



Environmental Research Newsletter

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Editorial

This issue of the Environmental Research Newsletter is mostly focused on the regulatory and research work of the Commission in the field of environmental chemicals.

The work encompasses the final master version of the European Inventory of Existing Commercial Chemical Substances (EINECS), the notification and assessment of new chemicals, the impact of environmental chemicals on human health, on the different environmental compartments, notably soil and water, and on the ecosystems.

Environmental chemicals are one of today's major concerns. They probably do not have the same glamour as other issues like "Global Change" (to which they contribute in any case), but they are indeed a problem we have to face in our day-to-day life. It is not necessary to develop hypothetical scenarios with more or less hypothetical models to demonstrate how environmental chemicals can seriously affect our way of life, health and comfort.

EINECS has clearly indicated that more than 100.000 chemicals are being marketed; we know that about 1,000 new chemicals have been notified so far and that their notification rate is in the order of 400-500 new compounds per year.

We desperately need to learn how to control and how to manage them.

The Commission of the European Communities has recently decided to reorganise its Joint Research Centre (JRC).

The former matrix structure has been abandoned in favour of a new structure by Institutes.

The JRC presently consists of eight Institutes, one of them, the Environment Institute, is devoted to environmental research and to technically support the implementation of the environmental directives promoted by DG XI.

Environmental chemicals are, and will be, one of the three major avenues of work of the JRC Environment Institute, the other two being Global Change and Food & Drug Analysis.

Mrs. Borlè who started and nursed the Newsletter has been appointed to another job. Mr. Rossi will take over the editorial responsibility assisted by Mrs. Presser and Mrs. Borlè (who will, however, continue to collaborate with us part-time).

On behalf of the Newsletter readers I would like to thank Mrs. Borlè for the excellent work she has carried out in the past and to wish Mr. Rossi the same success.

Editor

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Programme News

Proposals for specific programmes concerning the environment and related aspects

(see also Environmental Research Newsletter N° 5)

Proposal for a Council Decision adopting a specific research and technical development programme in the field of environment (1990 to 1994)

COM (90) 158 final - SYN 263 (OJ N° C 174/40, 16. 07. 90).

It is anticipated that the programme will become the objective from a common position by the Council at the end of December 1990 and will finally be approved in March 1991. A preliminary call for proposals might be published in January 1991. The budget amounts to 260 MECU with the following indicative breakdown of expenditures:

35 - 45 % for Area 1: Participation in Global Change programmes;
20 - 25 % for Area 2: Technologies and engineering for the environment;
5 - 10 % for Area 3: Research on economic and social aspects of environmental issues;

25 - 35 % for Area 4: integrated research projects.

A budget of 154 MECU has been attributed for the activities which the JRC will contribute to the programme and which will be subject to a separate decision by the Council.

Further information can be obtained from:

- H. Ott, DG XII/E, Tel. +32 2 2351182/2350415
- R. Fantechi, DG XII/E, Tel. +32 2 2355735/2351686
CEC, 200 rue de la Loi, B-1049 Brussels.

Proposal for a Council Decision adopting a specific research and technical development programme in the field of Marine Science and Technology (MAST) (1990 to 1994)

COM (90) 159 final - SYN 264 (OJ N° C 174/48, 16. 07. 90).

The timing is as before.

The budget amounts to 104 MECU with the following indicative breakdown of expenditures:

45 - 50 % for Area 1: Marine Science, including integrated projects;
15 - 20 % for Area 2: Coastal Engineering;
30 - 35 % for Area 3: Marine Technology.

Further informations can be obtained from:

J. Boissonnas, DG XII/E, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. +32 2 2356787.

Proposal for a Council Decision adopting a specific research and technical development programme in the field of non-nuclear energies (1990 to 1994)

COM (90) 164 final - SYN 269 (OJ N° C 174/77, 16. 07. 90).

It is anticipated that the common position of the Council might be obtained in April 1991. A preliminary call for proposals might be published in June - July 1991. The budget amounts to 157 MECU with the following indicative breakdown of expenditures:

5 - 7 % for Area 1: Analysis of strategies and modelling;
20 - 30 % for Area 2: Minimum emission power production from fossil sources;
30 - 40 % for Area 3: Renewable energy sources;
30 - 40 % Area 4: Energy utilization and conservation.

Further information can be obtained from:

M. Trousson, DG XII/E, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. +32 2 2353978.

Proposal for a Council Decision adopting a specific programme of research and technological development in the field of agriculture and agroindustry (1990 to 1994)

COM(90) 161 final - SYN 266 (OJ N° C 174/60, 16.7.90)

The proposal is currently being dealt with by the Parliament and Council. It is expected that the first reading in Parliament will be in the December 1990 Plenary Session. Whilst difficult to predict when the Council will adopt a Decision, it is expected that the programme will be fully launched later in 1991. In due course there will be an Information Package, a call for proposals and annual work plans. These will clearly show where the thrust of the research and technological development will be. The scientific and technical objectives and content as described in the proposal, even if there are modifications in Parliament or at Council level, already largely set the scene for the future. In terms of the Directorate General for Agriculture this is an important initiative to help adjust to the changes in the Common Agriculture Policy and to encourage rural development.

Further information can be obtained from:

D. Dessylas, DG VI/F II.3, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2358612

Environmental Protection

Environmental Chemicals

EC Research Programme and Support Activities to the Commission

Detailed information on activities managed by DG XII/E in the framework of the Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990) and by DG XII/JRC Ispra was given in Environmental Research Newsletter N° 3, February 1989. These activities are still going on. They include "Assessment of risks associated with chemicals" implemented by shared-cost contracts managed by DG XII/E as well as "Environmental Chemicals Data and Information Network" (ECDIN) and "European Inventory of Existing Chemical Substances" (EINECS) carried out at the CEC Joint Research Centre at Ispra, as support activities to the Commission.

Recent results are presented below together with information on the new STEP Programme.

1. Assessment of risks associated with chemicals

Research in this area mainly concerns genotoxic and non-genotoxic chemicals causing mutagenesis or carcinogenesis. It aims at developing

and validating test systems for regulatory purposes based on sound scientific knowledge of the mechanisms of action. It includes test systems for health effects, preferably providing alternatives to the use of vertebrate animals, as well as for environmental fate (degradation of chemicals) and ecological effects.

1.1. Test systems for health effects

A list of the ongoing coordinated projects in the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)** was given in Environmental Research Newsletter N° 3.

In the framework of the **STEP Programme (1989 - 1992)**, these activities will be enlarged. A call for proposals was published in OJ N° C 64/3, 14. 03. 1990 with a deadline of 15.06.1990. About 50 proposals originated from EC Member States as well as from EFTA

countries. Evaluation of the proposals was undertaken in October 1990.

Further information can be obtained from:

A. Sors, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2357659.

1.2. Test systems for environmental fate and ecological effects

In the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)**, the ongoing coordinated project on "Development and validation of methods for evaluating chronic toxicity to freshwater ecosystems" was reported in Environmental Research Newsletter N° 3 including participating institutes. An information folder describing the project was produced by Shell Research Ltd., Sittingbourne Research Centre, Sittingbourne, Kent ME9 8AG, UK and can be ordered at this address.

In the framework of the **STEP Programme (1989 - 1992)**, priority will be given to research on: (i) assessment procedures for the abiotic degradation of chemicals and (ii) development and validation of test systems to assess the ecological effects of chemicals, in particular tests for sub-lethal effects on organisms in soil, bacterial inhibition test methods, tests for anaerobic biodegradation as well as toxicity and biodegradation tests for poorly water-soluble and/or volatile substances.

A call for proposals was published in OJ N° C 64, 14.03.1990 with a deadline of 15 June 1990. The evaluation of proposals by independent experts and by the Commission's Advisory Committee will be completed by the end of 1990.

Further information can be obtained from:

H. Barth, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356452.

2. Support activities

The Environment Institute of the JRC Ispra provides the Commission with the technical support for the implementation of the Directives relating to chemicals evaluation and control. In particular it includes the Environmental Chemicals Data and Information Network (ECDIN) and the European Inventory of Existing Commercial Chemical Substances (EINECS).

2.1. Environmental Chemicals Data and Information Network (ECDIN)

These activities were described in Environmental Research Newsletter N° 3.

Over the past twelve months the ECDIN Data base was updated regularly and new data files, mainly in the category "Concentration and Fate in the Environment", were introduced.

EC Regulatory Action

Most of the EC regulatory actions on chemicals managed by DG XI (Environment, Nuclear Safety and Civil Protection) were reviewed in Environmental Research Newsletter N° 3.

The information given here updates the most recent actions to control hazardous chemicals in the environment.

Notification and risk assessment of new chemicals

From September 1981, when the 6th amendment (Council Directive 79/831/EEC) to the previous Directive 67/548/EEC was enforced, to 20 November 1990, 1037 full notifications were submitted under the harmonized Community procedure. More than 3000 limited announcements for low tonnage chemicals were made in the different Member States.

On the basis of the accumulated experience it is now considered opportune to amend the Directive for a 7th time to rectify anomalies which came to light and to improve the implementation efficiency.

Proposal for a Council Directive amending for the seventh time Directive 67-548-EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (OJ N° C 33, 13. 02. 1990)

The purpose of this Directive is to approximate laws, regulations and administrative provisions of Member States on : (i) notification of

In an effort to improve the European and worldwide distribution service, a call for tenders was made and a new host computer chosen. The production and marketing of a "short version" of ECDIN on CD-ROM, in parallel with the on-line version, is in progress.

Further information can be obtained from:

M. Boni, Environment Institute, CEC-JRC Ispra, I-21020 Ispra. Tel. +39 332 789720.

2.2. European Inventory of Existing Commercial Chemical Substances (EINECS) - Chemicals Evaluation

In the course of 1989 the final master version of EINECS was completed and the inventory published in the Official Journal in all languages of the European Communities (N° C 146 A, 15. 06. 1990).

After the successful completion of a pilot study investigating the scope of structuring the EINECS inventory into chemical groups of similar structure and properties, a more ambitious project has been initiated with the aim to allocate about 10 000 EINECS compounds of primary industrial and commercial importance to structural groups, based on a clustering approach. At the same time the work for identifying and extracting compounds belonging to the same structural group was continued and in 1989 about 1 700 chemicals belonging to the class of polycyclic aromatic halogenated hydrocarbons were identified in the EINECS inventory.

Studies aiming at the application and validation of QSAR-concepts (Quantitative Structure Activity Relationships) for the prediction of physico-chemical properties and environmental distribution patterns of organic substances are in progress.

A course on "Practical Applications of QSAR in Environmental Chemistry and Toxicology" was held in Ispra on 11-15 June 1990 within the framework of the EUROCOURSES programme.

The aim was to present structural and statistical background of QSAR methods and to highlight validated QSAR models for the derivation of physico-chemical and biological data. QSAR methods, developed to estimate the distribution of pollutants and chemicals in the environment including bioaccumulation and biodegradation aspects, were reported.

Proceedings, edited by W. Karcher and J. Devillers, were published by Kluwer Academic Publishers, Dordrecht, The Netherlands, as vol.1 of the Chemical and Environmental Science, series EUR 12831, ISBN 0-7923-0827-1, 1990.

Further information can be obtained from:

W. Karcher, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789983.

substances; (ii) exchange of information on those substances; (iii) assessment of their potential risk to man and the environment; and (iv) the classification, packaging and labelling of substances dangerous to man or the environment which are placed on the market in the Member States.

This Directive does not apply to provisions relating to medicinal products for human use, narcotics and radioactive substances, nor does it apply to the transport of dangerous substances by rail, road, inland waterway, sea or air. Similarly it does not relate to food stuffs in the finished state intended for final use, animal feeding stuffs, plant protection products, substances and mixtures in the form of waste or substances in transit under customs supervision, providing they do not undergo treatment or processing.

The proposal lists the various substances to be considered as well as the testing and assessment of the properties of these substances.

