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)

ICP VEGETATION

Minutes of the 20th Task Force Meeting

The twentieth meeting of the Programme Task Force was held from 5th – 8th March, 2007, at the Joint Institute for Nuclear Research, Dubna, Russian Federation.

1. The meeting was attended by 63 experts from 22 Parties to the Convention: Belgium, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Italy, Latvia, Macedonia, Moldova, Norway, Poland, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and United Kingdom. In addition, the chairman and one vice-chairman of the Working Group on Effects (WGE) and the UNECE secretariat for the Convention, one representative from the ICP Modelling and Mapping and three guests from Uzbekistan and Vietnam attended the meeting. Attendance included 23 experts from four EECCA (Eastern Europe, Caucasus and Central Asia) countries.

2. The Programme Task Force adopted the agenda of the meeting.

3. Mr H Harmens (chairman of the ICP Vegetation, UK) welcomed all participants on behalf of the ICP Vegetation Programme Centre and thanked the Joint Institute of Nuclear Research (JINR) for hosting the meeting and providing financial support to enable some participants from in particular the EECCA and South-Eastern European countries to attend the meeting. Mr Vladimir Kadyshevsky (former director of JINR) welcomed the participants to Dubna and gave an overview of the history and activities of JINR; 18 independent states are member of JINR.

4. Mr T Johannessen (chairman of the WGE) gave an overview of the status of work on the effects of major air pollutants on human health and the environment as reported at the 25th session of the Working Group on Effects (30 August – 1 September 2006, Geneva; see http://www.unece.org/env/wge/25meeting.htm for details). He highlighted the major achievements of the ICPs, Task Force on Health and Joint Expert Group on Dynamic Modelling and thanked the ICP Vegetation for its valuable input to the work under the LRTAP Convention. Mr Johannessen summarised the contributions of the WGE to the review of the Gothenburg Protocol, with ICP Vegetation providing up-to-date information on the critical

levels of ozone for vegetation, dose-response functions and stock at risk from air pollutants and field-based evidence on the impacts of ozone on vegetation.

5. Mr M Johansson (secretary to the WGE) reported that the LRTAP Convention has now 51 Parties since Montenegro joined as an independent Party. He gave an overview of the organisation of the Convention and its eight Protocols in force. He stressed the importance of support to the participation of countries in the EECCA region. He informed the Task Force that in 2007 the Convention reviews the effectiveness and the sufficiency of the 1999 Gothenburg Protocol to abate acidification, eutrophication and ground-level ozone. The new data rules of the LRTAP Convention where adopted by the Executive Body in December 2006. The Convention encourages the Parties outside the UNECE region to participate. It also continues to enable the participation of non-governmental organisations (NGOs) to its meetings.

6. Mr H Harmens (ICP Vegetation Programme Centre, UK), Chairman of the ICP Vegetation, gave an overview of ICP Vegetation activities and achievements in 2006. He informed the Task Force on progress made with the workplan items for 2007 (see ECE/EB.AIR/WG.1/2006/4/Rev.1) and indicated where these items will be reported in addition to the annual ICP Vegetation report 2006/2007. The items will be presented at the 26th session of the WGE, 29-31 August 2007, Geneva (for further details see http://www.unece.org/env/wge/documents.htm, where all the ECE/EB.AIR/... documents can be downloaded).

