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Contents

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Editorial

In this period of steadily increasing economic growth, competition in tne field of research and technological development presents an ever greater challenge. The authors of the Single European Act were well aware of this challenge when they drafted Article 130 F which adds a Title VI, "Research and Technological Development", to the EEC Treaty. This addition includes the statement: "The Community's aim shall be to strenghten the scientific and technological basis of European industry and to encourage it to become more competitive at international level".

Today, an increase in the competitiveness of European industries is not only determined by larger resources but also depends on quality and responsible orientation. Two aspects should be mentioned here: firstly, the protection of the environment and with it that of human health and safety, is not an extra-curricular activity to be applied a posteriori through follow-up procedures which aim principally at limiting the damages already done. On the contrary, it has become an intrinsic part of the problem and therefore must be included in production processes themselves. In consequence, research directed towards this specific aim is now essential.

Secondly, the European Community has acquired new legal and regulatory powers. Article 130 R of the Single European Act adds a new Title VII, "Environment", to Part Three of the EEC Treaty, aimed at improving environmental quality, protecting human health and managing natural resources. In this connection, the Commission must determine standards and establish minimum and maximum permissible levels for injurious contaminants. These values cannot be approximated, nor can they be stated following subjective opinions. Legislation and the establishment of regulations must be based on rational and scientific data. There is thus a fundamental need for research.

European Community research disregards neither of the two aspects stated above. Neutral and impartial expertise is indispensable and the necessary skills must be available within its ranks, implying within the Joint Research Centre. Herein lies an important justification of the Centre's activities, a major "raison d'être", in the broad field of research.

All these facts were considered when drafting the Framework Programme 1990-1994 which was the subject of the common orientation of the Council on 15 December 1989. In addition to the 3.1 billion ECU available under the Framework Programme 1987-1991, the new Framework Programme allocates a further 5.7 billion ECU, which would, among other things, reinforce activities in the environment field.

For the future, the European Communities have adopted a methodology of flexible programming which will better favour an acceleration of the rate of research and development activity. New economic and human resources leading to a more developed knowhow and a more exclusive innovative potential will give the European Community the necessary strength to face impending technological and competitive challenges. The JRC will play an important role in meeting these challenges.

F.M. Pandolfi
Vice-President of the Commission
of the European Communities

EC Research Programmes and Support Activities to the Commission

Programme News

Framework Programme of Community Activities in the Field of Research and Technological Development (1990-1994)

A new five-year framework programme, the third one in a series which started with the 1984-1987 one, has been proposed for adoption to the Council (OJ No C 243, 23.09.1989). During the first two years, the new programme will include activities from the ongoing second programme (1987-1991), according to a rolling formula.

The new framework programme is characterised by the regrouping of activities under three main headings covering six fields; an increase in the total budget and in particular that devoted to studies related to the environment; and the promotion of a new initiative to improve the mobility of young researchers at post-graduate level.

Special emphasis will be put on pre-normative research to guarantee the scientific and technical basis necessary to establish adequate norms and standards.

The contents of the programme includes: **(i) enabling technologies**: information and communications technologies, industrial and materials technologies; **(ii) management of natural resources**: environment, life sciences and technologies, energy; and **(iii) management of intellectual resources**: human capital and mobility.

The Commission intends to propose, after approval of the framework programme, six specific programmes corresponding to the six activities foreseen. The Joint Research Centre is called on to contribute to the implementation of the framework programme.

The Council of Ministers of 15 December 1989 reached an agreement on the framework programme with a budget of 5700 MEcus from which 518 MEcus would be devoted to the environment. The final adoption will be reached after the positive opinion of the European Parliament.

Further information can be obtained from:

— M. André, Tel. + 32 2 2360781 (languages: F, ES, PO, IT).

— E. Bock, Tel. + 32 2 2354132 (languages: DE, EN, DA, N).

— P. Wragg, Tel. + 32 2 2360126 (languages: EN, F, GR).
DG XII, CEC, 200 rue de la Loi, B-1049 Brussels.

EC Research Programmes STEP and EPOCH - DG XII/E (1989-1992)

STEP (**S**cience and **T**echnology for **E**nvironmental **P**rotection) and EPOCH (**E**uropean **P**rogramme **O**n **C**limatology and Natural **H**azards) are two specific research and technological development programmes in the field of Environment (see also Environmental Research Newsletter No 3).

STEP includes research into the environment and human health, assessment of risks associated with chemicals, atmospheric processes and air quality, water quality, soil and groundwater protection, ecosystem research, protection and conservation of the European cultural heritage, technologies for environmental protection, major technological hazards and fire safety (in order 1-9).

EPOCH includes research into past climates and climatic change, climate processes and models, climatic impacts and climate-related hazards, and seismic hazards.

The Council of Ministers adopted a common position on these programmes on 20 June 1989. The final decision is expected to be taken by the Council by the end of 1989.

The call for cost-shared contract proposals were advertised prior to the Council Decision to avoid delays in implementing the programme.

The submission of proposals for research areas 3, 4, 5 and 6 of STEP has been sollicited in a call for proposals with a deadline of 29 December 1989 (OJ No C 248, 29.09.1989).

That for research areas 7, 8, 9 and 1, 2 are orientatively March and May 1990.

The submission of proposals for EPOCH has been sollicited in a call for proposals with a deadline of 30 November 1989 (OJ No C 198, 03.08.1989).

Further information on STEP and EPOCH can be obtained respectively from:

— H. Ott, DG XII/E1, Tel + 32 2 2351182/2350415.

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

Note from the Editor

With this issue No 4 of the Newsletter we will have surveyed together the activities of the European Community connected with environmental research problems and legislation.

Following an ***overview of the programmes*** presented in issue No 1, we have devoted issue No 2 to aspects of ***air quality***. Issue No 3 considered ***human health, environmental chemicals, waste research*** and ***reduction of pollution***.

In this issue No 4 we deal with ***water, soil,*** and ***ecosystem research*** as well as ***climatology and natural hazards***.

In all these issues we have introduced information related to other activities concerning environmental problems and relevant legislation aspects. Here, we report also on a ***community-wide coordination of information on the environment*** and ***on the greenhouse issue***.

We will now concentrate on supplying information of developments which occurred since the previous mention of the topics. We hope that with your collaboration we will be able to bring up to date activities and results which are of interest to all of us in the field of environmental problems.

Due to unforeseen circumstances, this issue appears with some delay. We apologize and by the same token wish you all very happy and unpolluted years to come.

EC Research Programme MAST - DG XII/E (1989-1992)

MAST (**MA**rine **S**cience and **T**echnology) is the first specific research and technological development programme in the field of marine environment. It is designed to contribute to the implementation of "Exploitation of the sea bed and use of marine resources" activity of the 1987-1991 EC Research and Technological Development Framework Programme. It was adopted by the Council Decision of 20 June 1989 (OJ No L 200, 13.07, 1989). A call for proposals was launched by the Commission with a deadline of 30 June 1989 (OJ No C 75, 23.03.1989).

The main objectives of the programme are:

- to contribute to a better knowledge of the marine environment in order to improve its management and protection and to predict change;
- to encourage the development of new technologies for the exploration, protection and exploitation of marine resources;
- to improve coordination and cooperation and the exchange of information amongst national marine R&D programmes in the Member States, and to help increase the effectiveness of these programmes through better use of research facilities;
- to strengthen industrial competitiveness in the relevant sectors;
- to contribute to the economoic and social cohesion of the Community by encouraging the involvement of scientists from all Member States to stimulate technology transfer and the joint and more efficient use of facilities, and simultaneously strengthen the scientific and technological basis of the Community, in the pursuit of scientific and technical excellence;
- to provide the technical basis for, and encourage the development of, common norms, standards and design guidelines, for the implementation of the European internal market in 1992;
- to facilitate training and exchange of personnel;
- to assist, as far as possible, Community participation in international ocean programmes.