Evaluation and control of environmental risks of existing substances

The Fourth Community Action Programme on the Environment (1987 - 1992) gave a priority to the evaluation of the risks to the environment and human health caused by chemical substances. The Commission therefore considers that there is an urgent need to introduce regulatory measures in this area at Community level, since a harmonized approach to risk evaluation

and control of existing chemicals would provide the basis for a high and consistent level of protection for man and the environment.

A proposal for a Council Regulation on the evaluation and control of the environmental risks of existing substances has been submitted. This proposal takes the OECD 1988 Chemical Programme into consideration and will ensure a more active Community participation avoiding unnecessary duplication.

The proposal covers the ca. 100 000 substances existing on the Community market by 18 September 1981 and listed in the EINECS Inventory (see Environmental Research Newsletter N° 3). A notification procedure established by Directive 79/831/EEC (the so called Sixth Amendment) already deals with chemicals marketed after 18.09.81. This proposal will lay down a similar system for collecting information and evaluating the risks of existing substances. It is based on the same principle as the one of the 6th Amendment, i. e. it is the duty of the manufacturers and importers to provide the necessary information and data to evaluate environmental risks of dangerous substances.

Further information can be obtained from:

P. Murphy, DG XI/A2, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2357181.

Vienna Convention - Montreal Protocol Council Regulation (EEC) N° 3322/88 (OJ N° L 297, 31.10.88)

In view of the responsibilities of the Community for the environment and trade, the Council has approved by Decision 88/540/EEC (5) the Vienna Convention for the protection of the ozone layer and the Montreal Protocol on substances that deplete the ozone layer.

The Council Regulation (EEC) N° 3322/88 applies to the importation, exportation, production and consumption of chlorofluorocarbons, other fully halogenated chlorofluorocarbons, halons, carbon tetrachloride and methyl chloroform.

Further information can be obtained from:

G. Strongylis, DG XI, CEC, 200, rue de la Loi, B-1049 Brussels
Tel. + 32 2 2357260.

Environment and Human Health

EC Research Programme and Support Activities to the Commission

Detailed information on activities managed by DG XII/E in the framework of the Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990), and by DG XII/JRC Ispra was given in Environmental Research Newsletter N° 3, February 1989.

These activities consider "Biological Markers of Exposure and Preclinical effects" (1), "Environmental Epidemiology in the European Community" (2), "Indoor Air Quality and its Impact on Man" (3, 4) and "Trace Metal Exposure and Health Effects" (5). They are implemented by shared-cost, concerted and direct actions.

Recent results are presented below together with information on the new STEP Programme.

1. Biological Markers of Exposure and Preclinical Effects

Research in this area aims at providing a scientific basis for the continuing development of preventive environmental health policies. It is implemented by shared-cost contracts managed by DG XII/E and by direct action at the JRC Ispra.

1.1. Biomonitoring of human populations exposed to genotoxic environmental chemicals

In the framework of the **Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990)**, a coordinated project grouping 12 shared-cost contracts was started in February 1989 (see also Environmental Research Newsletter N° 3). It aims at developing population monitoring systems to quantify its exposure to potential mutagenic chemicals in the environment and to detect any possible early effects. In the present phase, the Biomonitoring Project consists of the development, comparison and intercalibration of advanced techniques for the quantification of molecular (target) doses and their comparison to external exposures. The approach is based on the formation of DNA- and protein adducts, in relation to selected genetic end-points.

Participating laboratories cooperate closely on various aspects of methodological development, including intercalibration, for the (i) identification and measurement of DNA adducts by ³²P-postlabelling method, immunological assays and advanced mass spectrometry technique, (ii) detection of hemoglobin and plasma protein adducts by gas chromatography-mass spectrometry, (iii) detection of chromosomal aberrations, sister chromatid exchange and micronuclei in peripheral lymphocytes, (iv) quantitative determination of HPRT-mutant

frequency in lymphocytes and mutations in hemoglobin gene. The potential mutagenic chemicals under study are: aromatic amines, hydrazine, styrene, 1,3-butadiene, ethylene oxide and chemotherapeutic agents such as melphelan, bleomycin, cyclophosphamide, Cis-Platinum.

The Environment Institute of the JRC Ispra participates in this project as the coordinating laboratory. It is directly involved in the development of reference physico-chemical methods for the characterization of DNA adducts and in the preparation of reference standard materials.

In the framework of the **STEP Programme (1989 - 1992)**, these activities will be continued and enlarged.

A call for proposals was published in OJ No 64/3, 14.03.1990 with a deadline of 15.06.1990. About 50 proposals originated from EC Member States as well as from EFTA countries. Evaluation of the proposals was undertaken in October 1990 (also see above).

Further information can be obtained from:

- A. Sors, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2357659.
- E. Marafante, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789144.

1.2. Early indicators of adverse health effects from exposure to environmental pollutants

In the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)**, a coordinated project on nephrotoxic effects grouping 8 shared-cost contracts was started in February 1989 (see Environmental Research Newsletter N° 3). Its aim is to develop, validate and apply sensitive tests for the detection of early effects of environmental chemicals on the kidney, in particular glomerulus and tubule, and on the immune system. Methods are based on measurements in easily accessible biological materials (e.g. blood, urine, etc.). The selected tests will be used in studies on populations to assess their practical value for identifying exposed groups and estimating the excess risk of health impairment.

In the framework of the **STEP Programme (1989 - 1992)**, these activities will be also extended to early indicators for neurotoxic and immunotoxic effects.

Further information can be obtained from:

A. Sors, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2357659.

2. Environmental Epidemiology in the European Community

Coordination activities to support the development of an EC capability in epidemiological surveillance of environmental health and to provide a coordinated framework for advancing methodology development in environmental epidemiology will be launched within the framework of the STEP Programme.

Further information can be obtained from:

A. Sors, see above.

3. Concerted Action "Indoor Air Quality and its Impact on Man" COST Project 613

In 1989 Sweden joined this COST Project.

A collection of data sheets on 239 ongoing or recently concluded research projects or investigations pertinent to COST Project 613 have been published by the JRC as a "Project Inventory" (Bulletin S.P./I.89.33, September 1989).

3.1. Activity of the Working Groups (W. G.s)

W. G.s 1-3: Results of activities have led to the following reports:

- "Sick building syndrome: a practical guide" (EUR 12294 EN, August 1989)
- "Strategy for sampling chemical substances in indoor air" (EUR 12617 EN, December 1989)
- "Formaldehyde emission from wood based materials: Guideline for the determination of steady state concentrations in test chambers" (EUR 12196 EN, April 1989).

W. G. 4: A draft review of known "Biological effects in man related to indoor air pollution" was discussed at the October meeting of the Community-COST Concertation Committee and redraft is in preparation.

Four further W. G.s have been set up and started their activity:

W. G. 5: "Procedures for the determination of biological pollutants" aims at preparing guidelines for the measurement of such pollutants (bacteria, fungi, viruses, spores, allergenes, organic dust) with the scope to standardize source investigations, sampling procedures, culture media, counting etc.

W. G. 6: "Ventilation requirements" as a first objective has to define ventilation requirements for an adequate perceived indoor air quality.

W. G. 7: "Sick building syndrome research" is a follow-up of W. G. 1. The first objective of this group is to prepare a design for longitudinal or intervention studies, i.e. studies in which, after careful assessment of the situation in a building with complaints on air quality and/or climate, actions are taken to remove suspected causes, and the outcome of these actions is evaluated.

W. G. 8: "Procedure for the characterization of volatile organic compounds (VOC) emitted from indoor materials and products" is a follow-up of W. G. 3 which focussed only on formaldehyde and on one class of source materials. Scope of the new group is to prepare and possibly validate a procedure for the characterization of the emission of a broad range of organic compounds from a large variety of indoor sources.

3.2. Support activity to Commission services

Activities of this COST Project were carried out in close collaboration with/and as a support to interested Commission services. Of particular interest to DG III was the guideline on the measurement of formaldehyde emissions from wood based materials prepared by W.G. 3 (see above). Limitation of these emissions is envisaged as an essential requirement as defined in the **Framework Directive 89/106/EEC** on building products. Therefore, on request of DG III, the guideline will be validated by a European interlaboratory comparison exercise organized under the auspices of the Comité Européen de Normalisation (CEN). The JRC has been entrusted with the statistical evaluation of the results.

An information booklet on indoor air quality aimed at the general public is in preparation and a preliminary draft prepared by the Institut d'Hygiene de Paris, France, on behalf of DG XI was reviewed at the above mentioned October meeting of the Concertation Committee.

Further information can be obtained from:

H. Knöppel, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789204.

4. Indoor Air Pollution Research at the Environment Institute of the JRC Ispra

As outlined in Environmental Research Newsletter N° 3, the JRC Ispra is directly involved in an indoor air pollution research programme, with particular emphasis on Volatile Organic Compounds (VOC).

Considering the importance of VOC as indoor pollutants (many of them are known or suspected to cause carcinogenic, neurotoxic, allergenic, irritating effects), the characterization of VOC emissions from building/furnishing materials, household and hobby products has been investigated in small test chambers. For this work a new 0.28 m³ stainless steel chamber has been installed. The research concerns in particular the methodological aspects of the characterization of VOC emissions, including models describing the concentration/time patterns of compounds emitted in the chambers.

A strategy for investigating the potential influence of VOC pollution on air quality complaints in office buildings, aimed at minimizing the measurement effort, has been developed and applied in six buildings of the European Parliament. The strategy consists in the administration of a 2 page questionnaire asking for various types of complaints and in selecting a few measurement locations with high and low complaint rates.

Further information can be obtained from:

H. Knöppel, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789204.

5. Trace Metal Exposure and Health Effects Research at the Environment Institute of the JRC Ispra

The aims of the activities on Trace Metal Exposure and Health Effects, which have already been outlined in Environmental Research Newsletter N1983, consist essentially in establishing, on a scientifically sound basis, dose-effect relationships in view of preventing potential health hazard from the exposure to trace metals.

To achieve this goal, two topics, linked to each other and covered by this more comprehensive theme, are being investigated, i.e. :

- trace metal levels in human tissues of EC population;
- metabolism and biochemical effect of trace metals.

The first topic is addressed, on one side, to establish baseline values in general population as the fundamental parameter for the assessment of the biological effects of trace metal exposure on humans.

Reference values for 18, 12 and 15 trace elements in urine, blood and plasma respectively have been established, while indicative values are suggested for more than 25 elements..

On the other side the determination of trace metals in body fluids and tissues of individuals exposed professionally or individuals poisoned accidentally as well as of pathological cases has provided meaningful information on etiological power of some elements, on their potential role in the induction processes of some diseases (mesothelioma) and on the dose-related adverse effects on health.

For the development of the second topic, studies on the metabolism and on the biochemical effects of trace metals are required these being performed both in vivo on laboratory animals and by in vitro toxicity testing as alternative to animal testing.

In vitro toxicity testing is a methodology which allows a more direct answer to be given regarding the possibility of the toxicity of chemicals for humans.

In particular, the combination of the in vitro testing methods with nuclear and radioanalytical techniques, such as neutron activation analysis and radiotracers, plays a fundamental role in studies on uptake, intracellular distribution, biotransformation and biochemical effects of trace metals in cell culture systems, subcellular fractions and isolated biomolecules.

So far, the cytotoxicity and carcinogenic potential of As compounds, the effect of vanadate ions on peroxidase enzymes, the interactions of the hard-alloy elements Co, Nb, Ta, Ti and W with pulmonary and plasma components, and the molecular interaction of Cd in human spermatozoa have been investigated, a quite clear insight into very complicated processes having been thus obtained.

In vivo studies have mainly concerned the metabolic pathway of trace metals.

In particular the neurotoxic effect of Tl in rats, the detoxification mechanism for inorganic As in rabbits, mice and hamsters, and the distribution of Ba in different body compartments of rats and rabbits have been investigated.

EC Regulatory Action

Regulatory action in the field of "Safety, Hygiene and Health at work" is managed by DG V (Employment, Industrial and Social Affairs). Related information is published in "Social Europe", Office for Official Publications of the European Communities, 2 rue Mercier, L-2985 Luxembourg. Tel. + 352 499281. Telex PUBOF LU 1324 b.

