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**EXECUTIVE BODY FOR THE CONVENTION ON
LONG-RANGE TRANSBOUNDARY AIR POLLUTION**

Working Group on Effects
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Item 5 (b) of the provisional agenda

**DRAFT MEDIUM-TERM WORK-PLAN FOR THE FURTHER DEVELOPMENT
OF THE EFFECT-ORIENTED ACTIVITIES**

Note by the Bureau of the Working Group on Effects
in collaboration with the secretariat

1. At its eighteenth session the Executive Body for the Convention acknowledged the benefits of a more advanced, longer-term planning of the activities of its subsidiary bodies. It also invited the Steering Body of EMEP and the Working Group on Effects to prepare their medium-term programmes for the period 2001-2004 for review of the protocols and to submit them to it for consideration at its nineteenth session (ECE/EB.AIR/71, para. 80). Pursuant to this decision the Bureau of the Working Group on Effects, in cooperation with the Extended Bureau and in consultation with the secretariat, has drafted a work-plan for 2001-2004 for consideration by the Working Group on Effects at its twentieth session. It is expected that the medium-term work-plan will help to further develop the effect-oriented activities and focus them on the priorities of the Convention and its protocols.

Documents prepared under the auspices or at the request of the Executive Body for the Convention on Long-range Transboundary Air Pollution for GENERAL circulation should be considered provisional unless APPROVED by the Executive Body.

I. OBJECTIVES

2. The results of the effect-oriented activities in the 2001-2004 period should provide the necessary support for the future review/revision of the protocols to the Convention. To this end they should be aimed, in particular, at the further development of a reliable database and at broadening and updating scientific knowledge on the current state of, and on recorded trends in, the quality of the environment, and on the effects of selected air pollutants. In addition to acidifying compounds (S and N) and nutrient nitrogen, special attention should be devoted to the environmental and health effects of ozone (O₃), particulate matter (PM), heavy metals (HMs) and persistent organic pollutants (POPs).

II. MAIN ACTIVITIES

3. The tasks included in the medium-term work-plan should be formulated, and their implementation managed, in such a way that the expected results will substantially contribute to:

- (a) The continuing monitoring and collation of data on the state of the environment;
- (b) The further development and application of effect-based approaches and methodology, including:
 - (i) Updating of critical loads for acidity (S and N) and nutrient N, mapping of exceedances;
 - (ii) Updating of critical levels for ozone, mapping of exceedances;
 - (iii) Derivation of critical limits (loads) for HMs, mapping of areas at risk;
 - (iv) Development of critical limits/risk assessment for POPs;
 - (v) Further elaboration of acceptable corrosion rates and acceptable levels/loads of pollutants for materials;
- (c) The updating of existing and derivation of new dose-response functions/damage functions;
- (d) The collation of updated information on land use and on stock at risk;
- (e) The further development and application of dynamic modelling (including recovery);
- (f) The analysis of trends in the effects of air pollution;
- (g) The further assessment of the health effects of air pollution (in particular HMs, POPs, PM);
- (h) The development and application of bioindicators and health impact indicators;
- (i) The assessment of the impacts of air pollution on biodiversity and of the relation between air pollution (and its effects) and climate change.

III. IMPLEMENTATION OF THE MEDIUM-TERM WORK-PLAN; TIMETABLE OF MAIN DELIVERABLES

4. The activities of the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution (TFH) planned for the 2001-2004 period should be consistent with the timetable for decisive actions of the Executive Body and related (supporting) activities of other subsidiary bodies, in particular the Task Force on Integrated Assessment Modelling.

5. The most important deliverables of individual ICPs and TFH addressing the environmental and health effects of selected air pollutants in the 2001-2004 period are listed below and summarized in the table. The results of the work will be used for the preparation of the substantive report of the Working Group on Effects on the assessment of air pollution effects and their recorded trends. The substantive report, to be presented to the Executive Body in 2004, will be the main contribution of the effect-oriented activities to the future review of the protocols. It is planned, however, that some draft data and preliminary results could be made available already in 2003, as asked for by the Task Force on Integrated Assessment Modelling (TFIAM), thus allowing for the timely preparation of the review.

6. ICP on Assessment and Monitoring of Air Pollution Effects on Forests

- 2001:
- Report on the assessment of forest condition in Europe;
 - Report on cause/effect relationships in forest ecosystems (acidifying compounds, nutrient nitrogen), in collaboration with ICP Integrated Monitoring;
 - Report on the effects of heavy metals on forest ecosystems;
 - Photo guide on ozone injury on tree species (in collaboration with ICP Vegetation).
- 2002:
- Assessment of input/output budget of acidifying compounds on level II monitoring sites;
 - Assessment of the relationship between soil nitrate concentrations and environmental factors (in particular air pollution);
 - Level II ozone critical levels for tree species (in collaboration with ICP Vegetation).
- 2003:
- Critical loads and dynamic modelling for evaluating emission reduction scenarios (in collaboration with ICP Mapping);
 - Progress report on heavy metals critical limits and risk assessment in forest ecosystems.
- 2004:
- Trend analysis of crown condition, soil solution, foliar composition and deposition data;
 - Assessment of relationships between trends in ecosystem condition and stress factors;
 - Assessment of the geographical distribution of ozone injury, evaluation of sensitive tree species;
 - Assessment of heavy metals in soil on ICP Forests monitoring sites.