The programme is subdivided into four parts:

1. ***Basic and applied marine science:***
   aiming at (i) better understanding marine processes, especially in the coastal and regional seas of the Community Member States (including the N.E. Atlantic); (ii) improving the ability to predict changes in thoses seas; and (iii) establishing the scientific basis for their management, protection and exploitation. It comprises a modelling approach to study the structure, stability and dynamics of the marine environment, especially the continental shelf, regional seas and coastal waters. *Oceanography studies* include circulation and exchange of water masses, biogeochemical cycles and fluxes, interface and boundary as well as biological and sedimentary processes, to better understand marine systems and provide data for mathematical models.
2. ***Coastal zone science and engineering:***
   include *coastal morphodynamics* (study of shaping of the coast by waves and currents), *coastal ecosystems* (determination of broad zonal patterns and characteristics), *meteomarine predictions* (study of wave kinematics, wave growth and decay, interaction between waves, etc.), *coastal engineering* (improved design of coastal and harbour breakwaters, sea outfalls, beach nourishment schemes)
3. ***Marine technology:***
   precompetitive activities aim at encouraging the *development of instruments* (new sensors and instrument packages) and promoting *generic enabling technologies* (underwater signal transmission, imaging and marine applications of modern robotics) for the advancement of marine science and related future industrial developments.
4. ***Supporting initiatives:***
   include *European ocean data and information networks; research vessels and heavy equipment coordination; advanced training; surveying for resource evaluation; preparation of norms and standards; marine polar and marine lithospheric research.*

Two hundred projects, involving 900 participating laboratories, were received as a result of the call for proposals. The results of project selection will be available by December 1989.

Further information can be obtained from:
J. Boissonnas, DG XII/E, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356787.

EC Research Programme BRIDGE - DG XII/F (1990-1994)

BRIDGE (**B**iotechnology **R**esearch for **I**nnovation, **D**evelopment and **G**rowth in **E**urope) is a specific research and technological development programme in the field of biotechnology. It has been proposed for adoption to the Council (OJ No C 70, 20.03.1989).

BRIDGE will continue the work of the Biotechnology Action Programme (BAP), see Environmental Research Newsletter No 3.

BRIDGE includes **research and training activities** into (i) information infrastructure: culture collections, processing and analysis of bio(techno)logical data; (ii) enabling technologies: protein design/ molecular modelling, biotransformation, gene mapping/ genome sequencing/ novel cloning methods; (iii) cellular biology: physiology and molecular genetics of industrial micro-organisms, basic biology of plants and associated organisms, biotechnology of animal cells; (iv) pre-normative research: safety assessments associated with the release of genetically engineered organisms, in vitro evaluation of the toxicity and pharmacological activity of molecules.

Training actions shall be implemented through training contracts and courses; the cost of these actions shall be borne by the Community.

Research actions are to be implemented through shared-cost research contracts.

BRIDGE includes also **concertation activities** involving the participation of the relevant Commission services and the Member States to (i) monitor and improve developments; (ii) disseminate knowledge and increase public awareness, (iii) promote the involvment of small-firm sector in the Community.

The Council of Ministers of 20 June 1989 adopted a common position on a modified Bridge proposal made by the Commission. The final decision is expected to be taken in October by the Council.

The call for proposals for shared-cost R&D actions in the field of biotechnology was issued before the Council Decision, to allow a rapid implementation of the programme (OJ No C 169, 04.07.1989). Proposals have to reach the Commission before 15 December 1989.

Further information can be obtained from:
D. de Nettancourt, DG XII/F2, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2354044.

Environmental Protection

1. Water Research

Research managed by DG XII/E1 includes the development and validation of analytical methods for the determination of water quality and specific pollutants; the investigation of chemical transformations of pollutants in the aquatic environment and the effects of pollutants on the ecosystems. It is implemented by a Concerted Action on "Organic Micropollutants in the Aquatic Environment" (1.1.) and by shared-cost contracts to assess "Water Quality" (1.2.) and the "Ecological Effects of Pollutants" (1.3.).

The JRC Ispra's contribution to research on water quality includes the development of analytical methods to study the effects of pollutants on algal populations, modelling studies of transport, transformation, deposition of trace metals and ecotoxicogical studies aiming at determining the distribution of toxic metals in the various aquatic compartments as well as their effects on aquatic communities (1.4.).

1.1. COST Project 641: "Organic Micropollutants in the Aquatic Environment"

This Concerted Action, managed by DG XII/E1, is implemented since 1984 as an extension to research carried out under COST Project 64 b bis on the analysis of organic micropollutants in water (1978-1983). Non-Member States Finland, Norway, Sweden and Switzerland also participate in this project.

It is organized in 4 Working Parties (WP) which held scientific meetings and international symposia (Berlin, FRG, 1979; Killarney, Ireland, 1981; Oslo, Norway, 1983; Vienna, Austria, 1985, Rome, Italy, 1987) and an Activity Centre on "Modelling Concepts for Organic Pollutants in Natural Waters". The Activity Centres on "Pollutants Inventory" and Mass Spectroscopic Data" stopped their activities in 1987 (see below).

Fifth European Symposium on "Organic Micropollutants in the Aquatic Environment", Rome (Italy), 20-22 October 1987.

The symposium reviewed current studies and technical progress in the following topics: analytical methodologies, transport and transformation of organic micropollutants in water, water treatment processes and mathematical modelling. Two special sessions were devoted to laboratory data treatment and environmental scenario.

Proceedings edited by G. Angeletti and A. Bjorseth were published by Kluwer Academic Publishers, P.O. Box 17, 3300 AA Dordrecht, The Netherlands, as Water pollution Research report No 4, EUR 11350, 1988, ISBN 90-277-2738-4. Distributor in the USA and Canada Kluwer Academic Publishers, 101 Philip Drive, Norwell, MA 02061, USA.

Sixth European Symposium on "Organic Micropollutants in the Aquatic Environment" to be held in Lisbon (Portugal), 22-24 May 1990.

The symposium is organised jointly by the CEC, the Direccao Geral da Qualidade do Ambiente e Istituto Hidrografico, Lisbon (Portugal).

The aim of the symposium is to review the current studies of the various countries participating in the Concerted Action on "Organic Micropollutants in the Aquatic Environment".

The programme will cover the following topics: (i) analytical methodologies and data treatment; (ii) transport and distribution; (iii) transformation reactions in the aquatic environment; and (iv) behaviour of organic micropollutants in water treatment processes.

Further information and first announcement with the preliminary registration form can be obtained from G. Angeletti, see address below.

Working Party 1: Analytical Methologies and Data Treatment

The objectives are (i) to review and summarize the available methodology for analysis of the organic pollutants referred to in list 1 of 129 compounds, Annex of the Directive 76/464/EEC; (ii) to evaluate available methodology for the determination of compounds of known or suspected environmental concern e.g. chlorinated paraffins, organic complexing agents, surfactants and organometallic compounds; (iii) to assess new analytical techniques in particular for organic compounds in the aquatic environment; (iv) to review and develop methods for sampling and sample treatment of sediments, sludge, rainwater, etc.; (v) to advise on the most appropriate analytical methodology to tackle the problems related to the fate and behaviour of organic compounds in the environment; and (vi) to assist in (computerised) data treatment and utilisation of computer-aided laboratory support.

Workshop on "Analytical Methologies for Selected Organic Pollutants in the Aquatic Environment", Berlin (FRG), 30 September-1 October 1986.

The workshop organized jointly by the CEC and the Umweltbundesamt, Berlin, included presentations and discussions on (i) the availability of analytical methods for the determination of EC priority pollutants (list of 129 compounds); (ii) methods for the determination of organotin compounds; (iii) the determination of derivatives of aniline and benzidine; and (iv) the development of analytical methods for pesticides in relation to the EC drinking water directive. Attention was also paid to some technical approaches such as solid phase extraction of basic compounds and use of membrane inlet mass spectrometry for the mesurement of priority pollutants. Contributions on pattern recognition and quantification methods, on quality assurance, on detection of analytical systematic errors and on validation of standard procedures for organic micropollutants were also presented.

Proceedings were published by the CEC as Water Pollution Research Report N° 1, EUR 11070, 1987.

Workshop on "Sampling and Sample Treatment for the Analysis of Organic Micropollutants in the Aquatic Environment", Bilthoven (The Netherlands), 16-17 June 1987.

