

T. Schneider (Editor)/*Acidification and its Policy Implications*
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R E P O R T

Report of the
INTERNATIONAL CONFERENCE
organized by the
Government of THE NETHERLANDS
in cooperation with the
UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE
(ECE)

AMSTERDAM, 9 MAY 1986

I INTRODUCTION

1. At the invitation of the Government of The Netherlands the first international Conference on Acidification and its Policy Implications, organized in cooperation with the United Nations Economic Commission for Europe was held in Amsterdam from 5 to 9 May 1986. The purpose of the Conference was, as described in paragraph 18 of the Resolution adopted at the Multilateral Conference on the Environment (Munich, 1984), to support the Executive Body of the Convention on Long Range Transboundary Air Pollution in its task by holding international symposia to discuss most recent scientific information related to acidification and long range transboundary air pollution and its policy implications.
2. Representatives of the following Signatories to the Convention participated in the Conference: Austria; Belgium; Canada; Czechoslovakia; Denmark; Federal Republic of Germany; Finland; France; Hungary; Ireland; Liechtenstein; Luxembourg; Italy; Netherlands; Norway; Poland; Spain; Sweden; Switzerland; Turkey; Union of Soviet Socialist Republics; United Kingdom ; United States of America; Yugoslavia and the European Economic Community.
3. Representatives of the secretariat of United Nations Economic Commission for Europe (ECE) and the United Nations Environment Programme (UNEP) attended the Conference; the following specialized agencies of the United Nations were present: United Nations Educational, Scientific and Cultural Organisation (UNESCO); United Nations Industrial Development Organisation (UNIDO); World Meteorological Organisation (WMO).
4. Representatives of the Organisation for Economic Cooperation and Development (OECD), the Secretariat of the Nordic Council of Ministers and of the following non-governmental organizations also participated: International Union of Producers and Distributors of Electric Energy (UNIPEDE) and of the International Institute for Applied Systems Analysis (IIASA).
5. The Conference was further attended by approximately 120 observers in a personal capacity.
6. The Opening Session of the Conference was chaired by Dr.Ir.T.Schneider, Chairman of the National Organizing Committee. Mr.Schneider welcomed in particular Dr.P.Winsemius, Minister of Housing, Physical Planning and Environment of The Netherlands and Mr.K.Sahlgren, Executive Secretary of the United Nations Economic Commission for Europe.

7. In his Opening Address Minister Winsemius stated that this Conference, organized by the Government of the Netherlands in cooperation with the United Nations Economic Commission for Europe, resulted from the acidification conference held in Munich in June 1984 (Multilateral Conference on the causes and prevention of damage to forests and water by air pollution in Europe).

The purpose of the conference is to make research results in the area of acidification available as quickly as possible and to make it possible to translate those results into policy.

The results of this conference - as was intended in the 18th Final Conclusion from Munich - must support the work of the Executive Body for the Convention (EB).

The questions that are to be addressed, and that we hope to have answered or to bring closer to an answer in the conference summary and conclusions, are:

- What directions are emerging in the research?
- Is there more certainty and new information over the extent of effects?
- Is there more information about the causes; about the substances, elements (for example, about nitrogen) that play a major role?
Has the problem been sufficiently covered addressing just sulphur and nitrogen?
Should hydrocarbons and ozone also be tackled?
- Is there more clarity, more insight into the tempo with which the effects strike?
Does this force us to adjust the pace of the abatement effort?
- Is there more clarity about the levels of these substances at which possible effects appear and the levels that are acceptable?
- Is recovery of damaged ecosystems still possible? What is the situation with our cultural monuments?
- Is replanting the only hope for our forests? In that case, are temporary management measures possible and desirable?

Minister Winsemius stated that almost ten years after the OECD report "Long range transport of air pollutants", there is no doubt that acidification is a serious international problem laying responsibility on both science and politics. The question that is asked science is "what are the weakest links in the environment that we must protect and how can

we do that?". The question that politics must answer is "are we willing to act?". It will always be true that our knowledge about the causes and effects of acidification is characterised by uncertainty. It is not sensible to postpone action until we have 99 percent certainty. That would probably be too late. We have to be willing to accept uncertainty and to institute measures sooner.