Further information can be obtained from :

E. Sabbioni, Environment Institute, CEC - JRC Ispra, I - 21020 Ispra. Tel. +39 332 789070.

Water

EC Research Programme and Support Activities to the Commission

Detailed information on activities managed by DG XII/E in the framework of the Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990) and by DG XII/JRC Ispra was given in Environmental Research Newsletter N° 4, December 1989. These activities are still ongoing. They include the Concerted Action "Organic Micropollutants in the Aquatic Environment" (1) and cost-shared contracts in the field of "Water Quality" and "Ecological Effects of Pollutants" (2) managed by DG XII/E. The JRC Ispra's contribution includes "Water Quality Research" (3) as well as support activities (4).

Recent results are presented below together with information on the new STEP Programme.

1. Analysis and Transformation of Organic Micropollutants in Water

Research coordinated by DG XII/E includes the development and validation of analytical methods for the determination of water quality and specific pollutants as well as the investigation of the transformation of pollutants in the aquatic environment. It is implemented by some shared-cost contracts and by the Concerted Action "Organic Micropollutants in the Aquatic Environment".

1.1. Shared-cost contracts

No shared-cost contracts were funded in the framework of the **Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990)**.

In the framework of the **STEP Programme (1989 - 1992)**, following the call for proposals published in OJ N° C 248, 29.09.1989, 2 proposals relating to analysis and transformation of organic micropollutants in water were selected for funding.

1.2. Concerted Action "Organic Micropollutants in the Aquatic Environment" - COST Project 641

The structure and terms of reference of working parties remain unchanged, also in the new STEP Programme, and are described in Environmental Research Newsletter N° 4. The Concerted Action covers: (i) analytical methodologies and data treatment; (ii) physico-chemical behaviour of organic micropollutants; (iii) transformation reactions; (iv) behaviour of organic micropollutants during water treatment.

One symposium and several workshops were organized in the framework of the various Working Parties.

Sixth European Symposium on "Organic Micropollutants in the Aquatic Environment"

Lisbon, Portugal, 22 - 24 May 1990.

The symposium was organized jointly by the CEC, the Direcção-Geral da Qualidade do Ambiente and the Instituto Hidrográfico, Lisbon. Its

Further information can be obtained from:

W. Hunter, DG V/D, CEC, Bâtiment Jean Monnet, rue Alcide De Gasperi, L-2920 Luxembourg. Tel. + 352 43012719.

aim was to review the current studies of the various countries participating in the Concerted Action on organic micropollutants in the aquatic environment. The programme covered the following topics: (i) analytical methodologies and data treatment including the development and application of monitoring strategies; (ii) transport and distribution processes of organic micropollutants in the aquatic environment, in particular bioconcentration processes as well as the development of models for these processes; (iii) transformation reactions in the aquatic environment, including degradation of organic micropollutants during field conditions with emphasis on competition among microorganisms, degradation at low concentrations, degradation of mixtures of organic compounds and degradation under oxygen-limited conditions; (iv) behaviour of organic micropollutants in water treatment processes including degradation during irradiation and ozonization treatment and in situ biological clean-up techniques.

Proceedings will be published in the series Water Pollution Research Report.

Working Party 1: Analytical Methodologies and Data Treatment

Proceedings of the **Workshop on "High Performance Thin Layer Chromatography (HPTLC) Applied to the Analysis of the Aquatic Environment"**, Berlin (FRG), 16 - 17 March 1989 were published by the CEC as Water Pollution Research Report N° 17, ISBN 2-87263-030-9, 1990 (see also Environmental Research Newsletter N° 4).

Workshop on "Environmetrics", Oslo, Norway, 29 - 30 January 1990.

The workshop was jointly organised by the CEC and the Center for Industrial Research in Oslo. It was devoted to the application of multivariate statistical analysis of environmental data.

Proceedings will be published by the CEC in the series Water Pollution Research Report.

A **Workshop on Analytical Approaches and Strategies** dealing with environmental accidents was held in Berlin, 8 - 9 November, 1990.

The aim of the workshop was to report and to discuss on (i) analytical methodologies which allow production of quick but reliable results for further actions; (ii) strategies (models) for adequate and representative sampling; (iii) how to get the necessary information on the behaviour of the pollutants and how to make use of it.

Proceedings will be published in the series Water Pollution Research Report.

Working Party 2: Physico-chemical Behaviour of Organic Micropollutants in the Aquatic Environment.

A **Workshop COST 641 on "Transport of organic micropollutants in estuaries, marine and brackish waters"** was held in Stockholm, Sweden, 3 - 4 October 1990.

This workshop was jointly organised by the CEC and the Swedish Environmental Protection Agency in the framework of the Concerted

Action "Organic Micropollutants in the Aquatic Environment". Due to the fact that until now the behaviour of organic pollutants had been essentially investigated in fresh water and the receiving water bodies were lakes and rivers, the scope of the workshop was to broaden the field and cover other types of aquatic recipients like marine and brackish waters and estuaries which are characterized by varying degrees of salinity and other time-dependant factors.

The programme consisted mainly of presentations by scientists from Northern European countries concerning the sources and fate of organic compounds in various marine recipients, including also modelling and case studies. Bioavailability and bioconcentration data were also discussed.

The proceedings of the workshop will be published in the series Water Pollution Report.

Working Party 3: Transformation Reactions of Organic Micropollutants in the Aquatic Environment.

Proceedings of the *Workshop on "Biotransformation of Organic Pollutants in the Aquatic Environment"*, Helsinki, Finland, 22 - 23 May 1989 were published by the CEC as Water Pollution Research Report N° 14, ISBN 2-87263-028-7, 1989 (see also Environmental Research Newsletter N° 4).

A *Workshop on "Anaerobic Biodegradation of Xenobiotic Compounds"* was held in Copenhagen, Denmark, 22 - 23 November, 1990.

The aim of this Workshop was to present results and ongoing research within the area of anaerobic biodegradation in aquatic environments and in bioreactors.

Areas of special interest to presentations are biochemical pathways, reaction mechanisms for biotransformation and -degradation, kinetics and modelling, behaviour in natural aquatic environments and behaviour in laboratory and technical scale bioreactors.

Proceedings will be published in the series Water Pollution Research Report.

Working Party 4: Behaviour and Transformation of Organic Micropollutants in Water Treatment Processes

Proceedings of the *Joint Workshop of COST 641 and COST 681 on "Organic Contaminants in Waste Water, Sludge and Sediments: Occurrence, Fate and Disposal"*, Brussels (Belgium), 26 - 27 October 1988, edited by D. Quaghebeur, I. Temmerman and G. Angeletti were published by Elsevier Applied Science Publishers, LTD, EUR 11957, ISBN 1-85166-445-9, 1989 (see also Environmental Research Newsletter N° 4).

Proceedings of the *Workshop on "Laboratory Test for Simulation of Water Treatment Processes"*, CEC JRC Ispra, Italy, 23 - 24 November 1989, were published by the CEC as Water Pollution Research Report N° 18, ISBN 2-87263-034-1, 1990 (see also Environmental Research Newsletter N° 4).

The *activity Centre on Modelling Concepts for Organic Pollutants in Natural Waters* was incorporated in WP2.

Further information and reports can be obtained from:
G. Angeletti, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2358432.

2. Water Quality - Ecological Effects of Pollutants

A list of the ongoing shared-cost contracts on water quality and ecological effects of pollutants in the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)** was given in Environmental Research Newsletter N° 4 together with the institutes participating.

In the framework of the **STEP Programme (1989 - 1992)** the shared-cost contracts focus on the environmental effects of pollutants, especially the assessment of the impact (including economic aspects) of excessive nutrient release to coastal waters. They aim at developing methodologies to predict bloom formations and assess their consequences.

Following the call for proposals published in OJ N° C 248, 29.09.1989, six projects are envisaged for funding. Key projects treat the problems of the foam producing algae *Phaeocystis* in the North Sea and of phytoplankton blooms and mucilage formation in the Adriatic. They are complemented by research aimed at improving the predictive modelling of the eutrophication processes.

Further information can be obtained from:

H. Barth, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356452.

3. Water Quality Research at the Environment Institute of the JRC Ispra

Joint research projects were defined between JRC Ispra and national laboratories in the Mediterranean Countries in the framework of the research area "*Environmental Studies in the Mediterranean Basin*".

Micropolyte TOxins (MITO) Project

This project concerns the population dynamics of toxin-producing phytoplankton species in aquatic systems.

Main research aspects to be investigated by the participating laboratories as laboratory experiments and field campaigns consider:

- Interconnection between climatic changes and development of algal blooms;
- Establishment of a monitoring network to detect changes in the algal population leading to a bloom, as a warning of its movement and of changes in intensity and toxicity;
- Physiology of the algal blooms and understanding of their "weak points" to be used to prevent and/or eliminate them;
- Development of probes for the measurement of toxins;
- Development of flow-cytometric techniques as part of an early warning system.

The JRC contribution concerns mainly the application of flow-cytometric techniques.

Analytical Quality Assessment, Control and Assurance

This project aims at improving the analytical reliability of measurements regarding the aquatic environment.

In the first phase of the project most critical matrices and parameters will be selected. In addition to some physical and physico-chemical parameters usually measured in the water column such as conductivity and pH, a number of chemical elements and compounds appear to be critical with regard to EC-directives and corresponding national laws.

Amongst the trace elements mercury, whose evidence in critical pools, such as water, suspended particulate matter, sediments, fish, molluscs and other biota, is most obviously subject to numerous analytical uncertainties, represents an ideal "test element" in this project considering not only the total element concentration but also the element speciation.

Amongst the organic micropollutants, the family of persistent pesticides, and with some restriction the PCBs, seem to be suitable compounds to start with. Again, water, sediments and biota will be examined.

Sampling procedures will be considered in both the pollutant groups, inorganic and organic.

Joint field experiments, besides the laboratory exercises and considering all aspects from sampling to final analysis are envisaged. Protocols and procedures, as tested in the laboratory runs mentioned above, will be applied jointly to a selected test site, and the results will highlight the present state-of-the-art.

Further information can be obtained from:

G. Rossi, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789856.

4. Support activities

The Environment Institute of the JRC Ispra provides the Commission with the technical support for the implementation of the Directives relating to the quality of water.

In support to the **Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment (76/464/EEC)**, four reports have been completed on the impact of omethoate, dimethoate, dimethylamine and diethylamine on the water environment. Tentative limit values for tolerable

aquatic concentration levels in the EC have been elaborated and proposed.

A project on adaptation to technical and scientific progress of **Council Directive 80/778/EEC on the quality of water intended for human consumption** was carried out. Results are summarized in a report entitled "Scientific Assessment of EC Standards for Drinking Water Quality" by G. Premazzi, G. Chiaudani and G. Ziglio, Office for Official Publications of the EC, EUR 12427 EN, 1989. It aims at comparing the EC Directive with the national legislations in different Member States and with WHO Guidelines.

It contains (i) a brief summary of Directive 80/778/EEC; (ii) a full scale comparative study of drinking water quality standards in Member States and outside the Community with those set in Annex I of the Directive; (iii) a review of MACs and GLs set of parameters listed in Annex I, including a case-by-case analysis of substances under parameters which cover more than one substance.

Summarized files were compiled for each parameter, consisting of a general comment on values proposed and of a summary of salient elements for health assessment; (iv) a list of parameters considered in the legislations of Member and non Member States, not included in the

Directive 80/778/EEC; (v) recommendations for regulation of contaminants currently grouped under single parameters, for new parameters to be considered for addition to the Directive and for parameters to be considered for a better specification and/or definition.

A Study on the impact of non-point sources of trace elements to the aquatic environment was started. The objectives of the study are: (i) the input quantification of trace elements such as Mo, B, As, Ni as well as Cu, Cr, Zn, Hg and Se from non-point sources to the aquatic environment; (ii) the development of simple models.

The major non-point sources considered are: atmospheric deposition, surface run-off from agricultural land, motorways, buildings and urban areas, discharge from municipal sewage treatment works, spreading of sewage sludge and agrochemicals on land, leaching from waste deposits and mining residues, release from sediments.

