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

Working Group on Effects
(Twentieth session, Geneva, 29-31 August 2001)
Item 7 (a) of the provisional agenda

EXPERT GROUP MEETING ON DYNAMIC MODELLING

Summary report prepared by the organizers
with the assistance of the secretariat

I. INTRODUCTION

1. The meeting of the expert group on dynamic modelling took place under the auspices of the Working Group on Effects. It was organized by the Swedish programme on International and National Abatement Strategies for Transboundary Air Pollution (ASTA programme) and the University of Lund (Sweden) in cooperation with the Centre for Ecology and Hydrology (United Kingdom).

2. The meeting took place from 3 to 5 October 2000 in Ystad (Sweden). It was attended by 26 experts from the following Parties to the Convention: Czech Republic, Denmark, Estonia, Finland, Germany, Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The International Cooperative Programmes (ICPs) on Integrated Monitoring (ICP IM), Mapping (ICP Mapping), Frests (CP Forests) and Waters (ICP Waters), as well as te Coordination Center for

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Effects (CCE at the National Institute of Public Health and the Environment (RIVM), Bilthoven), the Centre for Integrated Assessment Modelling (CIAM at the International Institute for Applied Systems Analysis (IIASA), Laxenburg) and the UN/ECE secretariat were also represented.

3. The meeting was chaired by Mr. Alan Jenkins (United Kingdom).

II. AIMS AND ORGANIZATION OF THE MEETING

4. The objectives of the meeting were:

(a) To define the role of dynamic modelling in the framework of the Convention in general, and in assessing recovery and providing input to integrated assessment modelling in particular;
(b) To draw up strategies for the development of dynamic modelling of soils, waters and nutrient nitrogen;
(c) To prepare plans for future activities.

5. The meeting was organized in a series of plenary sessions addressing general issues, including:

(a) The present status of dynamic modelling (including available data, methods, results);
(b) Possible new approaches/developments;
(c) Possible roles for national institutes, national focal centres (NFCs) and ICPs;
(d) Further work.

6. Three discussion groups were set up to address in more detail specific issues related to the dynamic modelling of: soils; waters; and nutrient nitrogen.

7. In particular, the groups considered the following:

(a) The state of the art, methods/models;
(b) Available data; requirements for new data /information;
(c) Targets; format of outputs;
(d) Spatial scale/approach;
(e) Uncertainty/validation;
(f) Commonality of approach/use of common data.

III. CONCLUSIONS AND RECOMMENDATIONS

8. The expert group agreed on some 20 conclusions and recommendations, here grouped into six sections.

A. Role of dynamic models

9. Dynamic models can provide an assessment of expected future development of soil and water acidification and recovery from acidification for given scenarios of future sulphur (S) and nitrogen (N) deposition, for example as a consequence of the 1999 Gothenburg Protocol. These assessments are ongoing at individual sites, nationally and regionally, through existing and planned projects (such as the European Commission-funded RECOVER: 2010 project), and other national efforts. The expert group recommended that these ongoing assessments should be collated, combined and summarized into European-scale assessments by ICP Mapping.

10. In addition, dynamic models offer a tool for evaluating monitoring programmes and interpreting trends in data at the national level. This work is ongoing and should be continued.

11. Dynamic models can be used to provide targets, based on chemical/biological criteria, to be achieved within a given timescale, for integrated assessment models (IAM). This can be achieved over the next 1-3 years.

12. The expert group discussed the state of the art in the dynamic modelling of impacts of N as a nutrient, particularly in terrestrial ecosystems, and concluded that at present such models were insufficiently developed and tested for use in application and assessment activities. National and European work with dynamic models in the context of the Convention will in the short and medium term focus primarily on the acidification and recovery of surface waters and forest soils.

13. The expert group agreed that integration of dynamic effect models into the IAMs for full-scale optimization was not likely within the next five years unless simplified versions of the models were used in such IAM. Such simplified versions have not yet been developed or tested.

B. Role of individual countries

14. The expert group strongly emphasized that dynamic modelling must be carried out with the active participation of the individual countries, and noted that these countries would be the primary beneficiaries of the results.

C. Common results

15. The expert group strongly advised that common deposition scenarios should be used for all models. These may be scaled from the actual observations for 2000-2050. The expert group requested that IIASA/CCE supply data for 1980-2010 as soon as possible.

16. The expert group agreed that common historical emission trends should be used for the application of dynamic models. Data for S, NO_3, NH_4 and base cations (1850-2000) were needed, preferably split into wet and dry deposition and preferably on a 50 km x 50 km grid scale. The expert group requested that EMEP should provide this information at the earliest opportunity.