The workshop organized jointly by the CEC and the National Institute of Public Health and Environmental Hygiene, Bilthoven, included presentations and discussions on some aspects of sampling and sample treatment: (i) sampling procedures for the determination of organic micropollutants in sediments, fogwater and groundwater; (ii) influence of sample homogeneisation on the accuracy of analytical results; (iii) characterisation of airborne particles using organic marker substances and multivariate analysis; and (iv) use of a thermal desorption cold-trap injector for the analysis of traces of organic substances in waters. Attention was also devoted to sampling strategies and to the evaluation of results with contributions concerning (i) the objectives for setting up monitoring systems and (ii) the sampling strategies and analysis involved in the "Herald of Free Enterprise" accident.

Proceedings were published by the CEC as Water Pollution Research Report N° 5, EUR 11355, 1987.

Workshop on "Pesticides: Analytical Requirements for Compliance with EC Directives", Medmenham (UK), 23-24 November 1988.

The workshop was organised jointly by the CEC and the Water Research Centre, Medmenham. Presentations and discussions focused on (i) which pesticides should be monitored; (ii) analysis problems; (iii) development of multi-residue methods; and (iv) dissemination of information. The EEC regulations regarding pesticides in drinking water was presented and discussed.

Proceedings were published by the CEC as Water Pollution Research Report N° 11, EUR 12041, ISBN 2-87263-013-9, 1989.

Workshop on "High Performance Thin Layer Chromatography (HPTLC) Applied to the Analysis of the Aquatic Environment", Berlin (FRG), 16-17 March 1989.

The workshop was organised jointly by the CEC and the Umweltbundesamt, Berlin. Presentations and discussions concerned the use of HPTLC techniques for the identification and quantification of organic micropollutants. Demonstration of various TLC techniques was provided.

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

Activities of this Working Party aim at studying physico-chemical parameters influencing the behaviour of organic compounds in the environment and the incorporation of these parameters in predictive models. They are carried out in close cooperation with Working Party 3 and the Activity Centre on "Modelling Concepts for Organic Pollutants in Natural Waters" (see below).

Workshop on "Transfer Processes between Water and Organic Phases-Biotransformation of Organic Pollutants", Dübendorf (Switzerland), 1-2 December 1986.

The workshop was organised jointly by the CEC and the Eidgenossische Anstalt fur Wasserversorgung, EAWAG, Dubendorf, in the framework of this and Working Party 3 (below). The session devoted to transfer processes between water and organic phases concerned mainly Working Party 2. Most of the reports on the partitioning of organic chemicals between water and other phases containing organic matter referred to equilibrium or steady state conditions; some results concerned the study of the kinetics of associations and specific molecular interactions. Partitioning of different types of chlorinated hydrocarbons and polycyclic aromatic hydrocarbons was discussed in detail for different environmental situations.

Proceedings were published by the CEC as Water Pollution Research Report N° 2, EUR 11071, 1987.

Workshop on "Bioavailability and Partitioning", Oslo (Norway), 4-5 June 1987.

The workshop was organised jointly by the CEC, the Senter for Industriforskning, Oslo, and the National Institute of Public Health and Environmental Hygiene, Bilthoven (The Netherlands).

The presence of humic substances in the aquatic environment was found to decrease bioconcentration factors and uptake rates for hydrophobic compounds. Results suggest that compound properties other than hydrophobicity can determine uptake rates.

Modelling studies to estimate concentrations of micropollutants in the environment showed that there is a good agreement between data and predictions in general.

Proceedings were published by the CEC as Water Pollution Research Report N° 7, EUR 11357, 1988.

Workshop on "Incorporation of Physico-Chemical Processes in Models describing the Environmental Fate of Chemicals", Bilthoven (The Netherlands), 20-21 April 1989.

The workshop was organised jointly by the CEC and National Institute of Public Health and Environmental Protection, Bilthoven.

Swiss and Dutch models on the environmental fate of chemicals in surface waters were presented and applied to both a Swiss and a Dutch lake. The session devoted to sediment- water exchange of chemicals included the presentation and discussion of experimental data on sedimentation and remobilisation as well as an incorporation of data in models.

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

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

The objective is to study nonbiological and biological transformation of organic micropollutants in the aquatic environment. Emphasis is put on the fundamental aspects of biotransformation reactions to better understand the fate of organic micropollutants in water treatment and in the aquatic environment. Many activities are carried out in cooperation with Working Parties 2 and 4.

Workshop on "Behaviour and transformation of organic pollutants in Groundwater Treatment", Chania (Greece), 16-17 October 1986.

The workshop was organised jointly by the CEC, the Water Quality Institute, Horsholm (Denmark), and the Eidgenossische Anstalt fur Wasserversorgung, EAWAG, Dübendorf, (Switzerland).

Presentations and discussions concerned mainly the quality of the raw water used for drinking water production. They were grouped in 4 sessions: (i) natural bank filtration and water treatment; (ii) treatment of contaminated groundwaters; (iii)biotransformation in groundwater; and (iv) artificial groundwater recharge. An increase in the levels of organic micropollutants in ground- and surface water was generally reported. Special attention was drawn to low molecular chlorinated compounds and chelating agents.

Proceedings were published by the CEC as Water Pollution Research Report N° 3, EUR 11094, 1987.

Workshop on "Transfer Processes between Water and Organic Phases-Biotransformation of Organic Pollutants", Dübendorf (Switzerland), 1-2 December 1986.

The workshop was organised jointly by the CEC and the Eidgenossische Anstalt fur Wasserversorgung, EAWAG Dübendorf (Switzerland), in the framework of Working Parties 2 and 3.

The sessions concerning the biotransformation of organic pollutants focused on (i) pure strain studies; (ii) chlorinated compounds in soil and water; and (iii) screening and kinetics. It was pointed out that the relative significance of aerobic and anaerobic microbial reactions in determining the persistence of xenobiotics must be taken into account especially in situations -groundwater and sediments- where a range of oxygen tensions may occur. Metabolic interactions between these two groups of organisms may be important. Biodegradation in the marine environment requires a preliminary comprehensive investigation to establish on a scientific basis a rational estimate of persistence of organic compounds.

Proceedings were published by the CEC as Water Pollution Research Report N° 2, EUR 11071, 1987.

Workshop on "Transformation Reactions of Organic Pollutants in the Aquatic Environment", Helsinki (Finland), 22-24 May 1989.

The workshop was organised jointly by the CEC, the National Board of Waters and the Environment, Helsinki, and the Eidgenossische Anstalt fur Wasserversorgung, EAWAG, Kastanienbaum (Switzerland).

Papers in the field of biological transformations concerned (i) development of specialised microbial communities for the degradation of organic pollutants; (ii) test methods to predict the biodegradation of pollutants; (iii) biotransformation in groundwater, landfills and sediments; and (iv) biotransformation in enrichment cultures, wastewater and treatment plants.

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

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

The objective is to study the fate of organic micropollutants in water treatment with particular emphasis on the processes and mechanisms involved rather than on monitoring studies. The processes consider biodegradation, hydrolysis, adsorption, volatilisation, solubilisation and precipitation, as well as formation of pollutants, e.g. by chlorination, of waste, drinking and ground waters. This Working Party actively interacts with the other ones.

Workshop on "Behaviour and transformation of organic pollutants in Groundwater Treatment", Chania (Greece), 16-17 October 1986.

The workshop was organised jointly with Working Party 3 (see above).

Workshop on "Behaviour of Organic Micropollutants in Biological Waste Water Treatment", Copenhagen (Denmark), 18-19 May 1987.

The workshop organised jointly by the CEC and the Water Quality Institute, Horsholm, started with two overviews on administrative/political and technical/scientific matters. It included presentations and discussions on (i) biodegradation in aerobic systems; (ii) degradation in anaerobic systems; (iii) use of biodegradation and other tests for predictions and monitoring; (iv) behaviour of detergent chemicals in biological treatment plants; (v) combined biological and physical/chemical removal; and (vi) mathematical modelling. Of particular interest were the studies of the behaviour of pollutants in anaerobic systems and the attempts to model the removal of micropollutants in a sewage treatment plant.

Proceedings were published by the CEC as Water Pollution Research Report N° 6, EUR 11356, 1987.

Workshop on "Organic Micropollutants in Drinking Water", Tenerife (Spain), 21-22 April 1988.