Studies have been completed on the non-point sources of As, Ni, Zn, Cr and Cu.

Further information can be obtained from:

G. Rossi, Environment Institute, CEC-JRC Ispra, I-21020 Ispra. Tel. + 39 332 789856.

EC Regulatory Action

Most of the EC regulatory actions on protection and management of water managed by DG XI (Environment, Nuclear Safety and Civil Protection) have already been reviewed in Environmental Research Newsletter N° 4.

The information given here updates the most recent actions in the framework of the new Community water policy of the 90's. These take into account the new orientations resulting from the Ministerial Seminar on the Future Community Water Policy in Frankfurt on 27 - 28 June 1988, focusing on preventive aspects and on interactions between soil, air and water.

A new area of competence has started to consider the protection and planning of coastal zones and the environmental implications of tourism.

Ecological quality of Community waters

The new orientations of the water policy aim at the preparation of regulatory action to reach a high ecological quality level. A proposal is in preparation.

Proposal for a Council Directive concerning the ecological quality of Community waters

This aims to ensure that Community waters, including surface freshwaters, estuarial, coastal and marine waters, are restored and/or maintained at a high level of ecological quality. To achieve this objective, Member States will be requested to guarantee the preservation or restoration of biological diversity, sediment quality and self-purification capacity.

The parameters defining high ecological quality, the classification schemes, the guidelines for monitoring programme and the rules for making predictive statements are in preparation.

Waste water treatment

The importance of the provision of adequate treatment of municipal and industrial waste waters was recognised at the Ministerial Seminar in Frankfurt. In the light of the conclusions of this Seminar, the Environment Council of 28 June 1988 asked the Commission to prepare proposals concerning the treatment of municipal sewage.

Proposal for a Council Directive concerning municipal waste water treatment

A proposal was submitted by the Commission to the Council on 9 November 1989 (OJ N° C 300, 29.11.89), see Environmental Research Newsletter N° 4.

It was completed with Annexes concerning definitions, requirements for municipal waste water, criteria for identification of sensitive and less sensitive areas and reporting of national programmes (OJ N° C 1, 04.01.90).

Dangerous substances

Based on the proposal of the Parliament and on the conclusions of the Ministerial Seminar on future Community water policy held in Frankfurt

on 27 - 28 June 1988, the Commission proposed an amendment to Directive 76/464/EEC according to Article 130S of the EEC Treaty.

Proposal for a Council Directive amending Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (COM (90) 9 final, 08.02.90)

This proposal intends to alter Article 6 of Directive 76/464/EEC to enable the Council to take decisions by qualified majority with regard to the determination of limit values and quality objectives pursuant to Article 6 of Directive 76/464/EEC for the substances included in the family and group of substances within List I of the Annex to this Directive.

The Commission suggested that the procedure under Article 130S, second indent, of the EEC Treaty, be first applicable to the following sixteen substances: trifluralin; endosulfan; simazine; atrazine; the four triorganotin compounds: tributyltin oxide, triphenyltin acetate, triphenyltin chloride and triphenyltin hydroxide; and the eight organophosphorus substances: azinphos-ethyl, azinphos-methyl, fenitrothion, fenthion, malathion, parathion, parathion-methyl and dichlorvos. These substances were chosen from the "List of 129 substances" on the basis of their ecotoxicological properties (toxicity, mutagenicity, carcinogenicity, teratogenicity, bioaccumulation and persistence), production and usable statistics as well as their presence in the Community surface waters.

Diffuse sources

At the Ministerial Seminar in Frankfurt an agreement was reached on the necessity to reduce pollution from diffuse sources and in particular nutrients and pesticides from agriculture.

Proposal for a Directive concerning the protection of fresh, coastal and marine waters against pollution caused by nitrates from diffuse sources

(OJ N° C 54, 03.03.89)

This Directive applies to use of nitrogen compounds on land, management practices on land and the treatment of municipal sewage. Its objective is to avoid the concentration of nitrate in freshwaters, both surface and ground, used or intended for use as sources of drinking water, reaching a nitrate concentration of 50 mg/l (see Directive 80/778/EEC) and to prevent the eutrophication of surface, estuarial, coastal and marine waters.

Water resources

The need to protect and manage Community water resources efficiently has been a recurrent theme in all Community environmental action programmes. A large number of studies on the availability, quality and vulnerability of such resources have been undertaken; one notable result being the "**Water Resources Atlas**" published in 1981.

Following the conclusions of the Frankfurt Ministerial Seminar (1988) and drought problems experienced in parts of the Community, the Com-

mission is again paying close attention to water resource management, in conjunction with Member States.

In the immediate future a **workshop** involving Member State operational experts will take place, in order to highlight national experiences, to exchange information and to stimulate necessary action to counter water resource problems.

Over a longer term the Commission may propose a **Community Water Management Strategy**, so that in future all necessary precautions are taken to avoid a crisis of either water availability or quality and, should such a situation arise, how to limit the effects.

Coastal Zones and Tourism

Heavy pressure for development in coastal zones, and those exerted in general by tourism throughout the Community, result in a variety of environmental problems: most notably pollution, the effects of erosion and diseconomies which stem from inadequate infrastructure or planning measures.

The special needs of coastal zones were first highlighted in 1973 in the First Environmental Action Programme which stressed the importance of tackling problems specific to coastal areas. Subsequent Actions Programmes (1977, 1983, and 1987) have reiterated the theme of

strengthening planning procedures for regions under pressure to develop, mostly from tourism and industry.

Recognising the increasing importance of these aspects, DG XI has recently created a new sector to consider both the protection and planning of coastal zones and the environmental implications of tourism in general.

The initial approach being developed by this new sector is likely to contain three main elements;

- a consideration of how Community policies affect the economic and environmental well-being of coastal zones and areas where mass tourism is, or could be, significant;
- developing guidelines and management strategies which will help decision-makers in the Member States to protect sensitive ecological habitats and to plan for economic development which is rational and sustainable;
- seeking original initiatives and advice on means to achieve such objectives from internationally recognised experts in these fields.

Further information can be obtained from:

V. Mandl, DG XI/B1, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2354249.

Soil

EC Research Programme and Support Activities to the Commission

Detailed information on activities managed by DG XII/E in the framework of the Fourth Community R & D Programme of the CEC on Environmental Protection (1986 - 1990) and by DG XII/JRC Ispra was given in Environmental Research Newsletter N° 4, December 1989. These activities are still ongoing and include shared-cost contracts in the field of "Soil Quality" managed by DG XII/E (1) and research on the "Migration and transformation of pollutants in soils" carried out at the JRC Ispra in the framework of the "Chemical Waste" Programme (2).

Recent results are presented below together with information on the new STEP Programme.

1. Shared-Cost Contracts on Soil Quality

The shared-cost contracts managed by DG XII/E in the framework of the **Fourth Community R & D Programme of the CEC on Environmental Protection (1986 - 1990)** in the soil quality area deal with soil pollution, effects of agricultural practices and soil erosion. They were listed in Environmental Research Newsletter N° 4 together with a list of the participating institutes.

Progress achieved during the second year of the contracts was presented and discussed in a number of small workshops. A Progress Report 1989 is in press.

A final meeting on the "Nitrate project" will be organised in the Winand Staring Center, Wageningen, The Netherlands, on 17-19 December 1990.

Programme STEP (1989-1992) includes a research area devoted to "Soil and groundwater protection" taking into account three soil functions: filtering, crop production and soil as an ecosystem component. It considers protection against (i) inorganic pollutants (in particular Cd, Zn and nitrogen and its compounds), (ii) organic pollutants (polychlorinated biphenyls, polyaromatic hydrocarbons, organic solvents, pesticides such as atrazine) and (iii) soil erosion.

Following the call for proposals published in OJ N° C 248, 29. 09. 1989, eleven out of the 81 projects submitted were proposed for funding. Seven of these concentrate on two types of inorganic pollutants: heavy metals, nitrates and nitrous oxide, three on organic pollutants including pesticides and one on soil erosion to complete and test the EC Erosion Model.

Further information can be obtained from:

P. Reiniger, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2359586.

2. Soil Research at the Environment Institute of the JRC Ispra

Soil quality studies at the Environment Institute of the JRC Ispra is part of the research on Chemical Waste carried out at the Institute (see also Environmental Research Newsletters N° 3 and 4).

As outlined in Environmental Research Newsletter N° 4, a study on the migration of trace metals and organic compounds using micromorphological techniques was undertaken.

Laboratory experiments were performed to determine soil sorption data on non-"ortho"-chlorinated (co-planar) and "ortho"-chlorinated (non-planar) PCBs in six sandy soil horizons.

Soils were classified as Dystric Gleysols (FAO, 1985) or Aquic Ustipsamments (Soil Taxonomy, 1987) according to their morphological and chemical characteristics. These soils, weakly developed during the last two thousands years, are formed on coarse sandy fluvioglacial sediments. Hydromorphic features as well as organic matter mottles can be seen below first horizon (A).

Three of the most toxic congeners, the non-"ortho"-substituted PCB 77, PCB 126 and PCB 169 were compared with the moderately toxic mono "ortho"-substituted PCB 52, PCB 101, PCB 138, PCB 153 and PCB 180.

The PCB standards were synthesized (PCBs 77, 122, 126 and 169) at the JRC Ispra or obtained from the EC Community Bureau of Reference (see also chapter "Other activities Relevant to EC Environmental Programmes").

The sorption kinetic was studied in the A horizon (13-18 cm) at shaking periods from 10 minutes to 98 hours. The role of soil parameters was studied in all horizons.

The kinetics of soil sorption reached a quasi-equilibrium after a period of several hours, but a real equilibrium was not reached even after several days. Horizons with high organic matter content have slower kinetics than those with low organic matter content.

The soil-water distribution coefficient (Kd) was in the same order of magnitude for all PCB congeners. A higher degree of chlorination and absence of "ortho"-chlorination favoured sorption. However, this "ortho"-effect was gradually diminished as the degree of chlorination increased.

The Kd was correlated by linear regression analysis with different soil parameters: organic carbon, silt, clay, aluminium and iron oxides. Soil

sorption was favoured by high total organic carbon, high total aluminium and iron oxides and increasing fine particles like silt.

Further information can be obtained from:

L.E. Götz, Environment Institute, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789588.

EC Regulatory Action

Most of the EC regulatory action on soil protection managed by DG XI has been already reviewed in Environmental Research Newsletter N° 4.

Further information can be obtained from:

A. Nychas, DG XI/B2, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2359209.

Ecosystems

EC Research Programme and Support Activities to the Commission

Detailed information on activities managed by DG XII/E in the framework of the Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990) was given in Environmental Research Newsletter N° 4, December 1989. These activities are still ongoing and consider the "Functioning of Terrestrial and Aquatic Ecosystems" (1). Activities related to "Air Pollution Effects on Terrestrial and Aquatic Ecosystems" (2) are reported here although they are classified in the research area devoted to atmospheric processes and air quality as indicated above and in the new STEP Programme.

In the framework of the **STEP Programme (1989 - 1992)** two large shared-cost research projects have been proposed for funding: the revised phase of the EROS Project, with input from MAST (Marine Science Technology), aiming at the elucidation of the bio-geochemical process in coastal areas and their role in Global Changes and a functional analysis of various types of river margin wetland ecosystems along a climatic transect from northern to southern Europe. (See also Environmental Research Newsletter N° 5.)

1. Functioning of Terrestrial and Aquatic Ecosystems

1.1. Terrestrial Ecosystems

A list of the ongoing shared-cost contracts on the functioning of terrestrial ecosystems in the framework of the **Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990)** was given in Environmental Research Newsletter N°4 together with the participating institutes.

In the framework of the **STEP Programme (1989 - 1992)** the shared-cost contracts focus on two topics: basic research on terrestrial ecosystems aiming at their protection and management and research on specific ecosystems important at European scale.

Following the call for proposals published in OJ N° C 248, 29.09.1989, 12 projects were proposed for funding.

The implementation of a Concerted Action in the field of Terrestrial Ecosystems is foreseen. A first initiative is the organization of a symposium on forests and woodlands in Florence, Italy, in May 1991 (see below).