   Workplan items common to bodies under the WGE (all ICPs and the Task Force on Health):

   - *Final report on support of effects-based approaches for review and possible revision of the Convention protocols (in particular the Gothenburg Protocol).* A 2-page summary will be produced by the ICP Vegetation and included in a document (ECE/EB.AIR/WG.1/2007/14, in preparation) prepared by the Bureau of the WGE. In addition, the ICP Vegetation provided a summary paragraph on the current ozone critical levels for vegetation and spatial and temporal trends on ozone damage to vegetation (see ECE/EB.AIR/WG.5/2007/1), which will be revised later (ECE/EB.AIR/WG.1/2007/17, in preparation). The ozone critical levels for vegetation are described in detail in the *Manual on methodologies and criteria for modelling and mapping critical loads and levels and air pollution effects, risks and trends* (Mapping Manual; see http://www.icpmapping.org/);
   - *Updated summary report of current information on dose-response functions and stock at risk*. The Bureau of the WGE will produce a report by the end of 2007, to which the ICP Vegetation will contribute a 2-page summary;
   - *Updated review report of current information on links between field observations and critical loads and levels*. The ICP Vegetation will provide a 2-page summary on this item to be included in the report prepared by the Bureau of the WGE (see previous item). In addition, the ICP Vegetation will produce a glossy 'Evidence Report' on field-based evidence on the impacts of ozone on vegetation, to be presented at the 25th Session of the Executive Body of the LRTAP Convention (10-14 December 2007, Geneva); see paragraph 13 for further details.

The ICP Vegetation will report on the following common workplan items in the 2007 Joint Report of the ICPs/Task Force on Health (ECE/EB.AIR/WG.1/2007/3, in preparation):

- *Review of robustness of monitored and modelled air pollution impacts*;
- *Compilation of observed parameters, monitoring methodologies and intensities of effects-oriented activities*;
- *Summary of effects-oriented activities in countries of Eastern Europe, Caucasus and Central Asia (EECCA countries)*. Participation of EECCA countries was substantially increased at the 20th Task Force Meeting in the Russian Federation.

Mr Harmens continued to report on progress with the specific ICP Vegetation workplan items for 2007, which will be reported in more detail in ECE/EB.AIR/WG.1/2007/3 (in preparation):

- *Annual report on the extent of ozone damage to vegetation, using standardized experiments with ozone-sensitive species*, i.e. biomonitoring experiments with white clover (15 sites in 11 countries) and brown knapweed (15 sites in 7 countries). At 63% of the clover sites the concentration-based ozone critical level for crops (AOT40 = 3 ppm h) was exceeded and at the majority of sites ozone-specific leaf injury was observed. For details of the biomonitoring results with brown knapweed, see paragraph 16;
- *Report on Ellenberg modelling approach to identify (semi-)natural vegetation at risk from ozone*. A regression-based model was developed for predicting changes in biomass of individual species exposed to ozone, based on their Ellenberg Indicator values (Jones et al., 2007. Environmental Pollution 146, 744-753). This item will be reported more extensively in the technical document of the ICP Vegetation (ECE/EB.AIR/WG.1/2007/9, in preparation);
- *Interim report on assessment of evidence of effects of current ambient ozone on vegetation* (see paragraph 13 for further details);
- *Flux-based maps of risk of ozone damage to generic crops and tree species for use in integrated assessment modelling (in collaboration with ICP Forests and EMEP Meteorological Synthesizing Centre – West)*. These maps were presented and discussed in detail in the EMEP Status Report 1/2006 (see http://www.emep.int/publ/emep2006_publications.html). Maps of the ozone flux to generic crop and tree species for 2004 and 2010 indicate that the highest risk of ozone damage is in central and southern Europe. However, the gradient between northern and southern Europe was much lower for the ozone flux than the concentration-based index (Simpson et al., 2007. Environmental Pollution 146, 715-725). Lower fluxes and therefore lower risk were predicted for Mediterranean evergreen tree species;
- *Report on progress with the 2005-2006 survey of heavy metals and nitrogen in mosses*. So far, data have been received by the Programme Centre from 14 and 9 Parties to the Convention for heavy metals and nitrogen, respectively.