The workshop organised by the CEC included presentations and discussions on (i) organic micropollutants introduced after water treatment and problems concerning specific compounds; (ii) tastes and odours in drinking waters and (iii) National and EC regulations regarding organic micropollutants in drinking water. Two EC Directives and some legislation aspects in FRG with special emphasis on pesticides were presented. Data on pesticide levels in drinking water sources in Spain and the Netherlands were also considered.

Proceedings were edited by J. Rivera and G. Angeletti and published by the CEC as Water Pollution Research Report N° 9, EUR 11878, ISBN 2-87263-006-6, 1988.

Workshop on "Laboratory Tests for Simulation of Water Treatment Processes" held at the CEC-JRC, Ispra (Italy), 23-24 November 1989.

This workshop organised by the CEC aimed at reviewing established and new test methods for simulating the behaviour of xenobiotic compounds during treatment employing biological degradation, volatilisation, sorption and separation processes. Presentations included procedures for data evaluation and interpretation.

Proceedings will be published by the CEC.

Joint Workshop of COST 641 and COST 681 on "Organic Contaminants in Waste Water, Sludge and Sediments: Occurence, Fate and Disposal", Brussels (Belgium), 26-27 October 1988.

The workshop was organised jointly by COST 641 and COST 681 "Treatment and Use of Organic Sludge and Liquid Agricultural Waste".

The importance of increasing research in the field of occurence, behaviour and fate of organic compounds in the environment to assess effective measures for prevention and proper treatment of all types of wastes was underlined. Chloro-organic compounds and surface active agents were recognised as the most important groups of pollutants, followed by polycyclic aromatic hydrocarbons resulting mostly from combusion processes and phtalates. Simple aromatic substances, heterocyclic compounds, volatile and easily degradable organic chemicals like alcohols, ketones, etc. being of minor importance.

Proceedings edited by D. Quaghebeur, I. Temmerman and G. Angeletti are being published by Elsevier, EUR 11957.

Activitiy Centre 1: Inventory of Pollutants

The objective of this Activity Centre (1978-1987) was to collect data on organic pollutants which are present in all types of water.

The inventory of organic micropollutants in the aquatic environment has been compiled from a computer data base established at the Water Research Centre, Stevenage Laboratory, Stevenage, Herts, SG1 1TH, UK. The work was funded by the UK Department of the Environment for the period 1972-1984 and until 1986 by the CEC-JRC, Ispra (Italy). The data are also available as a sub-file on the Environmental Chemicals Data and Information Network (ECDIN) at Ispra (see Environmental Research Newsletter N° 3, p. 8)

The inventory includes available data on organic compounds of environmental importance, mostly from European, American and Japanese sources. Updates of collated information are incorporated into ECDIN twice a year. The addendum to the 4th Edition of 1984 was published in 1987 as report XII/311/87.

Activity Centre 2: Mass Spectrometric Data

The objective of this Activity Centre (1978-1987) was to collect the mass spectra of organic compounds found in surface waters.

The COST reference spectra collection includes 2000 mass spectra of organic compounds representing 1817 compunds.

The collection was published in 4 volumes in 1986 as report XII/ENV/29/86.

Activity Centre 3: Modelling Concepts for Organic Pollutants in Natural Waters

The objective of this Activity Centre (1986-now) is to disseminate information on existing software for mathematical modelling of organic micropollutants. This should help interested scientists and stimulate the development of new modelling concepts and software.

Activities were started in 1986 with the development of mathematical models for the evaluation of the dynamic behaviour of anthropogenic substances in aquatic systems (MASAS). The MASAS system is being developed at EAWAG, Dubendorf (Switzerland). It allows the user to construct models of increaring complexity for lakes, rivers and groundwater aquifers.

Other publications

Tributyltin in the Environment: Sources, Fate and Determination, M. Muller, L. Renberg, G. Rippen and A. Bjorseth, CEC Water Pollution Research Report N° 8, EUR 11562, 1988.

This report aims at assessing the effects on the environment from the use of tributyltin (TBT). The main sections give an overview on the use, emission, toxicity and environmental fate of TBT, butyltin speciation at trace levels. Conclusions and recommendations for future research are also given.

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.

1.2. Water Quality

Research in this area covers inland surface waters, estuarine and marine waters (groundwater quality is considered under "Soil Quality"). It is managed by DG XII/E1.

Emphasis is placed on the major pathways (including atmospheric and sediments) of inorganic and organic pollutants, their biological and chemical transformations (e.g. complexation, speciation, microbiological transformation, etc.) and their abiotic and biotic degradation.

The projects are covering marine and freshwater quality:

Studies on N- and P-cycles and eutrophication in the deltas of Ebro, Po and Rhône

The objectives are to assess sources, fluxes and sinks of nutrients in three important Mediterranean river deltas and develop strategies for countermeasures against eutrophication to protect wetland habitats.

Participating institutes are:
- Fondation Sansouire, Station Biologique de la Tour du Valat, Le Sambuc/Arles, France (H.L. Golterman, project leader);
- Universidad de Barcelona, Spain, (F.A. Comin);
- Università degli Studi di Ferrara, Italy (I. Ferrari).

Ecosystem research in freshwater environment recovery: reversibility of eutrophication in lakes

The objectives are to investigate the possibilities of using various methodologies, including biomanipulation of the trophic chain, to counteract the effects of organic pollution (eutrophication) in lakes. These studies aim also at restoring the ecosystems by environmentally sustainable and cost-effective methods.

Participating institutes are:
- Limnological Institute of the Royal Netherlands Academy of Arts and Sciences, Nieuwersluis, The Netherlands (L. van Liere, project leader);
- Rijkswaterstaat, Institute for Inland Water Management, RIZA, Lelystad, The Netherlands (M.L. Meijer);
- CNR, Istituto Italiano di Idrobiologia, Pallanza, Italy (G. Guissani);
- Università degli Studi di Milano, Italy (M. Vighi);
- University of East Anglia, School of Environmental Sciences, Norwich, UK (B. Moss).

Further information can be obtained from:
H. Barth, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356452.

1.3. Ecological Effects of Pollutants

Research in this area considers the effects of well characterized organic and inorganic pollutants on estuarine and marine environments to support the establishment of water quality objectives. It is managed by DG XII/E1.

Preference is given to an integrated research on the effects of low concentrations of pollutants on several environments (e.g. surface waters, estuarine, sea) as well as on the influence of important boundary conditions, such as temperature, salinity, light conditions, etc.

Projects in progress concern marine and freshwater pollution.

Physiological and biochemical approaches to the assessment of pollution of European estuarine and coastal ecosystems

The objectives are (i) to investigate the biochemical and physiological effects of contaminants and the response to natural variables in organisms representative of major European estuarine and inshore coastal environments and (ii) to relate pollution effects and biological responses to the inherent variability of the environment. The relative importance of natural stresses on the effects of pollution are assessed by the biochemical reactions of benthic organisms (see also 3.3.1.).

Participating institutes are:
- NERC-Plymouth Marine Laboratory, UK (B.L. Bayne, project leader);
- University of Aarhus, Denmark (R.E. Weber);
- University of Utrecht, The Netherlands (A. De Zwaan);
- University of Liege, Belgium (R. Gilles);
- University of Bologna, Italy (P. Cortesi);
- University of Nice, France (M. Lafaurie);
- University of Bordeaux I, Talence, France (M. Garrigues/M. Narbonne);
- University of Genova, Italy (A. Viarengo);
- University of Aix-Marseille, France (M. Monod);
- Oceanographic Museum of Monaco, France (J. Maigret).

Origin and fate of methylmercury

The objective is to investigate the extent to which biotic and abiotic processes are responsible for the formation of methylmercury in freshwater and marine environments.

Participating institutes are:
- ENEA, La Spezia, Italy (M. Bernhard, project leader/M. Filipelli);

- Università degli Studi di Genova, Italy (R. Capelli/V.Minganti);
- Università di Siena, Italy (A. Renzoni/F. Baldi);
- K.F.A. Julich, FRG (M. Stoeppler);
- Université de Bordeaux I, Talence, France (A. Boudou/ F. Ribeyre).

Further information can be obtained from:
H. Barth, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356452.