Further information can be obtained from:

P. Mathy, DG XII/E1, CEC, 200 rue de la Loi, B-1049, Brussels.
Tel. + 32 2 2358160.

1.2. Aquatic, Coastal, River Margin and Wetland Ecosystems

A list of the ongoing shared-cost contracts on biogeochemical cycles and aquatic coastal and wetland ecosystems in the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)** was given in Environmental Research Newsletter N°4 together with the participating institutes.

Progress achieved during phase I of the EROS (European River-Ocean System) Project were presented and discussed at the **Second EROS 2000 Workshop on Research in the North Mediterranean** held in the Centro de Estudios Avanzados in Blanes, Spain, 6 - 9 February 1990.

Proceedings of the workshop will be considered as the final scientific report on phase I of the EROS Project covering the period from 1st February 1988 to 28 January 1990. They will be published by the CEC as Water Pollution Research Report.

Concerted Action "Coastal Benthic Ecology" - COST 647

This ongoing Concerted Action aims at investigating the temporal and spatial variability and dynamics of near-shore benthic populations and communities as a basis for assessing the quality status of coastal ecosystems (see also Environmental Research Newsletter N° 4).

Complementary to this Concerted Action, the running shared-cost project concerned with investigations on biological and ecological processes in a specific Mediterranean benthic ecosystem (Posidonia ecosystem) will be extended to also include chemical interactions between the populations and their surrounding environment (sediment, water mass, water/air exchanges).

Further information can be obtained from:

- H. Barth, Tel. + 32 2 2356452
- A. Sors, Tel. + 32 2 2357659 (for the Concerted Action "Coastal Benthic Ecology").
DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.

2. Air Pollution Effects on Terrestrial and Aquatic Ecosystems

Research managed by DG XII/E aims at assessing the effects of air pollution and acid deposition on terrestrial and aquatic ecosystems to identify "critical loads" as a sound scientific basis for regulations.

It is implemented by shared-cost contracts (2.1.) and by a Concerted Action "Effects of Air Pollution on Terrestrial and Aquatic Ecosystems" - **COST Project 612** (2.2.).

These activities are complementary to those dealing with "Atmospheric Processes and Air Quality" in the programmes managed by DG XII/E.

2.1. Shared-cost contracts

A list of the ongoing shared-cost contracts on Effects of Air Pollution on Terrestrial and Aquatic Ecosystems in the framework of the **Fourth R&D Programme of the CEC on Environmental Protection (1986 - 1990)** was given in Environmental Research Newsletter N° 2 together with the participating institutes.

In the framework of the **STEP Programme (1989 - 1992)** the shared-cost contracts concerning terrestrial ecosystems focus both on direct effects on forest trees and agricultural crops and on indirect effects through soil acidification. Those concerning aquatic ecosystems will consider acidification processes in remote mountain lakes in the alpine

region, Scandinavia and Pyrenees as well as the role of humic substances in lake and river acidification (HUMOR-Project).

Following the call for proposals published in OJ N° C 248, 29.09.1990, 8 projects concerning terrestrial ecosystems and three concerning aquatic ecosystems are proposed for funding.

Further information can be obtained:

- for Terrestrial Ecosystems from: P. Mathy, tel. + 32 2 2358160,
- for Aquatic Ecosystems from: H. Barth, tel. + 32 2 2356452, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.

2.2. Concerted Action "Effects of Air Pollution on Terrestrial and Aquatic Ecosystems" - COST Project 612

The structure and terms of reference of working parties remain unchanged and are as described in Environmental Research Newsletter N° 2.

Two experts groups, one on "Tree Physiology in relation to Stress" and one on "Catchment Research", were set up in 1988 with the aim to make the state-of-the-art in both research areas and to prepare two framework research projects. These latter are entitled: "European Collaborative Framework Project on Tree Physiology in relation to Stress (EUTREE)" and "European Network of Catchments organized for Research on Ecosystems (ENCORE)".

Several workshops were organized within the framework of the various Working Parties.

Working Party 1: Effects of Air Pollution on Terrestrial Ecosystems, in particular Forests

Workshop on Monitoring Air Pollution and Forest Ecosystem Research.

Bilthoven, The Netherlands, 20 - 21 February 1989.

This workshop was jointly organised by the CEC and the National Institute of Public Health and Environmental Protection (RIVM), Bilthoven.

The main objective was to gather and exchange information on issues concerned with the monitoring of pollution climates in forests. Information concerned monitoring equipment, validation of procedures applied, reliability of the data on air quality, meteorology, deposition and physiological parameters. Only the methodologies for investigating the above-ground processes were considered. Special attention was given to the significance of statistical issues and representation of data.

Proceedings edited by A.H.M. Bresser and P. Mathy were published by the CEC as Air Pollution Research Report N° 21, ISBN 2-87263-015-5, 1989.

Workshop on Denitrification in Forest

Copenhagen, Denmark, 6 - 7 November 1989.

This workshop was jointly organised by the CEC, the European Science Foundation and the Center for Environmental Biotechnology, Copenhagen.

The main objective was to review the state of knowledge concerning denitrification in forest soils (important pathway in N cycle).

Proceedings will be edited by S. Struwe and published by the CEC as Air Pollution Report N° 27.

International Conference on Environmental Research with Plants in Closed Chambers.

München, FRG, 9 - 11 October 1989.

This conference was organised jointly by the CEC and the Institut für Biochemische Pflanzenpathologie, GSF München.

This conference was intended to present the state-of-the-art and provide a basis for further interdisciplinary cooperation in the field of environmental studies, particularly with plants.

Proceedings, edited by H. D. Payer, T. Pfirmann and P. Mathy, were published by the CEC as Air Pollution Research Report N° 26.

Workshop on Above- and Below-Ground Interactions in Forest Trees in Acidified Soils.

Simlångsdalen, Sweden, 21 - 23 May 1990.

This workshop was organised jointly by the CEC and the Department of Ecology and Environmental Research, Swedish University of Agricultural Sciences, Uppsala.

The aim was to review the current studies on root structures/morphology and distribution relating in particular to soil conditions and the whole tree and important processes such as nutrient and water uptake. Emphasis

was placed on methodological aspects to promote the development of adequate experimental techniques and measurements when investigating the effects of acidification and an excess nitrogen saturation.

Proceedings will be published by the CEC as Air Pollution Report.

Working Party 2: Effects of Air Pollution on Aquatic Ecosystems

Workshop on Acidification Processes in Remote Mountain Lakes.

Pallanza, Italy, 20 - 22 June 1989.

This workshop was jointly organised by the CEC and the Istituto Italiano di Idrobiologia del C.N.R., Pallanza.

At first it addressed some general geographical, meteorological, physico-chemical and biological features of remote mountain lakes, followed by highlights on the chemical processes occurring in the catchments and in the water bodies, ranging from deposition of acidic substances, geological deposition processes to the modelling of exchange processes at the soil/water interface. Historical changes of acidity in those lakes, drawn especially from paleolimnological studies on lake sediments, were considered to assist in separating natural from anthropogenic acidification. Finally, the prediction of trends in the acidification of the remote lakes was discussed as a useful basis to advise on possible strategies and/or measures to manage those aquatic ecosystems which are already suffering from acidification impacts and to protect those from drastic changes which are sensitive but not yet considerably affected.

Proceedings, edited by M. Johannessen, R. Mosello and H. Barth were published by the CEC as Air Pollution Research report N° 20, ISBN-2-87263-033-3, 1990.

Workshop on Effects of Land Use in Catchments on the Acidity and Ecology of Natural Surface Waters.

Cardiff, Wales (UK), 11 - 13 April 1988.

This workshop was jointly organised by the CEC and the University of Wales, Institute of Science and Technology (UWIST), Cardiff.

It aimed to review the present state of knowledge of the effects of acid air pollution and different land-use practices in different types of catchment areas upon the water quality and the ecology of acid-sensitive surface waters. In particular it considered the effects of changes in grassland and forest management - including possible methods of mitigating those effects by suitable land management practices and by modifications to them - to acidity inputs to catchments. The transmission processes of air pollution to the vegetation, and the resulting effects and their magnitudes upon soil chemistry, and ultimately upon the hydrology and water quality of surface waters were also discussed in detail. Finally the consequences of these changes on aquatic life were assessed.

Proceedings, edited by H. Barth, were published by the CEC as Air Pollution Research Report N° 13, ISBN 2-87263-032-5 (EUR Report 11726 EN).

Working Party 3: Effects of Air Pollution on Agricultural Productivity

Workshop on The European Communities Research Project on Open-Top Chambers, Results on Agricultural Crops 1987-1988.

Pau, France, 29 - 30 September 1988.

Organised jointly by the CEC and the Centre Départemental d'Etudes et de Recherches sur l'Environnement, Département des Pyrénées-Atlantiques, Pau, this third Workshop on Open-Top Chambers (OTC) was restricted to project leaders and associated Swedish and Swiss teams involved in the agricultural crops sub-project.

Results indicated that ambient loads of atmospheric pollutants affect crop yield in many rural areas and possibly alter crop quality. A reduction in crop yield may occur after critical pollutants exposures, in particular ozone.

Interacting factors such as drought, pathogens, etc. and the chamber effect still make the interpretation of data difficult. A model which would allow comparisons between chamber types and which could be used to recommend ways of minimising the chamber effect is being developed by the Institute of Terrestrial Ecology, Bush Estate Research Station.

Comparisons of data concerning the pollution climate indicated important differences between sites. A formal link was set up between the OTC project and another CEC collaborative project aiming at improved defining of the patterns of European pollution climate, taking into consideration spatial and temporal variations.

The importance of a "common biological reference" was recognized by part of the research groups who decided to harmonise the biological material.

The advantages and feasibility of a centralised data handling system were discussed and the setting up of a working group to tackle these questions was suggested.

The Workshop recognised the interest of close cooperation between the European OTC Project and the UNECE (United Nations Economic Commission for Europe) Project on the consequences of air pollution on agricultural crops (see also Environmental Research Newsletter N° 2).

Proceedings edited by J. Bonte and P. Mathy were published by the CEC as Air Pollution Research Report N° 19, ISBN 2-87263-014-7, 1989.

Further information can be obtained:

- for Working Parties 1 and 3 from: P. Mathy, Tel. + 32 2 2358160,
- for Working Party 2 from: H. Barth, Tel.+ 32 2 2356452, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.

**Announcement:
First European Symposium on Terrestrial Ecosystems: Forests and Woodlands**

20 - 24 May, 1991, Florence, Italy
(already specified in Environmental Research Newsletter N° 5)

Further information can be obtained from:

- P. Mathy, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. +32 2 2358160
- A. Teller, European Science Foundation, c/o DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. +32 2 2358446.

EC Regulatory Action

Most of the EC regulatory action on **Protection of Endangered Species, their Habitats and the Natural Environment as well as the Environmental Impact Assessment** managed by DG XI has already been listed in Environmental Research Newsletter N° 4.

Further information is not yet available. Please contact eventually:
C. Stuffmann, DG XI/B2, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2354116.

Other Activities Relevant to EC Environmental Programmes

EC Community Bureau of Reference (DG XII)

As previously indicated, the aim of the programme managed by the EC Community Bureau of Reference (BCR), DG XII/C, is the preparation of certified reference materials for the calibration and the control of analytical methods in various fields, including the environment (see also Environmental Research Newsletter N° 3, February 1989). The projects are developed in collaboration with competent laboratories in Member Countries through analytical intercomparisons which allow pitfalls and errors in the applied methods to be detected. Thus, as a direct consequence, the BCR activity plays a fundamental role in the improvement of the quality of the measurements.

At present the activities of the BCR are focused on: industrially polluted soils, speciation of trace elements (incl. the binding to certain soil fractions), organic vapours at working places, water analysis and trace organic compounds such as PCDDs, PCDFs, PCBs, pesticides, etc.

Laboratories in the EC concerned with analytical problems can apply to the Commission for information and advice. Suggestions for topics of wide interest to be developed are welcome.