The ICP Vegetation will provide further details on its activities since the 25th Session of the WGE, including the 20th Task Force Meeting in Dubna, in ECE/EB.AIR/WG.1/2007/3/Add. 1 (in preparation). Mr Harmens drew also

attention to progress with ozone critical levels for vegetation, such as the inclusion of Annex III in chapter 3 of the Mapping Manual and progress made by the forest sub-group established at the ozone critical levels workshop in Obergurgl, Austria (15-19 November 2005). This forest-subgroup met twice since the Obergurgl workshop and is currently chaired by Ms L Emberson, UK (see paragraph 10).

7. Ms I Priputina (Russian Federation) represented the ICP Modelling and Mapping and gave an overview of the activities of the ICP Modelling and Mapping 2006-2007 and the results of the 22nd Task Force Meeting (6-7 April 2006, Bled, Slovenia) regarding critical loads updates for heavy metals, nitrogen and sulphur and nitrogen effects modelling. Ms Priputina emphasised the potential links with ICP Vegetation regarding heavy metal and nitrogen deposition effects and the important role of the ICP Vegetation in developing critical levels of ozone for vegetation. The 23rd Task Force Meeting of the ICP Modelling and Mapping and the 17th Workshop of the Coordination Centre for Effects will be held on 23-27 April 2007 in Sofia, Bulgaria.

8. Ms Marina Frontasyeva (Russian Federation) gave and overview of the contribution of JINR to trace elements atmospheric deposition studies in selected countries of Europe and Asia based on moss analysis. In collaborative projects JINR analyses the trace element concentration in mosses sampled in parts of the Russian Federation, Eastern Europe, the Balkan and Asia. Seventeen countries participated in the REGATA (Russian-European Gate To Asia) project and 14 countries currently participate in the REGATA-2 project, of which 13 contribute to the European moss survey 2005/2006. JINR also initiated heavy metals in mosses biomonitoring projects in China, Mongolia, South-Korea and Vietnam.

9. The meeting split into two parallel sessions considering the ozone and heavy metals/nitrogen sub-programmes. Ms G Mills (Head ICP Vegetation Programme Centre, UK) opened the ozone session and Mr H Harmens (Chairman ICP Vegetation, UK) opened the heavy metals/nitrogen session to introduce the aims of the parallel sessions.

10. The further development of Chapter 3 (Mapping critical levels for vegetation) of the Mapping Manual was considered by the ozone sub-programme. Ms L Emberson (UK) provided an overview of progress with the development of generic flux models and regional parameterisations for forest trees, and the ozone sub-programme agreed that the former should be included as an Annex to Chapter 3. The sub-programme also agreed that the revised critical levels for ammonia, recommended by the Workshop on Atmospheric Ammonia: Detecting Emission Changes and Environmental Impacts (4-6 December 2006, Edinburgh, UK), should be included as an Annex (see ECE/EB.AIR/WG.5/2007/3 for details). These two new Annexes will be presented for approval at the 23rd Task Force Meeting of the ICP Modelling and Mapping (26-27 April 2007, Sofia, Bulgaria). The Annex regarding the generic flux models for forest trees will also be presented for approval at the 23rd Task Force Meeting of the ICP Forests (12-16 May 2007, Zvolen, Slovakia). The sub-programme agreed to a proposal by Ms G Mills (UK) to re-structure Chapter 3 by incorporating the text in the six annexes into the main body of the chapter. This will involve editorial changes only and will be completed by the 26th session of the WGE.