1.4. Water Quality Research at the JRC-Ispra

Water quality studies at the Environment Institute of the Joint Research Centre Ispra (Italy) have considered the distribution and the biological effects of pollutants in freshwater ecosystems. Global studies on eutrophicated and heavy metal polluted lakes have been based on the mass balance concept.

The effects of chemical pollution on the biological populations and communities have been investigated using semi-natural ecosystems (enclosures) and flow-cytometric techniques.

Modelling has been used for the interpretative analysis of the evolution of lake ecosystems.

Results of these studies are used by other Commission services (DG XI) for the preparation of Community Directives.

1.4.1. Transport and fate of pollutants in aquatic ecosystems

The main objectives of these studies are the understanding of the mechanisms governing the transport, transformation, deposition and remobilisation of pollutants in the aquatic cycle. Special emphasis is given to studies on large freshwater systems likely to become drinking water reserves in the near future as well as the development, calibration and refinement of mathematical models.

Trace metals with distinct toxicity to aquatic biota such as Hg, Cd, Pb, Cu and Ni have been studied. Organic micropollutants such as PCB and PAH are also included.

These studies consider:

- the spatial distribution of trace metals in sediments, the assessment of the temporal evolution of their deposition rates and the calculation of total metal sediment inventories on the basis of geostatistical methods;
- the measurement of the spatial and temporal metal distribution in the system (lakes and feeding rivers), identification and quantification of external metal input sources and their corresponding input rates;
- the measurement of vertical particle and particle-associated metal fluxes and study of metal remobilisation processes during and after deposition; and
- the interpretation of experimental data collected to forecast the time-evolution of the total metal concentrations in the different aquatic compartments by mathematical models.

Studies carried out on lakes Orta and Maggiore (Italy) also aimed at creating, through modelling, interpretative and predictive schemes to be extrapolated to other situations in the European Community.

1.4.2. Effects of chemical pollution on aquatic communities

Laboratory experiments on single individuals and experimental populations

The aim of these experiments was to evaluate, under standardised conditions, the lethal and sub-lethal effects of Hg, Cd, Cu, Co, Cr, Zn, Pb, Ni, Se and Al on phytoplankton algae, molluscs and crustaceans. The influence of these metals on the demographic parameter was detected. Results suggest that long-term experiments are essential to estimate the actual toxicity of low concentrations of metals at population level. Toxicity thresholds of the tested metals for several freshwater species were detected.

Experiments in semi-natural conditions (enclosure method) on natural populations of phyto- and zooplankton

Experiments with Cd, Hg, Cu and Al added to the enclosures aimed at (i) evaluating the sensitivity of the single species in their natural environment, (ii) following the biomass variations of phyto- and zooplankton, (iii) studying the natural recovery processes of the planktonic community in relation to the physical and chemical characteristics of the environment, and (iv) comparing the community structure before and after the application of the pollution stress.
Results indicated that the ecosystem stressed by toxic metals recovers few days after their immission, but the structure of the community is deeply modified.

Other experiments aimed at testing the influence of the oxygen on the partitioning of some trace metals existing in the enclosed ecosystem among water, sediments, periphyton and suspended matter. The enclosures (40m dia and 6 m ht) were anchored in lake Comabbio (Italy) and the trace metals tested were Cd, Cu, Co, Zn, Cr, Al, Pb, V and Ni. Each enclosure represented a complete ecosystem consisting of the water column with its sediment, phytoplankton (producers), zooplankton (consumer of first order), fish (consumers of second order) and microorganisms (decomposers). In one enclosure pure oxygen was continuously dissolved in the water from early spring to late autumn, the other being a control.

Results indicated that the influence of the hypolimnetic oxygenation on the metal partioning among the major compartments of the ecosystem varies with the metal added. The oxygenation accelerates the ecosystem metabolism and changes the relation production/degradation of the organic matter.

1.4.3. Flow-cytometry

Flow-cytometry provides a fast and quantitative alternative to conventional techniques (microscopy, colorimetry and turbidimetry) to study characteristics of single cells. Measurements are carried out, on a cell by cell basis, 10^4 to 10^5 times faster than with conventional techniques. The higher sampling frequency allows the analysis of larger volumes with higher statistical significance as well as the study of ecological processes with very short time resolution.
It is a valuable tool for the rapid acquisition of information on water quality parameters, such as the composition, abundance and distribution of algae in a water sample, which can be related directly to the level of inorganic and organic pollution in the sample (bioindicator approach)..

In the past 6 years a project to investigate optical properties of algae such as light scattering and autofluorescence (chlorophyll fluoresence) has been carried out at the Ispra Establishment of the JRC.

The laboratory is presently equipped with:

- a prototype flow-cytometer with laser light source, using multi-angle-light scatter and fluorescence ("red" for chlorophyll-a and "green" for phycoerythrin) to distinguish algae species;
- a modular flow-cytometer with a less powerful laser source measuring fluorescence and small-angle-light scatter, to be operated in mobile laboratories or on board a ship; and
- a flow-cytometer with mercury arc-lamp source to identify and count bacteria and small algal cells.

Research performed indicated the possibility to carry out daily measurement of scattering and autofluorescence on algal communities to increase the accuracy of water quality assessment in an objective and comparable way.

Deterministic and probabilistic algorithms for the classification of algal species were developed. In future, more complex analyses like cluster analysis, will be used to develop more efficient classification methods and increase the number of algal species which can be distinguished simultaneously.

1.4.4. Modelling

Modelling studies in the framework of this project have concerned various ecologically relevant subjects:

- *water renewal in monomictic lakes*: a computer code has been written and used to evaluate water mean residence time in the basins of lakes Como, Lugano and Maggiore (Italy);
- *lake eutrophication, with particular emphasis on phosphorus cycle and phosphorus release from the sediments*: a lake eutrophication model, based on the vertical box concept and conceived for both interpretative and predictive purposes, has been constructed for lake Lugano, and later successfully validated for other eutrophic lakes;
- *vertical heat transfer in a lake*: a computer code has been written to evaluate the effective diffusion coefficient as a function of depth on the basis of measured water temperature profiles;
- *algal growth in laboratory cultures*: various types of algal experiments have been modelled, and the experimental results have been used to determine dynamic algal parameters;
- *heavy metal distribution in lake basins*: characteristic time of transient terms and asymptotic value of the metal concentration have been calculated as dependent on the concentration of suspended matter and distribution constant between dissolved and adsorbed metal phase.

Workshops

OECD International Seminar on "The Use of Biological Tests for Water Pollution Assessment and Control".

Held in Ispra, Italy, 25-26 June 1986, this seminar concluded the work of the OECD/EPA "Water Management Policy Group". This group was appointed to set an international guideline on the use of biological testing of effluents for water pollution assessment and control.

Conclusions are reported in: "The Use of Biological Tests for Water Pollution Assessment Control", OECD environmental monographs, No 11, 1987.

Ispra Course on "Ecological Assessment of Environmental Degradation, Pollution and recovery, Ispra (Italy), 12-16 October 1987.

The course, organised by the CEC, JRC Ispra, provided a review of the evolution trend of stressed and non-stressed ecosystems and compared the techniques for environmental recovery. In addition, the influence of air pollution on the various environments was discussed. Terrestrial ecosystems as well as standing and current waters were considered.

Proceedings edited by O. Ravera, were published by Elsevier Science Publishers, Amsterdam, The Netherlands, EUR 12054, ISBN 0-444-87361-9, 1989.

Further information can be obtained from:
G. Rossi, Institute for the Environment, CEC-JRC Ispra, I-21020 Ispra. Tel. + 39 332 789856.

2. Soil Research

Research on soil, managed by DG XII, focuses on various environmental aspects influencing soil quality. It is complementary to relevant parts of the Community's Agricultural Research Programme managed by DG VI/F.1. (see below). Some studies performed in the programme "Waste Research" provide useful information in the field of soil protection (see Environmental Research Newsletter N° 3, Waste Research).

Research managed by DG XII/E1. is implemented by shared-cost contracts relating to "Soil Quality" (2.1.).

The JRC Ispra's contribution concerns the "Migration and Transformation of Pollutants in Soils" (2.2.) in the context of the "Chemical Waste" programme.