Another problem is that sometimes control costs must be borne by one country, while another country is enjoying the benefits of the control. This can make a possible solution of the acidification problem more difficult. An international fund might provide a solution for this difficulty. Something similar has been mentioned by Dr. Steyrer - former Austrian Minister for Health and Environmental Protection - and Minister Winsemius has been mentioning it on various occasions. The impression is that analogous ideas are also circulating in other Western European countries.

Acidification is an international problem, urgently requiring international cooperation. It is clear that no matter where and how Europe is separated and unified - politically or administratively - the environment binds us together. Air is the most rapid connection. It takes only a few days for the atmosphere to transfer the side effects of activities elsewhere.

Minister Winsemius thought it admirable that - since the ECE Convention on Long Range Transboundary Air Pollution was brought about in 1979 and entered into force in 1983 - so much has been done internationally in a fairly short time, thanks partly to the active secretariat of the ECE. The question remains, however, whether the pace of our international abatement effort is fast enough. It is of great importance to establish that as quickly as possible. The speedy transmission of information will help reduce our uncertainty about this. The first step in international control of acidification was taken in Helsinki last July with the signing of the protocol on the reduction of sulphur emissions or their transboundary fluxes. This step must still be taken for NO_x .

Minister Winsemius emphasized that NO_x is a key component. It contributes to soil acidification and together with hydrocarbons is responsible for the formation of ozone. It will be especially important to learn the degree of NO_x control desired because we are still at the beginning of the decision-making process. Research is underway among

experts that stresses the role of nitrogen in soil acidification more strongly.

We know that products of photochemical air pollution, such as ozone, cause damage to vegetation. The damage from ozone - not only to forests but also, for example, to agriculture and public health - is considerable.

Air pollution also damages the harvest. Minister Winsemius thought it surprising that this damage receives so little international attention. The reduction in crop yield in The Netherlands is estimated to amount to circa 5 percent. This means circa 250 million US dollars per year. Translated to the European scale, this would mean near an amount in the order of four thousand million US dollar.

8. Mr.K.Sahlgren underlined in his statement that acidification is now recognized as a central environmental problem in the ECE region. It affects not only the material well-being through the deterioration of the natural resources on which that well-being depends - soil forests, freshwater - but also the cultural heritage, as historical buildings and monuments are crumbling under the effects of atmospheric pollution. The initial focus under the Convention, Mr. Sahlgren said, has been on sulphur dioxide emissions as reflected in the protocol adopted in July 1985 in Helsinki on the reduction of sulphur emissions or their transboundary fluxes by at least thirty per cent. Serious attention is now also being given to nitrogen oxides. Currently, data on air and precipitation quality from ninety six stations in twenty-four countries are reported to the European Monitoring and Evaluation Program (EMEP). Pending the entry into force of the Protocol for the long-term financing of the monitoring program, it is funded by voluntary contributions from the parties to the Convention. It should be emphasized that the voluntary financial contributions for EMEP received so far have been sufficient to cover only the basic requirements of the agreed work plan. Besides the EMEP program, three further international co-operative programs for monitoring and assessment of air pollution effects, under the auspices of the Executive Body for the Convention, have been launched during the past six months. Initial progress on these three government-sponsored programs has been most gratifying. It illustrates the kind of "multiplier effect" which the Convention has triggered in international efforts to deal with the acid rain problem.

The on-going programs for implementation of the Convention have already resulted in a lively exchange of technological information and know-how, which is beginning to have its spin-off in commercial terms, especially in the field of East-West trade relations. The search is now on for the most cost-effective methods of pollution control - thereby encouraging the export of specialized equipment and foreign licensing of new techniques. In this respect, the Executive Secretary recalled that air pollution control technology will be included among the subjects of the forthcoming ECE symposium on East-West business opportunities and trade prospects, to be held in Thessalonika (Greece) in September 1986. He pointed out that increased mobilization in market forces towards the achievement of the environmental objectives would lessen the need for coercion applied through governmental intervention.