11. Participants presented nationally-funded research that contributes to the programme's knowledge base on ozone impacts and the development of flux-based risk assessments. Mr H Pleijel (Sweden), presented dose-response functions for effects of ozone and CO_2 on grain quality in spring wheat based on results of experiments conducted in Sweden, Belgium and Finland. He concluded that there was a strong relationship between ozone flux and 1000-grain weight and protein content, and that elevated CO_2 often had an opposite effect to that of ozone on aspects of grain quality. Mr G Gerosa (Italy) showed that ozone fluxes to alfalfa (*Medicago sativa*) in open top chambers were in parallel with those measured in the open field using micrometeorological methods. Ozone impacts on alfalfa yield quantity and quality (e.g. raw fibre content) were also reported. Mr P-E Karlsson (Sweden) considered flux model parameterisation specific to forest trees in northern Europe and drew attention to, for example, the responses of stomatal conductance to temperature, derivation of g_{max}, and future consideration of partitioning between fluxes to sun and shade leaves. The results from the third year of a long-term free air fumigation of alpine pasture with ozone, including interaction with nitrogen deposition, were reported by Mr M Volk (Switzerland). Ozone exposure has enhanced senescence without significantly decreasing productivity, whilst nitrogen inputs have stimulated productivity, especially for sedges. Ms E Pellegrini (Italy) provided an insight into ozone-plant-herbivorous insect interactions and showed that some insect pests have a preference for and grow larger on ozone exposed leaves.

12. The ozone sub-group also benefited from information provided in 12 posters on ozone effects. Results of biomonitoring surveys and experiments were presented by groups from Greece, Hungary, Poland, Slovakia and Slovenia, whilst results of ozone exposure showed the widespread occurrence of ozone damage on sensitive vegetation. Exposure experiments provided information on the protective effect of fungicides and other chemicals against ozone effects (Greece), and interaction effects of ozone in combination with nitrogen (Spain) and insects (Italy). For the Mediterranean region, links between AOT40, ozone flux and wheat yield were described (Italy) together with a regional parameterisation of a flux model for Holm Oak (*Quercus ilex*), contributed by Spain.

13. A major deliverable for the ICP Vegetation in the forthcoming year will be a report reviewing field evidence for ozone effects on vegetation in Europe over the period 1990 – 2006 (relating to the third workplan item common to all programmes, see paragraph 6). Data is being compiled by Ms F Hayes (ICP Vegetation Programme Centre, UK) using the following sources: ICP Vegetation clover biomonitoring experiments, scientific journal papers, conference proceedings, workshop reports, web-pages, national reports and by visiting selected experts who have been particularly active in this field. Ms Hayes presented the results of data collected so far and described how the data would be analysed. She indicated that there were already over 500 incidences of ozone injury included in the database, covering 32 crop species and 159 species of (semi-) natural vegetation, occurring in 17 countries. More than 100 datapoints from 8 countries have been collected from exposure experiments in which plants were exposed to ambient air and filtered-air. Ms Hayes reported that analysis of trends in the clover biomonitoring data are unlikely to be possible due to changes

in location of sites and gaps in the data over the time period covered by the study. Nevertheless, there is already a clear indication that ozone effects on clover mirror the year to year variation in ozone climate. In the next few months, collated data will be analysed in relation to measured/modelled AOT40 and $AF_{st}Y$ with the aim of proving that predicted critical level exceedance is associated with measured biological effects in the field. The 'Evidence Report' will be published as a glossy full colour report in December, 2007.

14. Mr P-E Karlsson described a study being conducted in Sweden that will contribute to the ICP Vegetation 'Evidence Report'. The study will result in a separate report on the evidence for impacts of near ambient ozone concentrations on vegetation in Northern Europe, to be published in 2008. The report is wider in scope than that of the ICP Vegetation, and includes impacts on trees and impacts measured in exposure experiments at ozone concentrations that are predicted to be experienced this century due to the rising background concentrations.

15. There was an in depth discussion of the ozone-based experimental programme of the ICP Vegetation. This was supported by presentations from three participants describing results from their biomonitoring studies. Mr O Blum (Ukraine) reported that ambient ozone exposure during the period late June to late August, 2006, caused visible damage to ozone sensitive clover (*Trifolium subterranean*) and tobacco at locations in Kiev. For the south-east of England, Mr G Pellizzaro (UK) reported ambient ozone-induced changes in chlorophyll content and fluorescence prior to the development of visible injury on brown knapweed (*Centaurea jacea*). In addition, Mr I Gonzáles (Spain) described flux-modelling for ozone-sensitive white clover (*Trifolium repens*) and showed how different local parameterisations were required for coastal and continental Mediterranean climates.