2.1. Soil Quality

Research in this area considers some aspects related to the deterioration of soil quality, the accumulation of pollutants in soils and their transfer to groundwater and the food chain. It is managed by DG XII/E1.

Under the ongoing programme of Environmental Protection (1986-1990), the projects in progress are subdivided in "Soil Pollution" (2.1.1.), "Effects of Agricultural Practices" (2.1.2.) and "Erosion" (2.1.3.). They started at the beginning of 1988. The progress achieved during the first year of the contract were presented in the form of posters at the "First Meeting of the contractors of Soil Quality", Crete (Greece) 23-25 February 1989. They are published in the Progress Report 1988 (see below).

2.1.1. Soil Pollution

This topic covers research on the behaviour of pollutants in soils including their mobility and their transfer to groundwater, their availability for key processes as a function of soil characteristics and the dgradation of organic pollutants.

Five shared-cost projects are presently being carried out:

Biological and chemical behaviour of pesticides in phreatic aquifers

The objectives are (i) to determinate basic parameters of sorption and degradation of pesticides under environmental conditions in the groundwater zone and (ii) to gather information on the influence of variations in environmental conditions (redox state, pH, soil type) in the groundwater zone on degradation and sorption processes of pesticides.

Participating institutes are:

- National Institute of Public Health and Environmental Protection RIVM, Bilthoven, The Netherlands (J.P.G. Loch, project leader);
- Technical University of Denmark, Department of Environmental Engineering, Lyngby, Denmark (E. Arvin)

Coventry groundwater investigation: sources and movement of chlorinated solvents in dual porosity rocks

The objectives are (i) to develop field techniques for investigating groundwater pollution by halogenated hydrocarbon solvents (HHS) in dual porosity materials; (ii) to describe and model the regional distribution and movement of dissolved HHS in the Coventry area of the UK as an example of a dual porosity aquifer system; and (iii) to improve understanding of the movement and retention of HHS in soils and aquifer materials.

Participating institutions are:

- School of Earth Sciences, University of Birmingham, UK (D.N. Lerner, project leader);
- Geological Survey of Denmark, Copenhagen, Denmark (E. Gosk);
- Bureau de Recherches Geologiques et Minieres (BRGM), Orleans, France (A. Bourg).

Speciation model for competitive interaction of metal ions with organic matter

The objective is to develop and test physico-chemical models for the binding of ions to soil organic matter to improve the understanding and prediction of the effects of pollutants in soil.

Participating institutions are:

- Agricultural University of Wageningen, The Netherlands (F.A.M. de Haan, project leader);
- British Geological Survey, Wallingford, UK (D.G. Kinniburgh).

Nitrate in soils: soil profile

The objectives are (i) to assess the impact of agricultural practices on nitrate leaching from the soil root zone and the associated effects on groundwater quality; (ii) to develop practical techniques and to define associated data needs for modelling nitrogen transformations and patterns of movement under field conditions to optimise nitrogen fluxes for agricultural and environmental objectives; and (iii) to define data needs and models for studies at field, farm, catchment and regional level.

Participating institutions are:

- Agricultural University Wageningen, The Netherlands (J. Bouma, project leader);
- Soil Survey and Land Research Centre, Silsoe, UK (A.J. Thomasson);
- Laboratory of Land Management, Katholieke Universiteit Leuven, Belgium (J. Feyen);
- Universität Kiel, FRG (J. Lamp);
- Arbeitsgruppe Systemforschung, Osnabruck, FRG (H. Lieth);
- National Agency of Environmental Protection, Copenhagen, Denmark (M. Dyhr-Nielsen);
- Athens Faculty of Agriculture, Greece (N. Yassolgou);
- Winand Staring Centre for Integrated Land, Soil and Water Research, Wageningen, The Netherlands (A. Breeusma).

Nitrate in soils: groundwater

The objectives are (i) to elaborate models of nitrogen flux in regions with large amounts of manure and to apply and improve existing models; (ii) to link unsaturated and saturated models to a comprehensive nitrogen flux model of the agroecosystem; (iii) to design pumping strategies to avoid or minimise nitrate intrusion into pumping wells; and (iv) to calibrate devised models by means of field experiments.

Participating institutions are:

- Arbeitsgruppe Systemforschung, Osnabruck, FRG (H. Lieth, project leader);
- Rijksuniversiteit Gent, Belgium (M.F. de Boodt);
- Universität Hannover, FRG (R. Mull);
- Technische Universiteit Braunschweig, FRG (J. Wolff).

The above subprojects are coordinated by A. J. Thomasson.

Workshops on nitrate in soils and groundwater were organised at the Katholieke Universiteit Leuven and the Rijksuniversiteit Gent in Belgium for participants to present and discuss results obtained so far.

2.1.2. Effects of Agricultural Practices

This topic covers research on the consequences of cultivation techniques and management. In addition to projects studying the effects of fertilizers (see 2.1.1.) and specific erosion problems arising from human activities (see 2.1.3.). A shared-cost project to assess and prevent soil salinity after frequent irrigation is:

Effects of irrigation on soil quality of reclaimed areas in Las Marismas, Spain

The objective is to develop and validate models to predict water and salt movement patterns in soils to develop alternative tillage and irrigation practices conserving soil quality.

Participating institutes are:

- Consejo Superior de Investigaciones Cientificas (CSIC), Inst. de Recursos Naturales y Agrobiologia, Sevilla, Spain (J. Martin Aranda, project leader);
- Institut de Mécanique de Grenoble, Université J. Fourier, France (G. Vachaud).

A workshop on soil salinity was organised at the Inst. de Recursos Naturales y Agrobiologia, Sevilla, Spain.

2.1.3. Erosion

This topic covers research on models to predict erosion and tools to prevent it. Effects of forest fires are also considered.

Four shared-projects are presently under study:

Soil erosion in the EEC: a framework for soil protection

The objective is to develop and validate a procedure to predict rates of soil erosion and to serve as a design tool for soil protection in EC countries.

Participating institutions are:

- Silsoe College, UK (R.P.C. Morgan, project leader);
- Consejo Superior de Investigaciones Cientificas, Instituto di Agroquimica y Tecnologia de Alimentos, Valencia, Spain (J.L. Rubio);
- Katholieke Universiteit Leuven, Belgium (J. Poesen).

The following institutions contribute to the project without funding:

- Università degli Studi di Palermo, Italy (G. Chisci);
- Rothamsted Experimental Station, Harpenden, UK (R. Webster);
- Geografisk Central Institut, University of Copenhagen, Denmark (B. Hasholt);
- Danish Hydraulic Institute, Horsholm, Denmark (M. Styczen);
- INRA, Station d'Agronomie de Laon, France (J. Boiffin);
- Centro per la Genesi, Classificazione e Cartografia del Suolo, Firenze, Italy (D. Torri);
- Phys. Geographie u. Landschaftsoekologie, Technische Universität Braunschweig, FRG (H.R. Bork);
- Centro de Edafologia y Biologia Aplicada del Segura (CSIC), Murcia, Spain (J. Albaladejo Montoro).

Workshops on EC erosion models were organised at the Silsoe College, UK, and the Katholieke Universiteit Leuven, Belgium.

Study of erosion and sedimentation processes using satellite Data

The objective is to develop a methodology based on satellite images (Landsat TM and SPOT data) to monitor and follow the processes of erosion and sedimentation on the Mediterranean coast and in the Adra River Basin.

Participating institutions are:

- IBERSAT S.A., Madrid, Spain (S. Montesinos Aranda, project leader);
- Bureau de Recherches Geologiques et Minieres (BRGM), Orleans, France (G. Delpont).

Factors causing and controlling erosion in soils subjected to the action of fire

The objective is to evaluate the effects of fire, particularly ashes and heat wave, on the factors controlling soil erosion in two different districts of Southern Europe with frequent episodes of fire, i.e. Galicia (Spain) and Toscana (Italy).

Participating institutions:

- Istituto per la Chimica del Terreno, CNR, Pisa, Italy (G. Giovannini)
- Universidad de Santiago de Compostella, Spain (F. Diaz-Fierros Viqueira).