A catalogue of the available BCR reference materials will be sent upon request.

List of Reference Materials of potential environmental interest certified in 1989

CRM N°	Material	Certified Parameters
187	Natural milk powder	traces of HCB, α -HCB, γ -HCH, p,p'-DDE
188	Spiked milk powder	traces of HCB, α -HCB, β -HCH, γ -HCH, β -HEPO, p,p'-DDE, dieldrin, endrin and p,p'-DDT
392	Sewage sludge	traces of PCBs
100	Beech leaves	N, Cl, S and P content
101	Spruce needles	Al, Mn, Zn, N, Cl, S, P, Ca and Mg content
129	Hay powder	Zn, N, S, P, K, I, Ca, Mg, and Kjeldahl-N content
331	Steam coal	} S content
332	High volatile industrial coal	
333	Coking steam coal	
334	Anthracite	
335	Flame coal	
336	High volatile steam coal	

Further information can be obtained from:
B. Griepink, DG XII/C6, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2358812.

The Ocean Colour European Archive Network (OCEAN) Project (Institute for Remote Sensing Applications, JRC Ispra)

The Coastal Zone Colour Scanner (CZCS) aboard of the Satellite Nimbus 7 has collected a considerable series of ocean colour data (over a period of time), covering the major European basins, in the years from 1978 to 1986. These have obtained a great wealth of information on various oceanographic issues - from bio-geo-chemical parameters in surface waters to dynamical processes - to be derived.

The Ocean Colour European Archive Network (OCEAN) Project aims, on one side, at a thorough reappraisal of all CZCS data - referred to European marine regions - in view of the full exploitation of their scientific potential within the framework of existing research activities, and, on the other side, at the preparation of future operational use of ocean colour data through a coordinated initiative of the CEC-Joint Research Centre and the European Space Agency (ESA).

Several stations and/or establishments of both JRC and ESA cooperate in developing a network of facilities to carry out the project.

The CZCS data, currently stored at various locations in receiving station raw format, are to a large extent of good quality such as to justify their pre-processing to get image data integrated with geometric parameters and atmospheric pressure and ozone data. It is estimated that about half of these image products are suitable for subsequent processing into

geophysical parameters describing various aspects of the marine environment. From these data, sequences of images resampled to standard grids, composite and statistical imagery can be derived for specific research and operational applications.

Thus the project is being developed through the following actions:

- cataloguing of all CZCS data available in Europe, preprocessing of all suitable raw data and the set up of an accessible archive on optical disk;
- identification and assembly of a software package to extract relevant information from preprocessed data, to process and to file the obtained data using standard format;
- execution of a demonstration programme relating to the application of processed CZCS data, including systematic assessment of spectral and temporal patterns referring to marine processes in the field of primary productivity, pollution and sediment transport, which are of direct relevance to climatic and ecological models, in addition to resource exploitation.

Further information can be obtained from:

V. Barale, Institute for Remote Sensing Applications, CEC-JRC Ispra,
I-21020 Ispra.
Tel. + 39 332 789274.

Protection of the Community's Forests against Atmospheric Pollution (DG VI)

Community measures for the protection of forests against atmospheric pollution are managed by DG VI (see also Environmental Research Newsletter N° 2).

Council Regulation (EEC) N° 3528/86 on the protection of the Community's forests against atmospheric pollution (OJ N° L 326, 21.11.1986), entered into force on 1 January 1987, was amended by **Council Regulation (EEC) N° 1613/89** (OJ N° L 165, 29. 05. 1989).

A budget of 17 MECU for 5 years was allocated. The Community financial contribution is 50% (maximum) of the expenditure approved by the Commission. Projects must be submitted by the Member States to the Commission before 1 November each year.

Information concerning the application for aid from the Community are reported in OJ N° L 53, 21.02.1987.

Main actions

- Yearly forest damage survey throughout the Community

Inventory data are collected and transmitted by the Member States before being processed by the Commission. The detailed rules concerning the common methods are laid down by the **Commission Regulation (EEC) N° 1696/87 of 10 June 1987 (OJ N° L 161, 22.06.1987), as amended by Commission Regulation (EEC) N° 2995/89** of 4 October 1989 (OJ N° L 287, 05.10.1989).

- Field experiments, pilot and demonstration projects

Field experiments, pilot and demonstration projects are set up to understand more clearly the effects of atmospheric pollution on forests, to improve methods of monitoring and measuring forest damage and to devise ways of restoring areas damaged by atmospheric pollution. Pilot projects aim at maintaining damaged forests.

- Information

A programme for the synoptic processing of information on knowledge of atmospheric pollution in forests and its effects was decided by the Council (Council Regulation (EEC) N° 1613/89 (OJ N° L 165, 29.05.1989)).

Reports on forest health are periodically established by the Member States.

Progress

The EC Forest Health Survey was carried out for the third time in 1989. It covers the entire forest area of the Community. 45,000 trees are monitored every year on nearly 2,000 sample plots.

A first report was published by the Commission in November 1989, a second one will be published by the end of 1990.

During the first 4 years, Community financial aid was granted to 124 projects.

Participation in the International Coordinated Programme for the Evaluation and Monitoring of Air Pollution Effects on Forests

Convention on Longrange Transboundary Air Pollution 1979.

Working and Coordination Groups

Regular expert meetings are organized in the field of "Forest health monitoring", "Diagnosis of forest damage in Mediterranean regions" and "Use of remote sensing in monitoring forest damage".

Standing Forestry Committee

Following **Council Decision 89/367/EEC** of 29 May 1989, the Standing Forestry Committee has taken the functions of the Committee on Forest protection. It acts either as a regulatory or an advisory committee according to the nature of the subject concerned.

Further information can be obtained from:

F. Kremer, DG VI/FII.2, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356780.

Climatology and Natural Hazards

I. Climatology and Natural Hazards R&D Programme (1986 - 1990)

Information on activities managed by DG XII/E in the framework of the second R&D Programme on Climatology and Natural Hazards (1986 - 1990) was given in Environmental Research Newsletter N° 4, December 1989.

Shared-cost contracts

A list of the ongoing shared-cost contracts in the field of "Physical basis of climate", "Climate sensitivity", "Climatic impacts" and "Seismic risk evaluation" was given in Environmental Research Newsletter N° 4 together with the participating institutes. Projects are not expected to produce final results until the end of 1990.

Symposia, Workshops and Courses

International Meeting on Città d'Acqua

Venezia, Italy, 11 - 13 December 1989.

This meeting, organised by Città d'Acqua, Centro Internazionale, focused on effects of sea level rise: research, forecast and defensive measures.

International workshop on Analysis of Water Transport in Plants and Cavitation of Xylem Conduits

Vallombrosa, Italy, 29-31 May 1990.

This workshop was organised jointly by the CEC, Consiglio Nazionale delle Ricerche, Ce. S.I.A. - Accademia dei Geografi and Society for Experimental Biology.

It included presentations and discussions on: (i) assessing the impact of climatic changes on vegetation; (ii) modelling arid conditions and field; (iii) modelling water transport in single plants and crops; (iv) new methodologies for studying plant water relations; (v) physiological adaptation under climatic stress; (vi) cavitation of xylem conduits; (vii) vulnerability to embolism and hydraulic architecture of plants; (viii) methodologies for studying water transport in plants; (ix) cavitation and refilling mechanisms; (x) strategies of drought resistance; (xi) field measurements and study cases.

Proceedings are in press.

COMTAG-Symposium on Geomorphology of Active Tectonics Areas

Cosenza, Italy, 31 May - 10 June 1990.

The IGU-COMTAG (International Geographical Union-Commission on Measurement, Theory and Application in Geomorphology) Symposium was organised jointly by the CEC, International Geographical Union and Consiglio Nazionale delle Ricerche.

The meeting focused on problems linked with slope instability and increased erosion and their links with the geodynamics of a seismic active region.

Proceedings will be published as special issues of (i) Earth Surface Processes and Landforms and (ii) Geografia Fisica e Dinamica Quaternaria.

Course on "Natural Hazards and Engineering Geology - Prevention and Control of Landslides and other Mass Movements"

Lisbon, Portugal, 28 March - 5 April 1990.

Organised by the CEC, the course dealt with: (i) soils, rainfall and erosion; (ii) prediction of mass movements and stability assessment; (iii) slope instability and other natural hazards; (iv) landslide analysis and land use legislation; (v) correction methods for mass movements; (vi) case studies.

36 students from 8 Member States and a great number of local students attended the course.

Proceedings are in press.

Course on "Climate and Global Change"

Arles/Rhône, 4 - 12 April 1990.

Organised by the CEC, the course dealt with: (i) natural variability of the geosphere-biosphere system; (ii) biogeochemical cycles and their perturbation by human activities; (iii) monitoring and forecasting global changes.

29 students from 10 Member States and a great number of local students attended the course.

Proceedings are in press.

II. EPOCH: European Programme on Climatology and Natural Hazards (1989 - 1992)

EPOCH has been defined according to line 1.3. of the Framework Programme for Community Activities in the field of Research and Technological Development (1987 - 1991).

EPOCH came into force with the adoption of the Council Decision of 20 November 1989 and it will run until 31 December 1992. Hence, it overlaps with the ongoing Fourth R & D Programme of the CEC on Environmental Protection (1986 - 1990).

The objectives of the programme are:

- the provision of scientific and technical support for the environmental policy of the Community, and for other relevant Community policies such as energy, agriculture, industry, aid to developing countries, both for the solution of short term policy questions and for the medium and long-term formulation of preventive and anticipatory policies;
- the further improvement of the productivity of the overall research effort in the Community, the reduction of overlaps and the identification of gaps through the coordination of the national R & D programmes in the field of environmental research;
- the promotion of overall scientific and technical quality in the field of environmental research, as a contribution to the strengthening of the economic and social cohesion of the Community, R & D capabilities at the highest level in all parts of the Community being one of the prerequisites for its harmonious development.

As regards EPOCH, the first main objective requires that research results be provided that can advance our knowledge concerning climate change from the twofold point of view of man's contribution to the change and the impacts of the latter on man's activities, especially with regard to the Community. Research has therefore to be foreseen regarding the climate system, its natural changes, its responses to forcing factors of human origin (greenhouse gases), and its impacts on the environment and society. Research on the causes, mechanisms and impacts of natural hazards, whether linked to climate or not, is also welcomed.

Such knowledge is necessary as a basis for possible future policy options to counteract the climate change and to adapt to it, or of preventive and corrective measures concerning natural hazards.

In order to ensure that work undertaken within EPOCH is of direct relevance to the Community's environmental policy, the projects submitted should not only be in line with the general objectives of the various research areas but also with more specific "operational goals". These goals are explicitly defined in the detailed description of individual research areas or topics, except in those cases where such goals are evident from the description itself.

The programme is sub-divided into four research areas:

1. Research Area I: Past Climates and Climate Change

General goal: the study of climatic conditions and climate change when the influence of man upon the climatic system was devoid or negligible; to provide a better understanding of the functioning of the climate system (atmosphere, oceans, biosphere, cryosphere) apart from changes induced by man's activities.

1.1. Modelling of extremes

Modelling past climate fluctuations leading to extreme climates (e.g. ice age) for which typical parameters are known from proxy data. This should help to assess the power of mathematical models to simulate the real climate under known conditions.

1.2. Transient behaviour of the European climate: data and modelling

Reconstruction from proxy data and model simulations of past climates, aimed at understanding long-term variations (astronomical time scales) in relation to the corresponding atmospheric concentrations of CO₂.

2. Research Area II: Climate Processes and Models

General goal: to understand the mechanisms governing the various components of the climate system, and their interactions, in order to improve the physical formulation and the parametrization of climate models, and hence the ability to predict climate change.

2.1. Climate change detection, modelling and prediction, especially regarding greenhouse gas effects

The improvement, testing and validation of climate models, in order to enhance their ability to predict with the objective of improving the regional details of prediction of climatic change in Europe.

2.2. The global carbon cycle

Multi-disciplinary research on still unknown or insufficiently known aspects of the global carbon cycle including biological, geochemical and modelling aspects (such as CO₂ absorptivity in relation to ocean water temperature) to improve our understanding on CO₂ sources and sinks, especially in view of determining future atmospheric CO₂ levels.