16. Mr J Fuhrer (Switzerland) reviewed results of the 2006 pilot study using tissue culture-produced ozone-sensitive and –resistant clones of *Centaurea jacea* (brown knapweed). Supported by a contribution in kind from Switzerland, the experiment was conducted by 14 groups representing seven Parties to the Convention. Results were mixed, with some participants finding it difficult to distinguish between ozone-specific injury and non-specific reddening, with the latter being common on both clones. Nevertheless, most groups reported greater injury on rosette leaves of the ozone-sensitive clone than on the resistant one. It was concluded that a full-scale study involving a training workshop for participants was justified, but would not be possible in the short-term due to a lack of financial support and insufficient participant interest.

17. Ms G Mills (UK) led a discussion about future experimental and monitoring work within the ozone sub-programme. The group agreed that there was insufficient scientific justification for continuing with the pan-European clover experiment on a large-scale. However, continuation in southern European and in newly participating countries would be of benefit providing individuals could maintain their own stock plants and purchase their own wick material. The Programme Centre would continue to collate and report results from those continuing with this biomonitoring experiment. Ms Mills also outlined alternative experimental work for participants. In addition to the continuing smaller-scale clover experiments,

there will be two main experimental contributions: monitoring of ozone injury and inputs to local parameterisations for (1) crops (wheat, potato or a locally important crop) and (2) grasslands (on a dominant grass and legume species). For each, participants would contribute to a base study involving recording phenological development and injury, and collecting ozone and climate data from the site or the nearest monitoring station. Wherever possible, participants would also contribute to a detailed study by measuring stomatal conductance on at least five occasions. Contributions of data from participants' ongoing nationally-funded exposure experiments are especially welcomed in order to broaden the number of species for which flux or flux-effect models exist. Ms Mills informed the participants that, so far, 14 groups had committed to conducting the crop or grassland experiments, and that a draft of a detailed protocol would be circulated within the next few weeks.

18. Mr P Büker (UK) described recent developments within the RAPIDC Programme (Regional Air Pollution In Developing Countries), coordinated by the Stockholm Environment Institute at York. He informed the group that the aims of the study were to conduct risk assessments based on European and North-American air quality guidelines, to establish a biomonitoring network using the ICP Vegetation clover experiment and a chemical protectant against ozone injury, ethylene diurea (EDU), and to maintain and expand the Air Pollution Crop Effect Network (APCEN). Mr Büker reported that whereas there had been some interesting results using EDU, some technical difficulties in establishing clover plants within all participating countries, except South-Africa, meant that the start of the biomonitoring study had been delayed.

19. Mr E Steinnes (Norway) opened the heavy metals/nitrogen session focussing on temporal trends with a presentation on thirty years of atmospheric deposition studies in Norway using moss analysis. The most southern part of Norway has consistently received higher deposition of many elements than the rest of the country, mainly due to long-range atmospheric transport. Apart from mercury, the concentrations of 'volatile' elements were substantially reduced between 1977 and 2005, with the highest reduction (94%) being reported for lead in the south. Ms L Thöni (Switzerland) reported on the trends of heavy metal concentrations in mosses in Switzerland between 1990 and 2005. A consistent decline with time was only found for cadmium and lead, representing continuous reductions of emissions for these metals. Good correlations were observed between the nitrogen concentration in mosses and nitrogen deposition rates in rainwater, but the nitrogen concentration in mosses had not changed between 1995 and 2005. Mr H Harmens (UK) described the temporal trends (1990-2000) in the heavy metal concentration in mosses across Europe. Whereas the concentration of arsenic (note: only 5 Parties reported data for both 1990 and 2000), cadmium, copper, lead, vanadium and zinc had generally declined with time, no clear changes were observed for chromium, iron, mercury and nickel. It should be noted, however, that the temporal trends were country-specific. The temporal trends in the concentration of cadmium, lead and mercury in mosses were similar to the trends report by EMEP/MSC-East for the total modelled deposition in Europe. This confirms that mosses can be a useful and inexpensive tool to monitor temporal trends of atmospheric heavy metal deposition.

