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EUROPEAN POLICY IN THE FIELD OF ATMOSPHERIC ACIDIC PRECIPITATION

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ABSTRACT

Forests in the European Community are showing signs of considerable damage which is generally attributed to air pollution. Several areas are particularly affected but others are less. Whether this reflects differences in the perception of the problem, or real differences in environmental conditions is not clear. Monuments, soil and water are also affected.

The Community has therefore taken action and major resources have been mobilized, mainly in the framework of Research, Agricultural and Environmental Policies.

The need for coordinated international action on atmospheric pollution is paramount and the Community will continue its constructive role in a wider international framework.

The present situation

Woodlands in the European Community are showing signs of considerable damage which is generally attributed to air pollution. Areas of the Community which are particularly affected include the Bavarian forest, the Fichtelgebirge and the Black Forest, in Germany, and the Vosges in France. Damage has also been reported in Belgium, Greece, Italy, Luxembourg and the Netherlands. The species most affected are spruce, fir, pine and beech.

Many studies have been carried out in recent years to discover the causes of the damage and to find sylvicultural remedies. The studies show that trees are dying because of the combined effect of several harmful factors, among which air pollution appears to play a key role.

Fertilization trials have shown that appropriate quantities of minerals can increase the resistance of tree stands to air pollution and other stress factors.

Given that broad-leaved woodlands such as beech and oak are also dying, it is not certain that broad-leaved species offer better long-term resistance to air pollution than conifers.

The size of the problem

The effect of acid deposition and related processes on crop and forest growth have received particular attention, and numerous studies have been carried out. Only in the Federal Republic of Germany have regular national field surveys been conducted although in other Member States periodic evaluations have been made at regional or national level. Many of the results are contradictory, even when different survey teams have examined the same areas and evidence.

The problem of forest damage by acid deposition on any scale was first recognised in the Federal Republic of Germany. Early in the 1970s, reports from Bavaria remarked on the high incidence of die-back amongst silver fir, and by the mid 1970s similar symptoms had been noted in Baden-Wurtenburg. Since then, the extent of damage and range of species affected appears to have increased dramatically.

The extent of damage elsewhere in the Community is less certain. Whether this reflects differences in the perception of the problem, or real differences in environmental conditions is not clear. It has been suggested, for example, that a particular combination of climatic and soil conditions, together with the occurrence of ageing forests, make some woodlands particularly susceptible to the effects of acid deposition. It has also been argued that the lack of damage in some other regions is because sentitive species are traditionally not planted in the most vulnerable areas. Additionally, recent research has shown that ozone may be instrumental in causing forest damage, and variations in the extent of damage may reflect differences in the incidence of high ozone concentrations due to climatic factors.

Monuments, soil and water are also affected by air pollution.

The response to these problems has been quick and major resources within the framework of Agricultural Research and Environmental Policies have been mobilized.

Community Research Programme

I. Programme and General Outline

Most aspects of air pollution have been dealt with by the European Community research programmes since the European Community has been involved in environmental research in 1972.

Up to date, three environmental research programmes have been completed, a fourth one, which is the logical continuation of the others has been submitted by the Commission to the Council of Ministers for adoption. It is intended to cover the period 1986- 1990.

Air quality is one of the most important areas to be dealt with within the general framework described above. Although the occurrence of atmospheric acidic precipitation had already been taken into account previously, the Commission reviewed the research priorities as a consequence of disturbing reports on forest dieback in Central Europe and also as a result of the conclusions of the Symposium on Acid Deposition held in Karlsruhe 1983.

The Council of Ministers adopted in March 1984 a revision of the third Environmental Research Programme allocating supplementary funds for research in this area in response to an upgrading of their priorities triggered also by considerable public pressure.

It is foreseeable that the same priority will be given to acid deposition issues within the framework of the forthcoming Research and Development Programme.