7. ICP on Assessment and Monitoring of Acidification of Rivers and Lakes

- 2001:
- Report on the assessment of the present status and trends in nitrogen in surface waters;
 - Report on the use of multivariate statistical methods to detect trends in the biological recovery of surface waters.
- 2002:
- Updated trends in the chemistry (acidification) of surface waters for the 1990-2001 period;
 - Workshop on heavy metals in surface waters.

- 2003: - Progress report on the modelling of the effects of acidifying compounds on surface waters;
- Progress report on heavy metals in surface waters.
- 2004: - Modelling the effects of acidity on biological recovery;
- Assessment of persistent organic pollutants in surface waters.

8. ICP on Effects of Air Pollution on Materials, including Historic and Cultural Monuments

- 2001: - Progress report on multi-pollutant corrosion effects (acidifying compounds).
- 2002: - Start of new exposure programme to study the effects of acidifying compounds and particulate matter on the corrosion of materials.
- 2003: - Report on updated multi-pollutant dose/response functions (acidifying compounds);
- Report on updated trends in the corrosion effects of acidifying compounds;
- Workshop on problems related to the release of heavy metals to the environment due to the corrosion of materials.
- 2004: - Report on threshold levels for multi-pollutant effects on materials (acidifying compounds);
- Report on threshold levels for the effects of particulate matter on materials.

9. ICP on Effects of Air Pollution on Natural Vegetation and Crops

- 2001: - Photo guide on ozone injury on crops, natural vegetation and tree species (in collaboration with ICP Forests);
- Review of ozone effects on natural vegetation.
- 2002: - Level II ozone critical levels for crops, natural vegetation and trees;
- Economic assessment of crop losses due to ozone, including predicted losses for 2010 following implementation of the Gothenburg Protocol and the EU National Emission Ceilings Directive.
- 2003: - Review of the impacts of nutrient nitrogen on (semi-) natural vegetation, including identification of plant communities at risk;
- Workshop report: Level II critical levels for ozone;
- Inclusion of level II critical levels/loads of ozone for crops, natural vegetation and forest trees in a revision of the Mapping Manual (in collaboration with ICP Mapping);
- Preliminary maps of exceedances of level II critical levels/loads of ozone for crops, natural vegetation and forest trees (for information to TFIAM) (in collaboration with ICP Forests and ICP Mapping);
- Report on the 2000/2001 survey of heavy metals in mosses;
- Description of the database of the responses of species of (semi-) natural vegetation to ozone. Identification of plant communities at risk from ozone.
- 2004: - Trends in the frequency of injury-causing ozone episodes and biomass reduction in sensitive species;
- Final maps indicating areas where level II critical levels of ozone are exceeded and vegetation is at risk (in collaboration with ICP Mapping);
- Analysis of trends in the heavy metals in mosses (1980-2001 database);
- Maps indicating plant communities at risk from nitrogen.

10. ICP on Integrated Monitoring of Air Pollution Effects on Ecosystems

- 2001: - Scientific paper on trends in acidity and nutrient nitrogen (assessment of S, N, base cations and H⁺ data).
- 2002: - Report on concentrations, pools and fluxes of heavy metals at selected sites;
- Report on site-specific dynamic modelling and impact scenario assessment (first results).
- 2003: - Joint report (in cooperation with ICP Forests/EU Intensive Monitoring Programme) on air pollution effects on understorey vegetation (bioindication);
- Scientific paper on concentrations, pools and fluxes of heavy metals at selected sites;
- Scientific paper on proton budgets, including an assessment of the relative effects of nitrogen processes.
- 2004: - Scientific paper on recovery and trends in acidity and nutrient nitrogen;
- Report on site-specific dynamic modelling and impact scenario assessment.

11. ICP on Mapping Critical Levels and Loads

- 2001: - Review of critical limits of acidity and nutrient nitrogen;
- Preliminary updated maps of critical loads of acidity and nutrient nitrogen (and their exceedances).
- 2002: - Workshop on empirical critical loads of nutrient nitrogen;
- Dynamic modelling of acidity and nutrient nitrogen on a European scale; preliminary results (in collaboration with all ICPs);
- Critical levels of ozone on level II and maps (in collaboration with ICP Forests and ICP Vegetation);
- Critical limits of heavy metals in soils.
- 2003: - Preliminary updated critical loads of acidity and nutrient nitrogen and maps of their exceedances (for information to TFIAM);
- Preliminary level II critical levels of ozone maps (in collaboration with ICP Forests and ICP Vegetation);
- Preliminary maps of critical loads of heavy metals (for information to TFIAM);
- Critical loads and dynamic modelling at forest sites (in collaboration with ICP Forests and ICP Integrated Monitoring).
- 2004: - (Final) updated maps of critical loads of acidity and nutrient nitrogen and their exceedances (to TFIAM);
- Results of dynamic modelling of acidity and nutrient nitrogen on a European scale (to TFIAM);
- (Final) maps of level II ozone critical levels (to TFIAM);
- (Final) maps of critical loads of heavy metals (to TFIAM).

