



Economic and Social Council

Distr.: General
13 July 2010

Original: English

Economic Commission for Europe

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

Working Group on Effects

Twenty-ninth session

Geneva, 22–24 September 2010

Item 4 of the provisional agenda

Recent results and updating of scientific and technical knowledge

Integrated Monitoring

Report by the Programme Coordinating Centre of the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems

I. Introduction

1. The work of the International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (ICP Integrated Monitoring) has recently focused particularly on the following key topics: (a) calculation of site-specific critical loads for sulphur and nitrogen compounds; (b) relationships between critical load exceedances and empirical chemical effect indicators; and (c) compilation of available biodiversity data and indicators at the monitoring sites.

2. Work on pools and fluxes of heavy metals and relations to critical limits and risk assessment has continued and an assessment was reported in the annual report 2009. It also described the comprehensive assessment on calculations of fluxes and trends of nitrogen and sulphur compounds, base cations and acidity. These data were used for assessing the relationships with critical load exceedances. The results are presented here in accordance with item 3.6 of the 2010 workplan for the implementation of the Convention on Long-range Transboundary Air Pollution (ECE/EB.AIR/99/Add.2), adopted by the Convention's Executive Body at its twenty-seventh session in December 2009.

II. Workplan items common to all programmes

A. Targets and ex post application

3. The work on the relationships between critical load exceedances and monitored data was conducted and is reported in section B.

B. Robustness

4. Critical loads for acidification of aquatic ecosystems and eutrophication of terrestrial ecosystems were calculated for 16 ICP Integrated Monitoring sites across Europe. Empirical critical loads for nutrient nitrogen were in addition calculated for 74 plots in 26 sites. The critical loads were compared to modelled deposition estimates provided by the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP). The deposition estimates were available in the 50 km x 50 km EMEP grid. Critical loads were compared with deposition estimates for sulphur and nitrogen for the years 1995, 2007 and 2020. For the year 2007, receptor-specific depositions modelled by EMEP were additionally available as deposition to forest, semi-natural vegetation and as grid average values.

5. In 2007, more sites were protected from acidification than in 1995. The modelled nitrogen deposition to forest was larger than the grid average or the grid total nitrogen deposition for most of the grid cells. In 2007, compared with 1995, there was a clear increase in the number of plots protected from eutrophication if the grid total or the grid average deposition value was used. The improvement was much smaller if deposition to forest was used in the comparison.

6. Relationships between exceedance of critical loads for acidification and eutrophication for terrestrial and aquatic ecosystems and measured chemical indicators were calculated. The magnitude of trends, i.e., slopes for observed run-off water fluxes and chemical concentrations for the period 1993–2006, and annual average run-off water fluxes and concentrations for the period 2002–2006, were used as empirical impact indicators. Clear relationships between several of these impact indicators and critical load exceedances (year 2007) were observed, e.g., between measured acid neutralizing capacity (ANC) concentrations and the exceedance of the critical loads of acidity (coefficient for correlation $R^2=0.67$), and between changes in nitrate concentrations and the exceedance of the empirical critical loads for nutrient nitrogen ($R^2=0.41$). The collected empirical data allowed testing and validation of the key concepts in the critical load calculations and increased confidence in the regional scale critical loads mapping approach used in integrated assessment modelling.

C. Links with biodiversity

7. The links with biodiversity are reported in section VI.

D. Trends in selected monitored/modelled parameters

8. The trend assessment of the integrated monitoring data confirmed the previously observed regional-scale decreasing trends of sulphur in deposition and run-off and soil water. Of the 34 sites with sufficient data for trend analysis of bulk deposition, all sites had a downward trend in sulphate concentrations and the trend was statistically significant at 28

sites for the period 1993–2006. Acid-sensitive sites in northern Europe also indicated recovery from acidification. Few decreasing trends in nitrogen deposition showed statistically significant decreasing trends in nitrate concentrations (6 out of 34 sites) and both decreasing and increasing trends in run-off and soil water concentrations and fluxes (six sites with statistically significant decreasing and one site with increasing nitrate concentrations). Nitrogen clearly required continued attention as a European air pollution issue.

III. Acidification

9. Critical loads for acidification of aquatic ecosystems have been calculated for 16 ICP Integrated Monitoring sites across Europe. The critical loads were compared to modelled deposition estimates provided by EMEP. A comparison of the critical loads with deposition estimates for sulphur and nitrogen for the years 1995, 2007 and 2020 was conducted and the relationships between observed chemical indicators was assessed and reported in section II.D.

IV. Nutrient nitrogen

10. Empirical critical loads for nutrient nitrogen were calculated for 74 plots in 26 ICP Integrated Monitoring sites. Results of statistical trend analysis have indicated both increasing and decreasing trends in run-off and soil water concentrations and fluxes.

V. Cross-cutting issues

11. Biodiversity data and indicators available for ICP Integrated Monitoring sites are listed in the annual report 2010. Additional data were recorded at the sites, but were not reported to the Programme Centre. The work covered the hydrobiology of streams and lakes, vegetation and its structure and species cover, trunk epiphytes, aerial green algae and an inventory of birds. The collected empirical information on biological effects will be linked to site-specific critical load exceedance.