An outline of the implementation of the programme is as follows:

1. promotion of the coordination of national research by means of concerted actions, but also by more flexible means, such as the establishment of ad hoc task forces to enhance specific, narrowly defined aspects;

2. granting of selected research contracts either for projects which fill gaps in the national research programme or as contributions to well defined major national research efforts.

Two concerted actions cover the "acid deposition" field:

i. The physico-chemical behaviour of atmospheric pollutants (COST 611);

ii. The effects of air pollution on terrestrial and aquatic systems (COST 612).

Both concerted actions are managed by a Community-COST "Concertation Committee" constituted by the representatives of the member states while working groups are entrusted with the scientific tasks. The Commission of the European Communities provides the secretariat of the concerted actions.

In addition to the members of the European Community, a number of other countries which are involved in european co-operation in the field of scientific and technical research participate in the Concerted Actions :

- Finland, Norway, Sweden and Switzerland in COST 611 and

- Norway, Sweden and Switzerland in COST 612.

The objective of the Concerted Action is to coordinate research, at a national level. It is a tool for analysing the experiences and the results achieved by European research institutions and for assessing the state-of-the-art. As a result priority objectives for future research can be established.

To a very large extent, the granting of selected research contracts is based on the results of the concerted actions.

II. Achievements and perspectives

1. With regard to the Concerted Action on "Physico-Chemical Behaviour of Atmospheric Pollutants", the programme implemented several years ago has enabled a sound international cooperation to be achieved. The state of knowledge is updated on a regular basis; gaps are identified and recommendations for future research are formulated. The results of this concerted action are recorded in many reports which are available on request.

In order to establish a logical link between the physico-chemical behaviour of air pollutants and their ecological effects, it is necessary that a comprehensive qualitative and quantitative knowledge of the chemical environment of ecosystems, especially forests is available. At the moment this does not exist. This gap in knowledge is part of a more general insufficiency of information on the cycles of pollutants for which some important pathways are insufficiently quantified (e.g. dry deposition of NO and HNO_3).

The dry deposition of N-compounds needs to be investigated, even though many forests may receive more nitrogen than in the past (leading perhaps to a longterm modification of the functioning of the ecosystems via perturbations of nutritional and physiological processes).

The concentrations of air pollutants in the ecosystems are also not well known although this is a prerequisite when gauging their possible damaging effects on plant communities.

The data on SO_2, NO_x, and ozone are insufficient and sparse. For other pollutants such as peroxy acetyl nitrates and hydrocarbons, organic lead compound etc. the data are practically non-existant. As a result, it is difficult to investigate the role of these components in the functioning of ecosystem and further, to assess the consequences of these chemicals on the status of the ecosystems.

2. Since the Concerted Action on "Effects of Air Pollution on Terrestrial and Aquatic Ecosystems" was only started in March 1984, it is too early to draw any final conclusions either on the state-of-the-art or on what should be the main research in the future.

   Nevertheless, a first analysis has enabled the Commission to determine some basic gaps in the knowledge and to grant a number of research contracts to scientific institutions in the Member States.

Community Agricultural Policy

An inventory of Community forests, especially regarding damage due to atmospheric pollution, proposed by the Commission has been submitted to the Council. Pilot projects and specific experiences, which will contribute to a

better understanding of the dying forest, have also been included in this proposal as well as the creation of an Advisory Committee for forest protection at the level of the Community.

In the meantime a preparatory programme has already been started, mainly in order to assess the different methodologies which could be used for the proposed inventory. A remote sensing demonstrative project has been performed in some selected regions of France, the Federal Republic of Germany, Belgium, and Luxembourg. Three prominent laboratories of three different Member States of the European Community have cooperated their activities in this respect and have developed and tested an infra-red aerial photographic technique which promises to be a reliable method.

Other projects on hand have been carried out in France and Italy in order to compare different sampling methods in furtherance of the establishment of the Community Information System. Three additional projects are still in progress.