In concluding his statement, Mr. Sahlgren said that the phenomenon of acidification and long-range air pollution has ceased to be confined to the ECE region alone. The countries of the region - after pioneering, so to speak, the mass production and long-range export of acid precipitation - could also show the way towards effective international policies for its control in other regions.

II ELECTION OF OFFICERS

9. Prof.Dr.D.J.Kuenen (Netherlands) was unanimously elected Chairman. Unanimously elected as Vice-Chairmen were: Dr.A.Apling (United Kingdom), Mr.L.Björkbom (Sweden), Prof.Dr.B.Molski (Poland) and Dr.L.Szabo (Hungary). Mr.W.J.Kakebeeke (Netherlands) was appointed as rapporteur.
10. During the first three days of the Conference twenty-one lectures were given reviewing the state of the art in the respective fields of acidification research. On Thursday representatives of Parties to the Convention presented their national research programs and policies regarding acidification.

III/IV REVIEW OF THE STATE-OF-THE-ART IN THE RESPECTIVE FIELDS OF ACIDIFICATION RESEARCH AND GENERAL SURVEY OF EFFECTS

In the original report (par. 11-48) summaries of the papers were given. In these proceedings we would like to refer to the appropriate original papers giving the state-of-the-art in the respective fields of acidification research.

V SUMMARIES OF NATIONAL PRESENTATIONS AND ACCOUNT BASED ON THOSE PRESENTATIONS

In the original report (par. 49-69) only summaries of the national contributions were given. In these proceedings we would like to refer to the original national presentations following this report.

VI ACCOUNT BASED ON THE PRESENTATIONS ON RESEARCH PROGRAMS AND POLICIES REGARDING ACIDIFICATION

70. The account below is based on the presentations by 21 countries and the European Communities. In their presentations to the Conference most delegates addressed policies to abate acidification effects. Several delegations described the results of their research programs on acidification.

The plans for future policies and research were also presented.

71. All delegations stressed the importance of international cooperation within the framework of the ECE-Convention on Long Range Transboundary Air Pollution. Furthermore, many delegations referred to the European Monitoring and Evaluation Program (EMEP) as a basic project under the Convention, producing very useful results for the signatories.

72. Almost all delegations repeated their country's commitment to reduce SO₂ emissions as laid down in the Protocol on the reduction of sulphur emissions by at least 30%.

A few countries underlined the need to reduce SO₂ emissions but pointed out for different reasons that they are yet in a position to sign the protocol. Some countries stressed the need for continued effort to develop and improve quantitative estimates of the extent of effects and of their amelioration following emission reductions. Several countries emphasized that 30% reduction is far from sufficient for reaching an ecologically sound environment, but only a first step.

The ways in which countries aim to achieve reduction varied e.g. emission standards according to the best available technologies, ambient air quality standards and maximum sulphur content of fuels were mentioned.

73. The role of nitrogen compounds in the acidification processes was frequently mentioned. Several countries also stressed the importance of NO_x and hydrocarbons in the formation of ozone and other photo-oxidants

and their effects on forests and crops.

