and nitrogen enrichment. Mr Håkan Pleijel (Sweden) discussed the issue of ozone risk assessment for the 21st century based on ozone and climate change scenarios and Mr Eero Kubin (Finland) described how nitrogen deposition has affected nitrogen leaching in boreal forests.

20. In the final plenary session, the decisions and recommendations of the Task Force were agreed (see Annex I) and an updated draft medium-term workplan (2014-16) was agreed (see Annex II) for further discussion at the next session of the Working Group on Effects (WGE) and for final approval of the biannual workplan (2014-15) at the next session of the Executive Body. Mr Harmens (UK) reminded the Task Force again about the upcoming review of the ICPs in 2013 and the potential of a merger between WGE and EMEP, depending on the outcome of the review of the ICPs, and emphasized the ongoing collaboration between ICP Vegetation and many other bodies within the LRTAP Convention. The Task Force took note of the ideas and actions put forward to enhance the involvement of EECCA/SEE countries and outreach activities to regions outside the UNECE region (see Annex I and II) and emphasized the need for identifying experts in the field relevant to the work of the ICP Vegetation. Projects with Malé Declaration countries in south Asia are also encouraged.

21. Mr Harmens (UK) drew attention to the planned workshop by the Task Force on Hemispheric Transport of Air Pollution (TFHTAP) on methodologies for assessing impacts of air pollution, scheduled for October/November 2013 in India, and the 'Saltsjöbaden 5' workshop ('Taking international air pollution policies into the future'), 24 – 26 June 2013, Gothenburg, Sweden. The Task Force accepted the offer from France to host the 27th ICP Vegetation Task Force meeting in Paris, tentatively scheduled for 28 – 30 January 2014, starting with an ozone workshop on the first day. The Task Force also took note of the offer from Italy to host the 28th Task Force meeting in Rome in 2015.

22. On behalf of the Task Force, Mr Harmens (UK) closed the meeting by thanking IVL Swedish Environmental Research Institute (Ms Gunilla Phil-Karlsson, Ms Helena Danielsson, Mr Per Erik Karlsson) and the Department of Biological and Environmental Sciences, University of Gothenburg (Mr Håkan Pleijel) for hosting the meeting and the

Swedish Environmental Protection Agency for providing financial support. Mr Harmens acknowledged the UK Department for Environment, Food and Rural Affairs (Defra), the United Nations Economic Commission for Europe (UNECE) and the Natural Environment Research Council (NERC) for their continuous financial support of the ICP Vegetation Programme Coordination Centre. Last but not least Mr Harmens thanked his colleagues at the Programme Coordination Centre and the participants of the ICP Vegetation for their continuing support of the programme.

Annex I. Decisions and recommendations from the ICP Vegetation Task Force.

1. The Task Force approved the publication of the report on ozone impacts on ecosystem services and biodiversity by March 2013, as outlined by the Programme Coordination Centre.
2. The Task Force decided to continue the ozone biomonitoring activities with snap bean and recommended to extend this activity in EECCA/SEE and other regions outside the UNECE area.
3. The Task Force agreed on a method for developing ozone flux-response curves of the relative growth rate of trees from existing biomass flux-response relationships for applications in the future.
4. The Task Force recommended to further stimulate activities in EECCA/SEE and promote outreach activities beyond the UNECE region (e.g. Asia, North Africa) as specified in the medium-term workplan (see Annex II).
5. The Task Force approved the draft data and maps of the 2010/11 European moss survey, agreed on the outline of the report and decided to publish the final glossy report in March 2013 with minor amendments to the data and maps.
6. The outcome of the pilot study on POPs for the 2010/11 European moss survey should be presented in the annual ICP Vegetation report for 2012/13.
7. The Task Force recommended to continue the European moss survey on heavy metals, nitrogen and POPs, with the next one scheduled for 2015/16 (pending the outcome of the review of the ICPs). The Programme Coordination Centre should explore opportunities to enhance participation in EECCA/SEE and Asian countries and a more pronounced role of one of these countries in the coordination of future moss surveys.

Annex II. Draft medium-term workplan (2014 – 2016) ICP Vegetation
(updated on 30 January, 2013)

Ongoing annual activities:

- Report on supporting evidence for ozone impacts on vegetation;
- Report on preparations and progress with the moss survey 2015/16.

New activities:

2014:

- Report on the interacting effects of co-occurring pollutants and climatic stresses on vegetation;
- Report on air pollution deposition to, and impacts on vegetation, in EECCA/SEE countries and southern Asia.

2015:

- Report on the implications of rising background ozone for vegetation in Europe (contribute findings to TF HTAP);
- Update of chapter 3 of the Modelling and Mapping Manual by inclusion of a new annex describing further technical developments.

2016:

- Report on current and future ozone impacts in the Mediterranean basin, including implications for food security.