

# EUROPEAN COMMUNITIES

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SERIES: RESEARCH AND DEVELOPMENT

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## THE EEC AND ENVIRONMENTAL RESEARCH

### 1. Why a EEC action in the field of environmental research ?

The public is becoming increasingly aware of threats to the environment resulting from the excessive and uncontrolled development of economic and industrial activities. Responsibility for obtaining advance warning of these threats and containing them as far as possible lies with the state or Community of states. The European Communities have been concerned with the problem of environmental protection since 1973. The transnational nature of the problem an avalanche of pollution with no regard for national frontiers - and the need to avoid isolated national environment procedures and laws affecting our trade and competition would seem to justify this concern.

To achieve this, the Community's environment policy needs to be constantly backed up by the development of scientifically precise measuring methods as well as new technologies and discoveries in respect of the risk factors. This is why - again since 1973 - the Community has been conducting and commissioning environmental research.

The effective reduction of environmental pollutants and nuisances involves the objective evaluation of the inherent, not merely the short-time dangers, the first priority being to establish criteria to define the exact relationship between man's exposure to pollutants and their effects on his health and environment. The next step is to draw up directives, recommendations and standards for generally acceptable objectives. To be able to take this type of action, the Commission first had to assess the general level of information available on a number of problems. This it did by means of study contracts awarded to research laboratories, consultations with national experts, and international conferences and seminars.

The existence of many gaps in scientific and technical knowledge of pollutants was thus revealed or confirmed, making it difficult, if not impossible, to prepare effective measures for the protection of the environment and of human health. In many instances, only provisional measures can be recommended, to be revised as knowledge on the dispersal and effects of pollutants improves. For example, there is controversy over the toxicity of lead at the low exposure levels which result from the combustion of lead-containing petrol in motor vehicles and further research is therefore required before the situation can be assessed objectively. Another case in point is the identification of carcinogenic substances present at very low concentrations in drinking water, and the need for further study of the possible side effects before limit-values can be set. Here too, much more detailed information is needed to establish the basis for sound regulations.

Where new scientific knowledge is required specifically to implement the Commission's environmental policy, it is best acquired through research planned and managed at Community level. Indeed the joint implementation of Community environmental projects is beneficial in many respects. It makes it possible :

- a) to orient research towards the most pressing needs of the Community Action Programme on the environment and to apply directly to it the results obtained;
- b) where the individual, highly specialized laboratories located in different Member States do not offer the whole range of competence, to focus their joint efforts on particularly difficult problems;
- c) to carry out major projects throughout the territory of the Community in order to establish broad relationship between the pollution of the environment and the state of health. To yield significant results, such epidemiological studies on the largest number of observations over the greatest range of conditions, which is often not possible in any one community country. Such surveys are conducted according to the same experimental protocol applied everywhere in the same fashion, in order to obtain comparable results;
- d) to facilitate scientific cooperation with other countries actively involved in similar research; in this respect it should be noted that permanent relationships have been established with the USA to cooperate in such matters as epidemiological surveys and toxicity testing of environmental chemicals; other countries such as Canada, Switzerland and India expressed interest in being associated with certain research projects.
- e) to increase the productivity of the sum total of research carried out in the Member States by eliminating pointless duplication, while filling existing gaps in knowledge.

It should be said at this juncture that some aspects of environmental research has been covered earlier at Community level under the Euratom treaty (radioactive contamination) as well as, since 1971, in the form of three "COST" research coordination agreements, also involving several non-members European countries (Austria, Norway, Sweden, Switzerland, Yougoslavia, Greece, Turkey, Spain, Portugal)

These are :

COST Projcet 61a	Research into the physico-chemical behaviour of sulphur dioxide in the atmosphere
COST Project 64b	Analysis of organic micropollutants in water
COST Project 68	Sewage sludge processing

2. The first EEC environmental research programme : what has been done and how ?

For the first programme funds were allocated by the Council to carry out research both in the Community Joint Research Center ("direct action") and in research organizations in the Member States by means of costsharing research contracts ("indirect action"). Partial funding of research projects by the Community implies complementary financing at national level, bringing about a dovetailing of national and Community research programme and opening the way for a coordination of research planning and management with the Member States. The indirect action has included over 125 research contracts with national laboratories, university départements, industry and private research institutes.

The programme is managed by scientific officers of the Commission working closely with an Advisory Committee appointed by the Member States.

Research undertaken at Ispra dealt mainly with the analysis and monitoring of pollution, the dispersal of pollutants in the environment and their ecological affects, and the development of models and system analysis for such topics as the dispersion of air pollution and the eutrophication of lakes. With regard to analysis and monitoring of pollution, one project consisted in the development of a multidetection unit for organic micropollutants, combining the most modern techniques of chromatography, mass spectrometry and on-line computing which should facilitate the detection of the hundreds of organic chemical contaminants present in air and water.

Another project is concerned with the remote detection of air pollution. In combination with contract research, a systematic attempt is being made to develop, for use in field work, a series of optical and acoustical techniques (laser-based systems, correlation spectrometry, Sodar, etc...) for detecting air pollutants and for monitoring their dispersion. Also in progress are inter-laboratory calibration exercices on the determination of chemicals in the air and in drinking water.