20. Several participants reported on the current status of the 2005/2006 moss survey in their country. Mr K Vergel (Russian Federation) gave an overview of air pollution studies in the central part of the Russian Federation using the moss biomonitoring technique and presented examples of GIS-maps of the elemental distribution over sampled areas in 2005. Mr R Pesch (Germany) showed that the number of sampling sites in Germany could be reduced from 1028 in 2000 to 720 in 2006 without significant change of the landscape coverage of the monitoring sites, of spatial patterns of metal bioaccumulation or descriptive statistical measures. First results indicated that a considerable decrease in the metal concentration in mosses between 2000 and 2006 could be detected for cadmium, lead and mercury, whereas chromium and zinc showed significant increases. Ms V Ginzburg (Russian Federation) reported on a first attempt to investigate background levels of trace elements in mosses in reserves in the central part of the country. She showed that these background levels were generally higher than those observed in Norway. Ms J Pankratova (Russian Federation) applied the moss biomonitoring technique in the Republic of Udmurtia to study atmospheric deposition of heavy metals and other elements. Principal component analysis showed that 80% of the variation of elemental concentrations in mosses could be explained by seven factors, with the soil component being the most important factor (explaining 34%). Mr H Harmens (UK) presented provisional data for the UK moss survey 2005 and showed that the general decline in the metal concentration in mosses during the last five years of the 20th century continued in the first five years of the 21st century, although generally at a lower rate.

21. Mr H Harmens (UK) gave an overview of the progress with the European heavy metals in mosses survey: 2005/2006. Of the 32 and 18 Parties conducting the survey for heavy metals and nitrogen respectively, 14 and 9 Parties have submitted their data to the ICP Vegetation Programme Centre. Mr Harmens emphasised again the importance of submitting the data in the required format and submitting the data for the moss reference material for quality assurance purposes. The heavy metals/nitrogen sub-programme agreed on the time schedule suggested by Mr Harmens regarding data analysis and reporting. The final deadline for the submission of data to be included in the report is 1 September 2007, with a final deadline for the submission of data for the moss reference material set at 1 July 2007. The sub-programme also took note of the outline of the glossy 'European heavy metals in mosses report: 2005/2006' as presented by Mr Harmens; the report will be published at the end of June 2008. At the same time, a separate report will be published for nitrogen.

22. In the heavy metals/nitrogen sub-programme 19 posters were presented on a variety of themes. Results of biomonitoring case studies either in areas with background atmospheric deposition of heavy metals or near metal pollution sources were presented for Belarus, Czech Republic, Russian Federation, Serbia, Slovakia, Uzbekistan and Vietnam. Whereas Croatia and Macedonia showed results of the 2005/2006 moss survey, Latvia, Poland and Serbia described in more detail temporal trends in heavy metal concentrations in mosses. Spain provide information on the variability of nitrogen and heavy metal concentrations in mosses and the Czech Republic reported on temporal trends in the nitrogen concentration in mosses. In addition, Slovenia presented results on a quality

control study with moss samples and the UK contributed two posters on lichens as bioindicators of atmospheric ammonia pollution.