Effect of forest fire on soil erosion and drainage basin dynamics

The objective is (i) to assess the impact of forest fires on soil erosion and catchment dynamics in areas with a strong seasonal climatic regime, stressing the interactions and linkages between hillslope erosion processes and drainage basin dynamics, (ii) to identify the risk areas with severe soil erosion, so as to remediate in due time; (iii) to understand tendencies in landscape evolution due to phenomena of very short duration; and (iv) to identify the feedback mechanisms generated and try to predict the drainage basin model of evolution so as to take appropriate environmental protection measures.

Participating institutions are:

- Departamento de Ambiente e Ordenamento, Universidade de Aveiro, Portugal (C. de Oliveira Alves Coelho, project leader);
- Department of Geography, University College of Swansea, UK (R.A. Shakesby).

Symposium

Symposium on "Scientific Basis for Soil Protection in the European Community, Berlin, 6-8 October 1986

The objectives of the symposium were to discuss the present state of soils in the European Community to ascertain whether soils are being degraded, and if so, in which way, to what extent and with what consequences. The symposium highlighted the need for an overall community policy to protect soils.

Papers presented concerned soil damage through single crop farming, intensive use of chemicals as fertilizers, problems connected to the use of agricultural machinery, and practice of intensive livestock farming. Problems arising from the disposal of solid or liquid waste, in particular toxic waste in tips as well as those causing widespread atmospheric pollution from burning fossil fuels in power plants and motor vehicles were considered. Pollution abatement measures and nuclear accidents in relation to soil protection formed the subject of active discussions.

The proceedings which also include recommendations for action have been publihed by Elsevier Applied Science Publishers LTD, Ed. H. Barth and P. L'Hermite, 1987.

Publications

Environmental Research Programme, Research Area Soil Quality, Progress Report 1988, Report XII/69/89-EN.

Research Requirements relating to the Environment and Agricultural Land Use, A. Grafen, Report XII/252/88.

Soil Quality Assessment, State of the Art Report on Soil Quality, F.A.M. de Haan, A.C.M. Bourg, S.P. Mc Grath, P.C. Brookes, W. Verstraete, W.H. van Riemsdijk, S.E.A.T.M. van der Zee, J.V. Giraldez, March 1989, Report XII/523/89.

Further information and reports on all the above topics can be obtained from:

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

2.2. Chemical Waste- Migration and Transformation of Pollutants in Soils

Soil Quality studies at the Environment Institute of the Joint Research Centre Ispra (Italy) is part of the research on Chemical Waste carried out at this institute (see also Environmental Research Newsletter N° 3).

Research considers the migration and transformation of some selected toxic chemicals (hazardous and industrial waste and/or release of pesticides and herbicides) in various soils mainly in the unsaturated zone including groundwater contamination.

These investigations cover laboratory and field studies to evaluate parameters involved in flux kinetics and in the lixiviation of the contaminants into the soil profile. Laboratory investigations aim at understanding basic processes be they physical, chemical or biological which can affect solute concentration and transport of the studied contaminant through the specific soil medium.

Previsional models based on experimental data are elaborated to evaluate the potential impact particularly with reference to the prevention of eventual risks to the environment in general and human in particular.

Ongoing laboratory experiments tend to simulate unsaturated water flow in soil columns applying a negative pressure head to determine the relationship of hydraulic pressure head with soil moisture content and the hydraulic conductivity dependance of the soil moisture content. To

characterize the soil columns, an experimental gamma ray attenuation device is under construction to determine simultaneously soil density and water content. A dual source containing Am-241 and Cs-137 will be used. Radiotracers of high specific radioactivity allow the distribution study of toxic trace metals such as As, Cr, Se, Tl, Zn in soils and water.

Experiments have also been performed to obtain physico-chemical data on polychlorinated biphenyls (PCBs) and chlorobenzenes.
The sorption kinetics of selected chlorobenzenes and PCB congeners was studied by allowing an aqueous trace solution of the commercial transformer fluid Askarel to equilibrate with different soils. The coefficient of distribution between soil and water has proven to be an essential parameter for the transport of hydrophobic compounds from soil to water.

Log-linear relations between soil-water distribution coefficients normalized to organic carbon and published physical data (water solubility, octanol-water partition coefficients) were taken for future use in modelling the transport and fate of chlorobenzenes and PCBs in the environment.

A study of the influence of soil organization on the migration of trace metals and organic compounds using micromorphological techniques has been planned. These techniques allow to work with undisturbed soil columns and to have a real scale model.

Further information can be obtained from:
L.E. Goetz, Institute for the Environment, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789408.

3. Ecosystem Research

Research in this area consists of multidisciplinary approaches to improve knowledge on the functioning of ecosystems and the impact of a combination of factors on the overall ecological balance. The effects on different compartments of the environment are also considered. This research is managed by DG XII/E1 and is implemented by shared-cost contracts to investigate the "Biogeochemical Cycles" (3.1.); the "Functioning of Terrestrial Ecosystems" (3.2.); "Aquatic, Coastal and Wetlands Ecosystems" (3.3.); and the "Conservation of Species" (3.4.). A Concerted Action managed by DG XII/E1 focuses on "Coastal Benthic Ecology" (3.5). A new Concerted Action in the field of terrestrial ecosystems research which will also include the conservation of habitats for the protection of endangered species is considered.

3.1. Biogeochemical Cycles

This topic covers research on the most important mechanisms which could be involved, natural sources and sinks, anthropogenic perturbations of the various cycles and the environmental impact of such perturbations. Special attention is given to the quantitative aspects of the biochemical cycles of S, N and P (C cycle is considered in the Climatology Research Programme, see below).

A shared-cost investigation, related to COST Project 611 on "Physico-Chemical Behaviour of Atmospheric Pollutants", is under way:

Eurocore: a European ice-core programme on atmospheric chemistry and climate

The objective is to supply essential historical and baseline data by establishing a record of important trace gases in the atmosphere during the last 1200 years.

Participating institutes are:

- Laboratoire de Glaciologie, CNRS, Saint Martin d'Heres, France (R.F. Delmas, project leader);
- University of Copenhagen, Denmark (C.U. Hammer);
- University of Bern (Switzerland) is participating, without Community funding.

These institutes participated to a campaign in Greenland in summer 1989 to extract an ice-core. Other institutes may be involved in the analysis of ice samples collected in this campaign. For information, please contact the project leader or

G. Angeletti, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2358432.

Two shared-cost projects concern biogeochemical processes in coastal ecosystems, i.e. EROS 2000 Project and the "Shanelbe Project":

EROS 2000 (European River Ocean System)

This large-scale interdisciplinary research project aims at investigating the biogeochemical interactions affecting the cycling and transformation of pollutants and nutrients in European coastal waters and their environmental implications. It is subdivided in 4 subprojects: (i) modelling, statistics and remote sensing of coastal processes; (ii) bio-organic processes: nutrient fluxes and eutrophication, organic pollutants and biomarkers; (iii) inorganic processes: input, speciation and reactivity of trace metals and metalloids; (iv) sediment transport and deposition. During the first two-year period the project is being carried out in the NW-Mediterranean Sea; afterwards it could be extended also to other European regional seas.

Twenty six laboratories* from 11 EEC Countries and Switzerland are participating:

- CNRS, Ecole Normale Supérieure, Montrouge, France (J.M. Martin, project leader/M.D. Loye-Pilot/J.C. Brun-Kottan/J. Morelli);
- Université de Villefranche-sur-Mer, France (A. Morel);
- Université P. et M. Curie (U.A. 353 CNRS), Paris VI, France (A. Saliot);
- Station d'Océanologie et de Biologie Marine (LP 4601 CNRS), Roscoff, France (D. Vaulot);
- Station Marine d'Endoume et de Luminy-Marseille (U.A. 41 CNRS), France (H.J. Minas);
- Université de Perpignan (U.A. 715 CNRS), France (G. Cauwet);
- Université Libre de Bruxelles (ULB), Belgium (R. Wollast);
- Université de l'Etat de Liège, Belgium (J. Nihoul/J. Smitz);
- Aarhus Universitet, Denmark (T.H. Blackburn);
- CSIC, Centro d'Estudis Avancats de Blanes (Girona), Barcelona, Spain (A. Cruzado);
- CSIC, Centro de Investigacion y Desarrollo, Barcelona, Spain (J. Albaiges);
- University of Athens, Greece (L. Scoullos);
- University College Dublin, Ireland (P. O'Kane);
- CNR-Laboratorio FISBAT, Bologna, Italy (E. Prodi);
- CNR-Istituto di Biofisica, Pisa, Italy (R. Ferrara/A. Seritti);
- Nederlands Instituut voor Onderzoek der Zee (NIOZ), Texel, The Netherlands (V. Helder/D. Eisma);
- Instituto Superior Tecnico (ISF), Lisboa, Portugal (A. Neves);
- Kernforschungsanlage (KFA), Julich, FRG (L. Mart);
- Universität Hamburg, FRG (A. Spitzy);
- NERC- Plymouth Marine Laboratory, Plymouth, UK (F. Mantoura);
- University of Liverpool, UK (R. Chester);
- University of Southampton, UK (J.D. Burton);
- University College of North Wales, School of Ocean Sciences, UK (P. J. Williams);
- EAWAG, Dübendorf, Switzerland (W. Stumm) is participating, without Community funding.