12. Task Force on the Health Aspects of Air Pollutants

- 2001: - Report on the health risk of selected heavy metals: preliminary assessment (in collaboration with ICP Mapping).
- 2002: - Report on the health risk of selected persistent organic compounds: preliminary assessment.
- 2003: - Updated review of the health risk of particulate matter.

- 2004: - Report on the exposure assessment and health risk of ozone (in collaboration with ICP Forests, ICP Vegetation and ICP Mapping);
- Report on the exposure assessment and health risk of particulate matter.

Table. Medium-term work-plan: intended deliverables of the effect-oriented activities for individual pollutants and years

	Acidity	Nutrient N	Ozone	PM	HM	POPs
2001	Cause/effect relationship (F) Assessment effects (F) N in surface waters (W) Biological recovery (W) Corrosion effects (MAT) Trends in acidity (IM) Effects on forest ecosystems (IM) Review critical limits (MAP) Updated maps critical loads (MAP)	Cause/effect relationship (F) Assessment of effects (F) Trends and leaching in nutrient N (IM) Review critical limits (MAP) Updated maps (MAP)	Photo guide on O ₃ injury (V, F) Review of O ₃ effects on natural vegetation (V)		Report on effects of HM on forest ecosystem (F) Report on health risks of HM (H)	
2002	Input/output budget on: level II sites (F) Updated trends in chemistry of surface waters (W) Start of new exposure programme (MAT) Dyn. modelling: preliminary results: European scale (MAP); Site-specific application (IM)	Soil nitrate at forests sites (F) Workshop on empirical critical loads of nutrient N (MAP) Dyn. modelling: preliminary results: European scale (MAP); Site-specific (IM)	O ₃ critical levels (level II) (V, F) Economic assessment of crop losses due to O ₃ (V)	Start of exposure programme (MAT)	Workshop on heavy metals in surface waters (W) Report on concentrations and fluxes (IM) Critical limits for soils (MAP)	Review of occurrence and environmental effects of select POPs (Consultant) Assessment of health effects of selected POPs (H)
2003	Critical loads and dynamic modelling at forest sites (F, MAP) Modelling of effects in surface waters (W) Multi-pollutant dose/response functions (MAT) Updated trends in corrosion effects (MAT) Proton budget calculations (IM) Effects on vegetation (IM) Updated maps (MAP)	Impact on semi-natural vegetation; review (V) Effects on vegetation (IM) Updated maps (MAP)	Preliminary maps of level II O ₃ critical levels (V, MAP) Workshop on level II O ₃ critical levels; suggestions for revision of Mapping Manual (V) Database on response of natural vegetation to O ₃ (V) Identification of plant communities at risk (V) Review of health effects (H)	Updated review of health effects (H)	Critical limits and risk assessment of HM (F) Workshop on HM release due to corrosion (MAT) Report from HM in mosses 2000/2001 survey (V) Scientific paper on HM concentrations/fluxes (IM) Preliminary maps of critical loads for HM (MAP)	
2004	Modelling biological recovery (W) Threshold levels for multi-pollutant effects (MAT) Dyn. modelling (IM) Recovery and trends on IM sites (IM) Updated critical loads maps (MAP) Results of dyn. modelling on European scale to IAM (MAP)	Trend analysis (F) Recovery and trends on IM sites (IM) Updated maps of critical loads (MAP) Dynamic modelling (IM) Results of dyn. modelling on European scale to IAM (MAP) Maps of plant communities at risk from nutrient N (V)	Geographical distribution of O ₃ injuries in forests, incl. list of sensitive species (F) Trends in injury and biomass reduction (V) Final critical levels of O ₃ (level II) maps for IAM (V, F, MAP) Exposure assessment and health risk (H)	Threshold levels for effects of PM on materials (MAT) Exposure assessment and health risk (H)	Assessment of HM in soil on forest sites (F) Trends in HM in mosses database (V) Final maps of critical loads of HM for IAM (MAP)	Assessment of POPs in aquatic biota (W)

(F): ICP Forests; (H): TF Health; (IM): ICP Integrated Monitoring; (MAP): ICP Mapping; (MAT): ICP Materials; (V): ICP Vegetation; (W): ICP Waters; (IAM): TF Integrated Assessment Modelling.