The Commission of the European Communities has also issued a manual in all Community languages which gives a description of different damages to forest and their classification according to a jointly agreed scale. This manual has been drafted in accordance with the conclusion of the expert group which met in Freibourg on Brisgau on the initiative of the Economic Commission for Europe.

A report on action already undertaken by the Member States together with the previously mentioned proposals and projects should contribute to a more coordinated Community approach to forest damage.

Regulatory Measures

There are three main elements in European Community's environment legislation in respect of atmospheric pollution.

1. air-quality standards set the objectives which have to be achieved;

2. emission limits, and

3. product standards which set out the path for achieving these objectives.

Air quality standards set the parameters within which industry must operate and define the quality of the environment which citizens of the Community expect. These standards are of a general nature and set out limit and guide values for the concentration of a specific pollutant in ambient air.

Up to now standards have been agreed for SO_2 in conjunction with suspended particulate matter, NO_x and lead.

Quality Standards

Simply setting standards for the quality of the air is not enough to ensure that the standards are met, and met in a way that does not cause unfair competition or barriers to trade. Member States have agreed on a number of other directives relating to emission limits and product standards.

Emission limits

Industry, including energy production, is an important contributor to the air pollution problem. However, it is clear that industry is made up of a great many different processes and products which emit different substances to varying degrees.

Nevertheless, all Member States agree that industrial emissions should be curtailed and the Council of Ministers has given its approval to a general framework directive relating to emissions from industrial plant.

This defines the areas and substances which should be subject to control and authorisation and steers industry in the direction of advanced technology. Whilst it does not set specific limits it does set out the framework within which follow-up directives can be introduced and which can be aimed at the reduction or prevention of pollution from specific sources.

The first of these follow-up directives is currently before Council and is concerned with the limitation of emissions from large combustion plants.

Product Standards

In the area of product standards the example of the motor vehicle is the one which immediately springs to mind. Transport is a major source of pollution and the Commission has drafted a directive aimed at further reducing gaseous emissions from motor-vehicles weighing up to 3.5 tons, and intends to introduce a draft directive concerning the reduction of both gaseous and particulate emissions from diesel powered vehicles.

Other examples of product standards are the directive relating to the lead content of petrol and the proposals to further reduce the sulphur content of gas-oil.

There are a number of general principles underlying all the directives.

1. First and foremost is the polluter pays principle.

2. Secondly that use should be made of the best available technology, not involving excessive cost. This second principle is open to differences in interpretation, for example, on which technology is best, and what may not be an excessive cost in one country may well be excessive in another.

3. The directives should be controlable, compatible with the internal market, based on the widest possible international cooperation and agreement and their implementation should be practical. It will be quite clear then that any directive will be a compromise, but this does not mean that it will be ineffective.

   It is also clear that it is not reasonable to prescribe a certain technology or procedure. The aim must be clearly stated but the steps to be taken to achieve this aim must be left to the various national governments.

Conclusions

The problems of sulphur dioxide, nitrogen oxides and acid deposition are of major concern. Individually or together they act to acidify the soil and lakes, inhibit plant growth and damage buildings. The Commission's proposal for reducing emissions from large industrial plants is still under discussion

in the Council. The adoption of EEC proposals on vehicle exhaust emissions will lead to reductions in NO_x and other pollutants. These measures by themselves may not be enough.

It is difficult to attribute the impairment of terrestrial ecosystems which have recently been observed only to air pollution. A complex network of causes may be involved including:-

- some meteorological events
- long-term climatic episodes
- pests and viruses acting as primary or secondary agents
- forestry practices e.g. the former forestry practices of grazing or litter removal.

A wide investigation into these causes cannot be fully developed within a short period. The on-going research programme will be considered as the first step towards the establishment of a real coordinated programme and will provide the scientific basis for a more complete explanation of the currently observed impairment of terrestrial ecosystems.

The need for coordinated international action on atmospheric pollution is paramount. The Community may, conceivable, put its own house in order, but the Community will also need to continue to play a constructive role in wider international frameworks.