The following indirect action research projects initiated in 1974 may be mentioned by way of example:

- a) a coordinated epidemiological survey on the relationship between air pollution and respiratory disorders in more than 20.000 schoolchildren carried out in 19 study areas of 6 Member States. The answers to a questionnaire on health and socio-economic status of children and the results of physical measurements (height, weight, ventilatory function) are related to the levels of sulphur dioxide and suspended particulate matter determined within a harmonized measurement programme;
- b) a series of coordinated projects on the low-level toxicity of lead; related to these is a field experiment on the contribution of the automobile to the lead found within humans, using the stable isotope technique ;
- c) a joint project for the development of screening tests for the long-term toxicity of environmental pollutants involving nine laboratories in seven Member States;
- d) several experimental projects on the toxicity of a variety of substances alone and in combination (e.g. asbestos and heavy metals other than lead);
- e) The evaluation of the ecotoxicity of chemical pollutants in aquatic environments.

A project of a special nature, which has been undertaken both at the Joint Research Centre and by contractors, is a pilot data bank on environmental chemicals (ECDIN project) for the collection, storage and retrieval of all relevant information on environmental chemicals (properties, toxicity, ecological effects, production figures, use pattern, dispersal in the environment, etc...) needed to prepare regulations or to determine the best measures to counteract accidental contamination.

Also worth noting is the establishment in 1975 of a permanent inventory of environmental research projects in the Member States.

At the same time the three COST projects mentioned earlier have been completed and have yielded valuable results with regard to :

- the explanation of much of the chemistry of sulphur compounds in the atmosphere (COST 61a)
- the analysis of organic micropollutants in water; for instance, a preliminary list of over 1000 such compounds actually found in European waters has been published (COST 64b)
- the characterization of sewage sludges in view of their further use, as well as the evaluation of joint incineration of these sludges with urban wastes (COST 68).

3. The situation today : The Second Environmental Research Programme and its new perspectives

In view of its short duration, the first programme could only make a start in initiating cooperation among European laboratories, including the Joint Research Centre, involved in environmental research. The second programme, to be completed in 1980, should allow the full development of this undertaking.

It was prepared with the help of the Advisory Committee on the basis of the experience acquired during the first programme and taking full account of the evolution of the Community environmental policy in the meantime.

The latter has been implemented in the form of important Community directives dealing with the setting of environmental quality objectives and the reduction of pollutant emissions. In its second phase, the Action programme is giving much emphasis to the prevention of water pollution, the protection improvement of the natural environment and the problems of waste management. Accordingly the new research programme has been geared to meet these new requirements. It has been subdivided into four research areas as regards indirect action :

- a) research aimed at the establishment of criteria, i.e. exposure effect relationships, for pollutants and environmental chemicals (heavy metals, organic micropollutants, asbestos, air 'quality', water 'quality', new chemicals, noise)
- b) research into and development of environmental information management, essentially for environmental chemicals (ECDIN project);
- c) research into and development of the reduction and prevention of pollution and nuisances, including the application of 'clean' technologies
- d) research into the management and improvement of the natural environment.

The programme is to be implemented in two ways :

common action funded partly by the Community budget and concerted action financed from national sources, except for the cost of coordination, and carried out according to a jointly agreed programme under the supervision of a steering committee.

An invitation to tender published in 1976 has evoked an enthusiastic response from national research institutes and industry (800 applications greatly) exceeding available funds (16 million units of accounts) and compelling the Commission and the Advisory Committee to make difficult choices among priority proposals. Over 150 new cost-sharing research contracts have now been concluded to continue and expand the work started during the first programme.

The new programme of the Joint Research Centre includes four main environmental projects, which will be closely coordinated with related contract research forming part of indirect action :

- a) atmosphere : aerosol formation and transport of pollutants in air, modelling of pollution dispersion
- b) water : eutrophication in lakes, remote sensing of marine coastal pollution, ecological effects of thermal pollution
- c) chemicals : continuation of the ECDIN pilot data bank on environmental chemicals (cf. research area 2 of indirect action)
- d) resources : application of remote sensing to monitoring of ground water.

It is to be noted that the JRC is developing a general Community potential for the many applications of remote sensing for environmental and resources management. It can provide a focal point for the processing and filing of remote sensing data as well as carry out pilot operations in this field.

Related to the above activities, a new R & D programme, is being prepared for the recovery and recycling of domestic and industrial wastes, with the dual aim of protecting the environment and conserving valuable raw materials for industry and agriculture.

#### 4. The future : towards a progressive coordination of environmental research in the Community

The Commission will continue to try and gradually coordinate the research policies of the Member States and their sectoral programmes. This environmental coordination should be one of the medium to long-term objectives of Commission measures.

The Community's Research Programme has been an effective catalyser of cooperation between the many laboratories and scientists participation. These have learned to work in close contact to achieve common aims for several research topics such as the testing and application of remote sensing technology for the detection of air pollutants by means of joint measurement projects in sites of particular interest.

Specialized working groups have been established not only to follow the implementation of the projects, but also to enhance direct cooperation among scientists. The Commission's coordinating measures can also be augmented by means of concerted action.

The Advisory Committee, which is the indispensable link between Community and national activities, plays an invaluable role in promoting coordination. With its assistance, attempts will be made to achieve gradual coordination at the planning stage of national and Community programmes on the basis of the research needs and priorities resulting from the implementation of ever-converging environmental policies in the Community and the Member States.