74. Besides the effects of air pollutants which have been transported over a long distance, high concentrations from local sources with local effects were also reported. This includes the effects of ammonia in certain regions. Several countries mentioned the role of metals, especially aluminium, in toxic concentrations both in surface waters and in soils.
75. Regarding different types of damages some delegations reported recent figures of forest damage. Increased research efforts were frequently mentioned on effects of acidification in surface water, groundwater, forest soils, buildings and monuments. Actual types of damages vary markedly among countries.
76. Most delegations highlighted past and present achievements in emission reduction. A few delegations pointed out that new emission control programs should not be implemented until a more adequate scientific and technical base was established. Other delegations held the view that reduction of various emissions is appropriate in view of the seriousness and irreversibility of the observed effects, although gaps in knowledge still exist.
77. The determination of deposition target levels for sulphur and nitrogen was proposed by several countries. Necessary emission reduction can be derived from these levels.
78. The need for further discussions and decisions about reduction of NO_x emissions within the framework of the Executive Body was mentioned frequently.
Reductions of 30% were suggested. Some countries will introduce US-standards for motor vehicles. Speed limits were also mentioned as useful preventive measures.
79. Effects of nitrogen on the marine environment were mentioned by some delegations. Eutrophication of the Baltic Sea was considered of major concern by them.
80. The Conference stressed that the present situation urges signatories to the Convention to intensify their cooperation in executing the principles laid down in the Convention.

Especially the need of international research evaluation mechanisms was mentioned since a growing number of countries are working on monitoring and acidification research programs.

Exchange of information will be useful to profit optimally from research

results and to avoid duplication of research efforts.

It was suggested that in national acidification research programs, resources should be allocated for collaboration and for assessment of data originating from outside national programs.

81. Thanks were expressed to the Government of the Netherlands for the initiative to hold the Conference in cooperation with the ECE in Amsterdam and it was complimented for the effective way the meeting was organized.

The Conference was appreciated as very useful in reviewing the state-of-the-art in scientific knowledge in the field of acidification research. The Conference stressed that future exchange of information on the process of acidification and related subjects would be highly beneficial for all countries involved.

VII GENERAL CONCLUSIONS

82. On the basis of the scientific evidence brought forward at the Conference and the policy statements made by delegations, and bearing in mind the results concerning the abatement of air pollutants reached at the third session of the Executive Body of the Convention (Helsinki, 8-12 July 1985), the following general conclusions were agreed upon.

- a. The scientific evidence presented at the Conference confirmed that the primary cause of acidification¹⁾ is SO₂. It is also clear that NO_x plays a major role in acidification processes. In combination with hydrocarbons, NO_x plays a major role in the formation of photochemical oxidants, especially ozone.
- b. Acidification has widespread and in a number of cases irreversible effects on the environment and inflicts considerable economic losses and damage to the natural resource base and the cultural heritage of countries. Abatement programs implemented so far in Europe and North America have not yet led to sufficient reductions to protect the environment from acidification.
- c. Most delegates at the Conference stated that the Helsinki Protocol on the

¹⁾ In the view of some delegations it was preferred to add the words "due to air pollution"

reduction of sulphur emissions or their transboundary fluxes by at least 30 per cent is an important step forward to combat acidification of the environment, but that this is not sufficient. Many countries have already announced further reductions. The above delegations recognized that further international cooperation, with more participating countries, is needed to achieve sound scientifically based environmental targets for acid deposition by further reduction of emissions or their transboundary fluxes.

- d. The Conference agreed that the transboundary problems caused by NO_x emissions can only be solved through international cooperation. The Conference welcomed the progress of the working group on NO_x under the Convention. A number of delegates stated the need for a binding international agreement for the reduction of NO_x and hydrocarbons. Awaiting such an international agreement, a number of countries have already found it necessary to take appropriate action. Some delegations considered that such action should take place after appropriate scientific investigations.
- e. To enlarge the basis for the verification of nationally adopted measures to reduce emissions of relevant air pollutants and to broaden the knowledge concerning effects on the most endangered components of the environment, in particular forests, lakes and other ecosystems, materials, historical monuments, and other cultural establishment of permanent integrated monitoring stations could be supported. To support the further elaboration of policy measures to reduce emissions, the interaction between scientists and policy makers should, for instance, be intensified.
- f. The inadequate knowledge of physiological processes in trees as caused by acidification and other processes requires increased research efforts. The results of these efforts should be made available to assist policy makers in further shaping abatement policies.
- g. The exchange of information on research programs in existing international fora should be intensified in order to minimize unnecessary duplication of research efforts and to facilitate the development of complementary research activities. This can help to increase the efficiency of acidification research and the use of funds available for such research.
- h. To improve the data base for the development of dispersion and deposition models, it is recommended that national emission inventories be

established if this has not already been undertaken. This will facilitate a more accurate calculation of emission data, which will further increase both the comparability and quality assurance of data provided by countries and the value of models. Model projections can prove to be a valuable tool for policy makers in the development of national and international pollution abatement scenarios.