23. Several presentations were given on the theme 'bioindication/biomonitoring'. Mr S Fränzle (Germany) revisited bioindication by discussing systematic correction for metal accumulation behaviour of a given (plant or other) organism. Data from biological samples do not provide information on the state of the environment in a straightforward manner, except when representing mainly atmospheric deposition such as in mosses. Ms L González (Spain) tested the suitability of mosses as biomonitors of heavy metal and nitrogen deposition in the Pyrenees in the north of Navarra (Spain). She concluded that no important differences were found between the heavy metal concentrations in *Hypnum cupressiforme* in the Pyrenees compared with other areas in Europe. However, *H. cupressiforme* was not a good biomonitor of nitrogen deposition, except in areas with local pollution sources. Mr W Purvis (UK) studied the multi-element content of lichen, soil and bark samples from Burnham Beeches, Buckinghamshire, UK. High manganese concentrations were recorded in *Parmelia sulcata* samples and manganese species are known to limit lichen diversity, at least in coniferous woodlands. He concluded that understanding a pollution legacy is very important to conserve sensitive biota. Mr L De Temmerman (Belgium) biomonitored airborne gaseous mercury near a chlor-alkali plant using grass and leafy vegetables as model crops in the terrestrial food chain. A relationship established in 1986 between the mercury levels in grass and naturally grown leafy vegetables proved also to be valid when using more artificial cultures of vegetables, indicating that grasses can be used as model species for leafy vegetables.

24. Mr J Stamenov (Bulgaria) presented data on the heavy metal content in aerosols measured at peak Moussala at different altitudes and sites with different anthropogenic influences. Mr S Leblond (France) reported on the conversion of heavy metals in moss concentrations into atmospheric deposition fluxed for the 2000 survey in France. He found that the moss survey overestimated the total cadmium deposition but underestimated the total lead and mercury deposition compared with the deposition data modelled by EMEP. Mr L Kleppin (Germany) described the development, implementation and application of the WebGIS 'MossMet'. 'MossMet' comprehensively documents the site-specific metadata that characterise the sampling locations (e.g. vegetation, land use, distance to emission sources), the measurement values and statistically derived metal bioaccumulation indices for Germany. 'MossMet' was applied routinely in the German moss survey 2005/2006 and Mr Kleppin offered to apply this information system via internet across Europe for interested Parties.

25. Mr L De Temmerman (Belgium) attended the 9th meeting of the Joint Task Force on Health (of WHO and the Convention) (30-31 May 2006, Berlin) as the ICP Vegetation representative (see ECE/EB.AIR/WG.1/2006/12). At this meeting a preliminary assessment conducted in 2002 on the health risks of heavy metals (cadmium, lead and mercury) from long-range transboundary air pollution was updated using new scientific evidence on health effects, especially at low levels of exposure and in susceptible population groups. The meeting concluded that for cadmium every effort should be made to further reduce emissions to the atmosphere and soil, considering the narrow margin of safety. For lead LRTAP

may contribute significantly to the lead contents in crops through direct deposition. Due to the possible health risk of low level of lead exposure, lead emissions to the atmosphere should be kept as low as possible. Mercury bio-accumulates in the form of toxic methylmercury in fish. In populations consuming large amounts of fish, the intake of methylmercury may reach hazardous levels. As fish consumption has important beneficial effects on human health, decreasing the concentrations of methylmercury in fish should have a high priority. Reducing mercury emissions to the atmosphere provides a mean to reach this aim.

26. The heavy metals/nitrogen sub-programme concluded with a discussion on the future of the European moss survey. The group strongly advised to conduct the next survey in 2010/2011 and urged Parties to the LRTAP Convention to continue to provide the necessary financial support. The moss survey provides valuable (high resolution) empirical data to the Convention on the spatial and temporal trends of atmospheric heavy metal (and potentially nitrogen) deposition in addition to the (low resolution) empirical and modelling data provided by EMEP (the latter currently only for the metals cadmium, lead and mercury). The use of the moss data base within the Convention should be further explored and exploited, not only at the European level but also at the national and regional level. In particular, the collaboration with EMEP/MSC-E and ICP Modelling and Mapping was encouraged.