2.3. Land surface processes

Observation and modelling of the land surface characteristics which determine the fluxes of energy, mass and momentum between soil and atmosphere.

2.4. Climatic aspects of change in ozone concentration and troposphere-stratosphere interactions

Data collection and modelling studies to investigate the relations between changes in ozone concentration and climate.

2.5. Role of clouds in the climate system

Study and modelling of the role of clouds in energy and momentum transfer within the climate system.

2.6. Ocean circulation and air-sea fluxes for climate modelling

Ocean circulation studies for climate modelling, especially mixing processes in the upper ocean and their interaction with the atmosphere.

2.7. Cryospheric processes

Modelling of land and sea ice sheets, in order to understand their formation and stability and their disappearance especially in rapid deglaciation processes.

3. Research Area III: Climatic Impacts and Climate-related Hazards

General goal: to understand the effects of climatic and hydrogeological factors, and especially of climate change, upon various sectors of the European environment.

3.1. Sea level change

Research on the climatic and geological factors determining future sea level change, the hazard of storm surges for European coasts, and the impacts to be expected from sea level rise for natural ecosystems and coastal land use in Europe.

3.2. Climatic impacts on land and water resources

Assessing the perturbations which a climatic change could induce in the complex relations between vegetation and edaphic parameters as well as the impacts of increasing CO₂ in a changing climate on European forests and crops. Development of models capable of characterizing the effects of climatic change on hydrological systems (surface and ground water supplies).

3.3. European land degradation and desertification in a changing climate

Effects of climatic and meteorological factors on soil and vegetation degradation, especially in areas within Europe where such degradation has led to desert-like conditions.

3.4. Instability and erosion of natural slopes

Physical and human factors leading to the erosion and instability of natural slopes, such as those which can produce large-scale destructive landslides. Mapping of areas at risk, classification of instability processes in relation to climate, lithology, geological structure, morphology, active erosion. Development of methods for prevention, control and rehabilitation.

3.5. Storms and floods

Understanding, preventing and mitigating the risks associated with floods and related hazards. Methodologies for the study, forecast and control of floods, and for flood hazard assessment. Ascertaining how land use practices and human contributions have created conditions favourable to the occurrence or the aggravation of floods. Application of radar and satellite data to forecast and track severe storms, and to improve the hydrological models of catchment behaviour.

3.6. Wildfires

Understanding the conditions favouring or preventing the occurrence and spread of vegetation fires (climate, land use, ecosystem biomass, structure of vegetation, properties of vegetation fuels). Development of methods for forecasting fire severity and frequency.

4. Research Area IV: Seismic Hazard

General goal: to create the means for predicting and mitigating the seismic risk in Europe, not only in earthquake-prone areas, but also in low-seismicity areas where nevertheless high-risk objects (industrial and power plants, dams, etc.) exist.

4.1. Strong-motion measurements

Research and data analysis concerning various aspects of ground motion during strong earthquakes (ground acceleration and velocity).

4.2. European data centres and information services

Creation of European facilities (networked data centres) for the collection and exchange of relevant data, and for the dissemination of elaborated information to civil authorities, press media and the public, concerning the on-going seismic activity.

4.3. Multidisciplinary earthquake prediction studies

Identification of both seismological and non-seismological precursors of earthquakes, such as long-term regularities and seismic gaps, variations in the seismicity patterns, identification and mapping of active faults, geophysical precursors (e.g. geoelectric, geomagnetic, electrotelluric, gravity), ground water and gas emissions, ground deformations, etc..

4.4. Risk assessment including methods of evaluating seismic vulnerability of housing stock, lifelines, historical buildings and monuments

Vulnerability assessment studies based on analysis of past damage. Studies of different types of structures to estimate vulnerability functions. Survey objects at risk and impact studies of the consequences of earthquakes. Study of the effectiveness of existing codes and regulations.

A call for proposals has been published in OJ N° C 198, 03.08.1989 with a deadline of 30 November 1989. Of 192 proposals received, 17 concerned area I (Past Climates and Climate Change) with 68 participating institutions, 21 area II (Climate Processes and Models) with 136 participating institutions, 90 area III (Climatic Impacts and Climate-Related Hazards) with 427 participating institutions and 64 area IV (Seismic Hazard) with 277 participating institutions. The evaluation procedure is under way.

Most recent publication:

R. A. Warrick, E. M. Barrow and T. M. L. Wigley: *The Greenhouse Effect and its Implications for the European Community*, CEC-DG XII, Brussels, Luxembourg, 1990, EUR 12707 EN.

Further information can be obtained from:

F. Fantechi, DG XII/E2, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2355735/ 2351686.

Energy and Environment

Greenhouse Issue: Energy and Environment

Joule Sub-Programme on Models for Energy and the Environment - CO₂ Study - "Crash Programme"

As reported in Environmental Research Newsletter N° 4, this study was developed to assess energy and environmental policy options compatible with a reduction of CO₂ emissions. It covers four areas of activity:

- trend analysis of Community CO₂ emissions and definition of CO₂ emission reduction targets;
- identification of CO₂ emission control options and evaluation of their potential;
- cost-efficiency analysis of available control options, by system analysis, to identify the most cost efficient energy policies;
- analysis of the effects of identified cost-efficient policy options on economy, social structure, international competitiveness and security of energy supply.

This study is an extension of the previous one on SO₂ and NO_x abatement but, besides evaluating the trade-off between costs and policy objectives, it will analyse further the institutional mechanisms that will enforce the implementation of the policy actions.

Several projects were launched and are well on their way already testing operational methodologies and presenting preliminary results.

The DERE (Développement des Energies Renouvelables en Europe) Project has completely established the methodology of treatment of renewable energies in cost effective policy studies.

Work is now concentrating on the extension of national data bases and the assessment of their Community-wide consistency, to quantify the role of renewables in emission reduction policies.

The MURE (Modèle d'Utilisation Rationnelle de l'Energie) Project dealing with energy conservation is introducing it as an endogenous element in the energy system, both at supply and demand levels, to fully evaluate its potential role in environmentally constrained policies. The treatment methodology is now finished for most of the nine consumption sectors (light and heavy industry, specific uses of electricity, passenger and goods transportation, etc.) in which the economy has been divided. The research teams are now initiating the collection of the disaggregated data characterizing each conservation measure in terms of technical, economic and environmental parameters and allowing the elaboration of cost conservation curves.

The characterization of the conservation measures also includes the evaluation of their market potential, of the cost associated with the exploitation of that potential and the subsidiary actions required to support their implementation.

The FRET (Fossil fuel CO₂ REduced Technology) Project is analysing how modern technologies based on fossil fuels and with improved efficiency can have a positive impact on the reduction of CO₂ emissions associated with the energy system.

Combined heat and power generation, coal gasification integrated with combined cycle power plants, improved gas turbines, fuel cells, etc. are examples of technologies which can play a significant role in energy policies concerned with the environment.

Technical, economic and environmental data are now being gathered for the different Member States participating in the project and a preliminary study has been finalized for Germany and Denmark.

In a future stage this project can be extended to include CO₂ abatement technologies.

Depending on the national research teams and on the progress of each specific project, data from these three projects has been introduced in the **EFOM-ENV (Energy Flow Optimisation Model-ENVironment)** model to identify the mix of measures required to arrive at desired emission targets without undue costs. This mix of options has been assessed under different policy constraints.

First results:

First results are published in a report entitled "CO₂ Study Crash Programme".

This report summarises a "Crash Programme" of work undertaken for DG XII of the CEC to analyse the most cost effective route for achieving reductions in carbon dioxide emissions as proposed in the Commission's Communication to the Council regarding Community policy towards the greenhouse issue (COM(90) 496).

Five countries were involved in this work: Belgium, France, the Federal Republic of Germany, the Netherlands and the United Kingdom. Using the EFOM-ENV energy flow optimisation model developed by the Commission, teams in each of these countries calculated the energy systems which would achieve carbon dioxide emission targets at least cost. The forecasts of future fuel import process and useful energy demands needed for the model were taken from the Conventional Wisdom scenario of the Commission's Energy 2010 Study which analyses future energy use in Europe.

To ensure that the major options for mitigating emissions were included in the country databases, three subprogrammes were launched to collect and synthesize data on renewable energy sources, energy efficiency and conservation, and clean fossil fuel technologies. These subprogrammes, known respectively as DERE, MURE and FRET, surveyed the cost and potential of these options so as to provide data in a form suitable for incorporation in the EFOM-ENV databases. Inclusion of this data allowed the model to trade off investments in these options against investments in traditional energy supply and use technologies, including nuclear power.

The results from the study are specific to each country. However, the model showed that all options have a role to play. If the investments in cleaner supply technologies (principally gas, wind power and some biomass technologies) which the model calculates as cost effective were to take place, emissions from the countries studied would peak in the years 1995 - 2000; however, in those countries where the energy system is already clean from a CO₂ perspective (Belgium and France because of nuclear power, the Netherlands because of gas), emissions rise again later. Even more strikingly, in all countries studied, additional investment in the energy efficiency measures which the model calculates as cost effective would bring CO₂ emissions in the year 2000 to within 5 % of their 1988 levels, and in four of the countries emissions in 2000 would actually fall below the 1988 level.

If further reductions in CO₂ emissions from the 1988 level are sought, the results show that the scope for further fuel switching to more expensive renewables (and to nuclear power where this is allowed), is sufficient for reduction of 15 - 30 % to be achieved by 2005. Furthermore, at these reduction levels the model shows that the national savings capacity avoided and fuel costs obtained from the cost effective investments in energy efficiency measures are sufficient to offset the additional investments required in the more expensive supply of side technologies. Because of the significance of this result, a fuller examination of the costs and potentials of efficiency measures (as well as the other abatement options) will be undertaken.

Although the results from this programme are indicative of the monetary costs of pursuing different reductions targets, they do not yet take into account the wider social issues connected with energy policy. These issues include the domestic repercussions of closing coal mines, increased reliance on natural gas imports and the difficulties of persuading consumers and businesses to invest in energy efficiency measures. As well as consideration of these issues, in the longer term it is intended to extend the models to take account of the external costs of energy technologies, including pollutant production, damage of wildlife, noise and visual intrusions. This will enable the trade off in investments to take account of different energy strategies. In addition, price feedback effects resulting from changed demand will also be analysed.

Further information and the report can be obtained from:

P. Valette, DG XII/E/5, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356356.

Information

Eurocourses at the JRC Ispra

The Joint Research Centre of the CEC is organizing Courses for the training of scientific and technical staff in advanced sectors of science. The training courses are linked with the Commission research and development programmes and based on the specific competences of the individual Institutes of the JRC (see also Environmental Research Newsletter N° 4).

Extract from the programme foreseen in 1991:

Chemical and Environmental Science

Distributed Artificial Intelligence Theory and Praxis (18 - 22 March, 1991)

Quality Control and Quality Assurance in Environmental Analysis (8 - 12 April, 1991)

Statistic Analysis in Environmental Chemistry and Toxicology (24 - 28 June, 1991)

Remote Sensing

Remote Sensing Applied to Agricultural Statistics (9 - 13 September, 1991)

European Remote Sensing Satellite (ERS-1) SAR DATA Course (in collaboration with ESA) (30 Sept. - 4 October, 1991)

Ocean Colour: Theory and Application in the Coastal Zone Colour Scanner Experience over the last ten years. Workshop in the frame of the International Space Year Activity (21 - 25 October, 1991) (see also chapter WATER in this edition)

Reliability & Risk Analysis

Industrial Risks and Environmental Impact Assessment; Ispra contribution to the European Master Courses in Safety and Reliability (13 - 17 May, 1991)

Expert Systems in Structural Safety Assessment (ESSA) (10 - 12 June, 1991)

Experimental and Numerical Methods in Earthquake Engineering (7 - 11 October, 1991).

Further information and documentation on the Courses can be obtained from:

Secretariat EURO COURSES, JRC, I-21020 Ispra (VA), Italy.