- i. Given the imperative to minimize the effects of acidification in Europe and North America in a way that will lead to environmental as well as financial-economic benefits for all countries involved, the development of innovative cooperative pollution abatement measures should be considered.
- j. In areas with relatively high ammonia emissions in particular from agricultural activities and to a certain extent in other areas, due i.a. to long distance transport, ammonia contributes to the acidification process. Therefore, increasing attention should be paid to monitoring of NH_3 , nationally and internationally, as well as to national abatement of those emissions.
- k. In case of historical monuments a special role is played by carbonaceous particles.
- l. It is recommended to further stimulate directly or indirectly the development of advanced technologies to combat air pollutants at the sources i.a. through support for basic scientific and technological research as well as the application of these technologies through demonstration projects.
- m. Consideration should be given to further ways of increasing the effectiveness of national long term policies and strategies to minimize the effects of acidification; including, e.g., the formulation of appropriate deposition targets (for instance acid equivalent/unit of surface/year), and programmes to achieve them.
- n. The Convention has proved to be an effective instrument for international cooperation to combat acidification and for the development of international agreements aimed at the reduction of air pollutants. Increased support for the execution of activities under the Executive Body and its subsidiary bodies is necessary.
- o. The effect of air pollutants on the environment is becoming a problem of the first order in a growing number of developing countries; assistance should be offered to those countries, based on experience gained in Europe and North America, to help them formulate their air pollution

abatement policies and strategies.

VIII CLOSING REMARKS BY MINISTER WINSEMIUS

83. Minister Winsemius closed the conference by evaluating its results against the questions he had posed at the start. The conference proved to have provided new insights on many - although not all - points. Increasing attention for NO_x , hydrocarbons, ozone, and complex processes have provided new insights on many - although not all - points. Increasing attention for NO_x , hydrocarbons, ozone, and complex processes in the soil in addition to SO_2 was shown to be a clear tendency in research programmes. Another striking development is the application of models which can quantify and simulate acidification. This is of great importance in judging whether we are headed in the right direction with control measures. In the research sphere, the need to strengthen research coordination was also striking.

Concerning acidification's causes, it has become clearer that SO_2 cannot be the only substance that causes the stated effects. NO_x , O_3 and photo-oxidants also have a share in that. Levels at which effects occur have still been hardly presented. The Minister advised focussing attention on that in the research. It has become clear that the pace with which effects strike is probably faster than the tempo with which we are controlling acidification.

It has been stated that recovery of trees and lakes - to a limited degree - has occurred in places where SO_2 emissions have been actually reduced. In order to make recovery of ecosystems possible, further SO_2 reduction than has thus far occurred is needed and NO_x and hydrocarbons will also have to be tackled. Temporary measures, such as liming acidified lakes, are very expensive and certainly needed, but do not offer a general solution.

Given the points mentioned, the Minister concluded that the conference was cost-effective. Repetition can - through useful contact between science and policy - be very meaningful to stimulate execution of the ECE treaty.

IX ADOPTION OF THE REPORT

84. During the closing session a number of amendments were introduced. They are reflected in the report and adopted by the Conference.

The Conference agreed that a summary of Minister Winsemius's statement after the closure of the Conference be reflected in the report. On behalf of the participants Mr. Tarasti (Finland), chairman of the Executive Body asked Minister Winsemius to forward the report of the Conference to the Executive Secretary of the United Nations Economic Commission for Europe and to Governments, signatories to the Convention. He warmly thanked the Netherlands Government for having hosted a successful Conference.