27. In the final plenary session, Ms G Mills (UK) gave a brief overview of the conclusions and recommendations from the discussions in the ozone sub-group, followed by a brief summary from Mr H Harmens (UK) on the presentations and the outcome of discussions in the heavy metal/nitrogen sub-group (as described above). The meeting took note of the conclusions and recommendations of the heavy metal/nitrogen and ozone sub-groups. The Task Force adopted the parameterisation of the flux-based ozone critical levels for generic tree species and the new critical levels for ammonia as described in document ECE/EB.AIR/WG.5/2007/3. The Task Force discussed and adopted the medium-term workplan of the ICP Vegetation as described in Annex I.

28. Before the meeting in Dubna, Mr E Kubin (Finland) kindly offered to host the 21st ICP Vegetation Task Force Meeting in Oulu, which was gratefully accepted by the Task Force. The meeting was provisionally scheduled for the end of February 2008. The Task Force took also note of the offer from Mr V Urumov to host the 22nd Task Force Meeting in Macedonia. Mr H Harmens (UK) closed the meeting by thanking Ms M Frontasyeva, Ms T Donskova and Mr A Sissakian (local organising committee) and their colleagues at JINR, Dubna, for hosting the meeting. He acknowledged the contributions in kind to the ICP Vegetation by Ms L Emberson (UK), Mr J Fuhrer (Switzerland) and Mr L De Temmerman (Belgium) and the UK Department for Environment, Food and Rural Affairs (Defra) and the Centre for Ecology and Hydrology for their continuous financial support of the ICP Vegetation Programme Centre. Mr H Harmens also thanked the Secretariat and the Bureau of the WGE for their continuous support and acknowledge in particular the support provided over the years by Mr H Gregor (Germany), ex-chairman of the WGE. Last but not least he thanked his colleagues at the Programme Centre and the participants of the ICP Vegetation for their continuing support of the programme.

Annex I. Medium-term workplan of the ICP Vegetation.

Updated 7 March 2007

2008:

Workplan items common to bodies under the WGE (all ICPs and the Task Force on Health):

- Review of robustness of monitored and modelled air pollution impacts;
- Compilation of observed parameters, monitoring methodologies and intensities of effects-oriented activities;
- Summary of effects-oriented activities in countries of Eastern Europe, Caucasus and Central Asia (EECCA countries).

Workplan items specific to the ICP Vegetation:

- Annual report on experimental programme on responses of vegetation to ozone [O];
- Report on the evidence for effects of current ambient ozone on vegetation (1990 – 2006) [O];
- Flux-based maps of risk of ozone damage to crop and tree species using localised parameterisations (with EMEP/MSC-W) [O] (to be verified with Mr D Simpson, EMEP/MSC-W);
- Report on progress with the development of flux-based methods for (semi-)natural vegetation [O];
- Report on the European heavy metals in mosses survey 2005/2006 [HM];
- Report on the nitrogen concentration in mosses in the 2005/2006 survey [N].

2009:

- Annual report on experimental programme on responses of vegetation to ozone [O];
- Report on the risk of damage to (semi-)natural vegetation communities in Europe [O];
- Report on flux-based assessment of risk of damage to managed pastures in Europe [O];
- A glossy brochure and associated web page for the general public and other interested parties on field-based evidence for the impacts of ozone on vegetation [O]*
- Interim report on modelling for combined effects of ozone and nitrogen on (semi-)natural vegetation [O, N];
- Report on the temporal trends in heavy metal concentrations in mosses between 1990 and 2005 [HM].

2010:

- To be decided after the LRTAP Convention workshop‘Saltsjobaden III’ (Air pollution and its relations to climate change and sustainable development – linking immediate needs with long-term challenges, 12 - 14 March 2007, Gothenburg, Sweden).

* Item not included in the official Convention’s workplan.
Acronyms: (MSC-E): EMEP Meteorological Synthesizing Centre - East, (MSC-W): EMEP Meteorological Synthesizing Centre - West, [N]: Nutrient nitrogen, [O]: Ozone, [HM]: Heavy metals.