Tel. +39-332-789819/789308, Telex 380042 - 380058 EUR I,

Fax +39-332-789839.

NETT: Network for Environmental Technology Transfer

The NETT now provides companies, research institutions etc. with a new European information system for environmental matters. The world market for environmental technologies is evaluated at 75 billion ECU, of which 40% is represented by the European market alone. All organisations interested in such information with an average subscription fee of 400 ECU per year for all EEC countries, and 750 ECU for third countries, can now benefit from NETT services (see also Environmental Research Newsletter N° 3 and 4).

Conferences

4th International Workshop: Chemical, Biological and Ecotoxicological Behaviour of Pesticides in the Soil Environment

29 - 31 May, 1991, Rome, Italy.

The Workshop intends to continue providing an international opportunity to present new results and to discuss future research activities in the field of Pesticides and Soil Environment. The main topics will be: (i) Pesticide distribution in the solid, liquid and gaseous phases of the soil environment; (ii) Adsorption/desorption and mobility of pesticides in the soil profiles; (iii) Transport and conversion of pesticides in the soil-plant system; (iv) Ecotoxicology of pesticides as affected by the soil matrix; (v). Advances in analytical methodologies of pesticides and soil residues.

For further information please contact:

NETT, 207 Avenue Louise, Box 10, B-1050 Brussels

Tel. +32 2 645 09 40; Fax +32 2 646 42 66.

Environment and Cities

Commissioner Ripa di Meana presents the "Green Paper" on future EC urban environmental policy, adopted as an official CEC communication, aimed at resolving the environmental problems existing in European cities. Operational measures concerning the following items should be formulated: a) air quality; b) the protection of green zones; c) water management; d) the protection of monuments (see also Environmental Newsletter N° 5).

For further information please contact:

N. Hanley, CEC, DG XI/A/4, 200 rue de la Loi, B-1049 Brussels

Tel. +32 2 23 58 708.

Eureka Research Project VISIMAR

(EUROMAR Project EU 495)

Visualisation and Simulation of Marine Environmental Processes

The overall objective of the project VISIMAR is to develop and apply a low cost system for the production of animated sequences of marine environmental processes, which are based upon observational data, remote sensing, in-situ and in-vitro (tank) measurements and upon empirical and deterministic models.

There is an increasing need for a better visualization of time dependent processes, particularly in the geophysical domain. Two main reasons are to be stressed for the conversion of scientific data into video animations: (i) the presentation of results from numerical simulations or observations in a comprehensive way in order to improve the communication between scientists and the public, (ii) video animation may help scientists to a better understanding and interpretation of marine processes and process interaction, which in return may help in the development of mathematical models and in the planning of measuring campaigns.

The project consortium consists of 15 European partners (industry, research centres and university institutes) from which 4 come from EFTA countries. Collaboration between the participants will include the definition of guidelines, methodologies and standards for the application of video animation systems (considering also scientific and didactical aspects) as well as the specification of requirements for hard- und software components to be developed in the future.

The CEC participates actively in this project.

Further information can be obtained from:

W. Schrimpf, JRC, Institute of Remote Sensing, T.P. 690, I-21020 Ispra, Tel. +39 332 789111, Fax +39 332 78 96 48.

Further information can be obtained from:

Dr. A. Piccolo, Istituto per lo Studio del Suolo,

Piazza M. D'Azeglio, 30, I-50121 Firenze.

Tel. +39 552477242, Fax +39 55241485.

Cadmium in the Human Environment. Toxicity and Carcinogenicity.

An International Symposium, 25-27 September, 1991, Gargnano, Italy.

The Symposium is jointly organized by the International Agency for Research and Cancer and the International Union of Pure and Applied Chemistry in collaboration with the Institute of Occupational Health, University of Brescia.

The aim is to review the present knowledge of environmental health hazards which are connected with the presence of cadmium in the human environment. The following topics will be covered: (i) Human exposure; (ii) Ecotoxicology; (iii) Metabolism and toxicology; (iv) Carcinogenicity and genetic toxicology; (v) Epidemiology.

Further information can be obtained from:

International Agency for Research on Cancer, 150, cours Albert Thomas, F-69372 Lyon Cedex. Tel. +33 72 738485, Fax +33 72738575.

6th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region

6 - 9 October, 1991, Como, Italy

Organized by MESAEP (Mediterranean Scientific Association of Environmental Protection)

Preliminary programme: Sessions on (i) Chemical Aspects of Environmental Pollution; (ii) Biological, (Eco)toxicological and Health Aspects; (iii) Recent Developments and Advances in Waste Management; (iv) Aspects of Mediterranean climate change.

Further information can be obtained from:

D. Kotzias, CEC - JRC Ispra, Environment Institute
I-21020 Ispra (Va), Italy.
Tel. +39 332 789647. Fax +39 332 789222.

11th Biennial Meeting of the European Association for Cancer Research (EACR)

3-6 November, 1991, Genoa, Italy.

This Eleventh Meeting is also supported by the Commission of the EC. Outstanding scientists involved in the multidisciplinary field of basic cancer research will provide the forum for discussion of and reflection on the most recent findings deriving from various themes, topics and related issues, amongst others on Environmental Carcinogens and Relevance to Humans.

Further information can be obtained from:

EACR-XI Secretariat, Ufficio Rapporti Internazionali, Segreteria Scientifica, Istituto Nazionale per la Ricerca sul Cancro, Viale Benedetto XV, 10, I-16132 Genoa, Italy.
Tel. +39 10352827, Fax +39 10352888, Telex +39 10286353X I.

Publications

Impact of Gasoline Lead on Human Blood - The Athens Lead Experiment

An enforced reduction of the lead content of gasoline from about 0.49 to about 0.27 g/l was carried out in mid 1983 in the greater Athens area, including almost all the Attica, the region surrounding Athens. Taking advantage of this reduction, the Athens Lead Experiment attempts to assess the contribution of local gasoline lead to the level of lead in blood of healthy groups exposed non-professionally of central Athens inhabitants. The decline of level of lead in blood which was expected would follow the decreased population exposure to lead from vehicle exhausts, was the rationale underlying the study.

This publication has been prepared by A. Colombo, W. Leyendecker, B. Versino, S. Nakou, D. Hatzichristidis, S. Papadopoulou and B. Chartsias and published by the CEC-JRC, Ispra, EUR 12830 EN, ISBN 92-826-1432-8.

Exchange of Trace Gases between Terrestrial Ecosystems and the Atmosphere

This book explores the relationship between soil microbes, the plant canopy, and the physical and chemical dynamics in the atmosphere boundary layer, which together control the direction and rate of trace gas exchange. The microbial production and consumption of methane and nitrogen oxides in soils, the micro-meteorology of trace gas exchange from soils through the canopy to the overlying atmosphere, and the problems of measurement and extrapolation are critically discussed in a series of review chapters and group discussion reports. Trace gas exchange is placed into a global framework in a section dealing with atmospheric nutrient transport, chemical processes in the atmosphere, and the changing global climate. The book concludes with a chapter which intends to provide a framework for future international research programmes on biosphere/atmosphere exchange.

Dahlem Workshop Report, edited by M. O. Andreae and D. S. Schimal, Life Sciences Research Report N° 47, ISBN 0-471 92551 9.

A costed Evaluation of Options for the Reduction of Photochemical Oxidant Precursors by

N. Allemand et al.

Volume 1: Results of Three Possible Scenarios for the Abatement of Photochemical Oxidant Precursors

Volume 2: Abatement Technology and Associated Costs

Photochemical oxidants, with ozone as their main component, are increasingly thought to have adverse effects on human health and the environment. Volume 2 of this report describes and analyses the technologies available for reducing precursor emissions (particularly of volatile organic compounds). Volume 1 examines the reduction of emissions that could be achieved if these technologies were applied. The report considers: (i) the cost of buying and operating abatement equipment, or of using clean technology equivalents; (ii) emissions resulting from the adoption of alternative abatement technologies for the EC as a whole; (iii) the future trend of emissions resulting from the adoption of different programmes under various conditions of economic growth. Particular attention is paid to mobile sources (motor vehicles) and stationary emitters (the petroleum and chemical industries, petrol distribution, and solvent use in various industries).

EUR 12537/I EN and EUR 12537/II EN

Published by the CEC and available from the Office for Official Publications of the EC, L-2985 Luxembourg.

International Conference for Occupational Health, Safety and Hygiene Information Specialists

The proceedings of this Conference, held in Luxembourg in June 1989, will help information specialists in this area to prepare and supply validated information efficiently to management, unions, and the public.

EUR 12560 EN, ISBN 92-826-0986-3

Published by the CEC and available from the Office for Official Publications of the EC, L-2985 Luxembourg.

The Toxicology of Chemicals: Carcinogenicity - Vol. 2

Details about Volume 1 have already been given in Environmental Research Newsletter N° 5. This second volume provides clear and concise summary reviews of the main evidence on the carcinogenicity of 21 compounds, including 10 of the nickel family. In order to aid the reader, an introductory chapter is devoted to the inorganic chemistry, biological properties and processing of nickel ore.

EUR 12481 EN, ISBN 92-825-9790-3

Published by the CEC and available from the Office for Official Publications of the EC, L-2985 Luxembourg.

International Chemical Safety Cards Compiler's Guide

These Cards summarize essential health and safety information on 78 chemicals in a clear and accessible way. They cover hazards, prevention, symptoms, first aid, fire fighting, storage, disposal, packaging and labelling. They also carry back-up data on physical properties and exposure limits. The cards are intended for use at shop-floor level by workers, unions and employers, and also elsewhere in agriculture and construction.

EUR 12561/1 EN, ISBN 92-826-1331-3 (111 pp)

EUR 12561/2 EN, ISBN 92-826-1332-1 (78 cards)

Published by the CEC and available from the Office for Official Publications of the EC, L-2985 Luxembourg.

Il Lago di Garda - Evoluzione Trofica e Condizioni Ambientali Attuali

This study on the environmental conditions of the largest lake of the CE is an outstanding example to demonstrate how the scientific competences of the JRC can be exploited to cooperate in the definition of the necessary basis to guide and administrate an important water resource in the member state.

Published by CEC, DG XIII-C, EUR 12925 in Italian, ISBN 92 826 1569-3, Brussels and Luxembourg, 1990.

Inventory of Laboratories with Ecotoxicological Expertise in the European Communities

This book by G. Persoone and A. Van de Vel provides an ideal reference source for anyone working in the field of ecotoxicological testing and for organisations needing to have ecotoxicological tests carried out. It

contains full data on 126 different laboratories. A named contact is listed for each site, and details are given on the various tests regularly carried out. Data is given on the 35 tests prescribed by the 6th Amendment of Directive 67/548/EEC on the classification, packaging and labelling of dangerous substances.

Published by the CEC, EUR 12296 EN, ISBN 92-826-0630-9, and available from the Office for Official Publications of the EC, L-2985 Luxembourg.

(This publication has already been announced in Environmental Research Newsletter N° 5, but with an incorrect title, for which we apologize)

EC-Reports on measures to reduce air pollution from stationary sources

- **The Manufacture, Storage and Handling of Benzene** (EUR 13003);
- **Ammonia Production** (EUR 13002)
- **Nitric Acid Production** (EUR 13004)
- **The Manufacture of Cement** (EUR 13005)
- **Sulphuric Acid Production** (EUR 13006).

The Council of the EC adopted a Directive on 28.06.1984 aimed at the provision of measures and procedures to prevent or reduce air pollution from stationary sources (i. e. industrial process of utility plant). A key element in the Directive is the concept in the Best Available Technology 'that does not entail excessive costs' (BAT) to prevent or reduce air pollution. The Commission has taken the initiative in this regard by establishing a Working Party of experts to designate BAT pertaining to the production of ammonia and other substances.

These first five reports are published by the CEC-DG XIII, Brussels and Luxembourg, 1990.

Note from the Editor

The information contained in this Newsletter has been drawn from material supplied by the same persons indicated in each chapter as possible correspondants for further information.

Text have been checked and apologies are given for omissions or errors.