17. The use of common data for different model inputs and parameterization was recommended as far as possible. This would be best achieved nationally through ICPs and the relevant NFCs. These may be identified through the web site: http://www.unece.org/env/wge.

D. Role of ICPs

18. The expert group urged ICP Mapping to:

(a) Invite all NFCs to initiate dynamic modelling activities and to participate in the common presentation of the results on the European scale;

(b) Coordinate European scale harmonization and presentation of the results, in collaboration with the other ICPs, NFCs, national and international programmes;

(c) Draft a 'modelling manual' to be circulated to the experts in this group and to be presented at the CCE Workshop in April 2001 (as a basis for amending the Mapping Manual);

(d) Develop and test methods for identifying areas sensitive to excess deposition of S and N;

(e) Address the recognized need for dynamic biological models and targets at the planned workshop on chemical criteria and critical limits for steady-state and dynamic models (March 2001, York, United Kingdom);

(f) Consider how to include in the European dynamic modelling exercise countries that do not actively participate in the activities of ICPs.

19. The expert group encouraged ICP Waters to increase its focus on dynamic modelling in its participating countries by:

(a) Informing members of the Task Force of ongoing developments;

(b) Encouraging cooperation between the various focal centres within each country;

(c) Encouraging additional countries to participate;

(d) Taking action to identify areas where waters were acidified or at risk. For example, the areas considered by the expert group to contain acidified surface waters and where dynamic modelling would be desirable are given in the annex to this report.

20. The expert group encouraged ICP IM to continue site-scale application of dynamic models at selected IM sites. The work provides an assessment of the effects of emission/deposition scenarios in surface waters and soil chemistry, including estimates of uncertainty and the importance of ecosystem processes, particularly for N.

21. The expert group:

(a) Applauded the short-term plans of ICP Forests/Forest Intensive Monitoring Coordinating Institute (FIMCI) on the application of dynamic models (specifically SMART) to selected sites, in a north-south transection over Europe;

(b) Noted that this work would be carried out in cooperation with ICP Mapping since CCE was involved in this action;

(c) Recommended comparing this model application with applications of other models at some of those plots (e.g. the SAFE model in Germany).

E. Major gaps in knowledge and uncertainties

22. The expert group recognized gaps in knowledge with regard to N dynamics. The uncertainty could be estimated by considering best/worst cases and the risks of N leaching. The group further recognized the current limitations in models for predicting the effects of N enrichment on the biodiversity of natural and semi-natural terrestrial and aquatic ecosystems.

23. The expert group encouraged continued research on N dynamics within ongoing and future national and international programmes. Models for predicting the effects of N on biodiversity should also be further developed.

24. It recognized that future climate change could confound predictions of recovery and future acidification and therefore must be considered in predictions beyond 2010.

25. The expert group recognized that sulphur processes should be considered, and encouraged NFCs and ICPs to collect data relevant to the quantification of sulphur pools and fluxes. (These would also be useful for aluminium speciation.)

F. General

26. Dynamic modelling offers new tools for decision makers and provides the mechanism for assessing the agreed protocols. Furthermore, dynamic modelling on a European scale provides for a more efficient and full use of the data collected at national level. Dynamic modelling requires continued funding for national activities and some increased resources to enable coordinated activity at the European level.

27. It is recommended that the expert group on dynamic modelling should meet again in October 2001, in particular to:

(a) Review completed national scale model applications;
(b) Explore methods for presenting data;
(c) Explore methods for harmonizing outputs on a European scale;
(d) Determine targets;
(e) Assess the outputs from ICPs with respect to acidified and N-impacted areas.

28. The expert group urged the Working Group on Effects to encourage experts from the United States and Canada to participate in dynamic modelling activities, including the assessment of recovery of impacted areas in response to decreases in S and N deposition.

Annex

AREAS SENSITIVE TO SURFACE WATER ACIDIFICATION AND SUITABLE FOR MODELLING OF RECOVERY

Fenno-Scandian shield:	Norway Sweden Finland Russian Federation – Kola, Karelia
Upland areas in the British Isles:	United Kingdom – Scotland, Wales, Cumbria Ireland
Lowland heaths/forests:	SE England Denmark Northern Germany Netherlands Belgium
Mid-European forests:	France – Vosges Belgium – Ardennes Germany – Black Forest, Harz Mountains, Bavarian Forest, other areas in Mittelgebirge Czech Republic – Sumava
Alps:	Italy Switzerland Austria
Tatras:	Slovakia Poland
SE Europe:	Bulgaria (?) Romania (?)