First Scientific Workshop on "EROS 2000", Paris (France), 7-9 March 1989.

This workshop was organised jointly by the CEC and the French "Ministère de la Recherche et de la Technologie". The ojectives were (i) to report on scientific achievements of the project during the first year of activity; (ii) to identify major gaps in actual coverage by the EROS 2000 project of estuarine/coastal marine research subjects; (iii) to specify operational goals for the next research phase of the project; and (iv) to define the scientific (and possibly geographic) orientation of EROS 2000 after its pilot phase of two years, with regard to the forthcoming EC R&D Programmes in the fields of Environmental Protection (STEP) and Marine Science and Technology (MAST).

Presentations and discussions were grouped in five sessions: (i) regional integration, remote sensing and modelling of coastal zone processes; (ii) bioorganic processes; (iii) inorganic processes; (iv) particles and sediment/water interactions; and (v) river versus atmospheric imputs.

* Some of the above institutions are participating in the EROS 2000 project with two or more laboratories.

Proceedings, edited by J.-M. Martin and H. Barth will be published by the CEC as Water Pollution Research Report N° 13.

A progress report on the investigation carried out in the framework of the EROS 2000 Project will be provided, at request, together with the workshop proceedings.

Biogeochemical cycles in two major European estuaries: the Shannon and Elbe ("Shanelbe project")

The objective is to improve the scientific basis for controlling the inputs of nutrients and trace metals into two major estuaries and to predict the fate of pollutants.

Participating institutes are:

- Universität Hamburg, FRG (H. Kausch, project leader for German subproject);
- Technische Universität Hamburg-Harburg, FRG (U. Forstner);
- GKSS Forschungszentrum, Geesthacht, FRG (M. Knauth);
- Trinity College Dublin, Ireland (J.G. Wilson, project leader for Irish subproject);
- University College Galway, Ireland (F.W. Patching);
- An Foras Forbartha, Dublin, Ireland (L. Stapleton);
- Institute for Industrial Research and Standards, Dublin, Ireland (R.C. Boelens).

This project is complementary to two large national german projects ("Tide-Elbe" project and Zisch Study).

Workshop on "the Shannon-Elbe Estuaries Project", Hamburg (FRG), 17-18 March 1989.

The workshop was organised jointly by the CEC and the University of Hamburg.

Proceedings, edited by F.G. Wilson, H. Kausch and H. Barth, will be published by the CEC as Water Pollution Research Report N° 15. They are supplemented by a review of the available published and unpublished literature on the Shannon estuary prepared by T. Mc Mahon.

Further information on "EROS 2000" and "Shanelbe project" can be obtained from:

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

3.2. Functioning of Terrestrial Ecosystems

This topic covers research to better understand the ecosystems' dynamics to predict their response to environmental changes in space and time, and to develop rational environmental management techniques.

Six shared-cost projects are presently under study:

Mechanism of nutrient turnover in the soil compartment of forests

The objective is to develop process level models to describe nutrient turnover in the forest soils. This project which relies on the collaboration established through the Forest Ecosystem research Network FERN involves the participation of six research groups located throughout Europe:

- Natural Environment Research Council, Institute of Terrestrial Ecology, UK (P. Ineson, project leader);
- University of Exeter, Exeter, UK (F. Anderson);
- Gesellschaft für Strahlen- und Umweltforschung (GSF), München, FRG (R. Beese);
- University College, Dublin, Ireland (A. Bolger);
- CNRS, Brunoy, France (F. Couteaux);
- Vrije Universiteit, Amsterdam, The Netherlands (J. Verhoef).

Impact on ecosystem of methods used to prevent forest fires

The objective is to assess the ecological consequences of methods used to prevent forest fires and better understand the functioning of Mediterranean forest ecosystems.

Participating institutes are:

- Università degli Studi, Firenze, Italy (P. Piussi);
- Aristotelian University, Thessaloniki, Greece (A. Nastis);
- Universidad de Tras-os-Montes e Alto Douro, Portugal (F. Castro Rego);
- Université d'Aix-Marseille III, France (R. Loisel);
- CNRS, University of Montpellier, France (D. Gillon/F. Di Castri).

The role of biogeochemical cycling in the environmental impact of agroforestry

The objective is to understand and quantify nutrient cycles in agroforestry.

Participating institutes are:

- An Foras Taluntais, Dublin, Ireland (M. Bulfin);
- Macauly Land Use Research Institute, Aberdeen, UK (P. Newbould);

Aristotelian University, Thessaloniki, Greece (D. Papamichos).

Driving forces and limiting factors in long-term dynamics of forest ecosystems on sandy soils

The objective is to understand the basic eco-physiological processes in forest ecosystems.

Participating institutes are:

- University of Göttingen, FRG (M. Runge, project leader);
- University of Ghent, Belgium (P. Van Miegroet).

Nutrient cycling in the degenerate natural forests of Europe in relation to their rehabilitation

The objective is to carry out parallel studies of nutrition and nutrient cycling in forest stands in order to understand the forest ecosystem functioning.

Participating institutes are:

- University of Aberdeen, UK (H. Miller, project leader);
- CNRS, University of Montpellier, France (F. Di Castri);
- University of Salamanca, Spain (J. Gallardo);
- Forest Dervice, Department of Energy, Dublin, Ireland (R.G. Mc Carthy).

Watershed responses in Mediterranean ecosystems

The objective is to establish input-output nutrients and water balances in mediterranean watersheds.

Participating institutes are:

- Universidad de Alicante, Spain (A. Escarre, Project leader);
- University of Lancaster, UK (K. Beven).

Symposium

"First International Symposium on Terrestrial Ecosystems: Forests and Woodlands" to be held in Florence (Italy), 18-24 May 1991.

The CEC is organising together with the European Science Foundation and the Consiglio Nazionale delle Ricerche an international symposium to review available kowledge concerning patterns and processes in European terrestrial ecosystems. Reviews will focus on basic knowledge of forest and woodland. They will also consider the successional development of forest ecosystems from non-forest precursors. A series of study cases aiming at describing important European ecosystems and reviewing the most significant patterns and processes which characterise them will also be presented and discussed.

The preliminary programme comprises the following topics: (i) ecological science developement, general concepts and key issues; (ii) constraints of terrestrial ecosystems; (iii) processes in ecosystems; (iv) populations dynamics and patterns; (v) input-output analysis; (vi) terrestrial ecosystems in a changing environment.

The conference will consist of a series of plenary sessions with invited speakers and sessions of posters.

A first annoucement will be released by the end of 1989.

For further information, contact P. Mathy, address as below.

Publications

"Monitoring Air pollution and Forest Ecosystem Research". Proceedings of a workshop organised jointly by the CEC and the National Institute of Public Health and Environmental Hygiene RIVM), Bilthoven, The Netherlands, 20-21 February 1989, in the framework of the COST Project 612 on "Physico-Chemical Behaviour of Atmospheric Pollutants". Published by the CEC as Air Pollution Research Report N° 21, Eds A.H.M. Bresser and P. Mathy, ISBN 2-87263-015-6, 1989.

Further information can be obtained from:

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

3.3. Aquatic Coastal and Wetlands Ecosystems

This topic covers research on the role of the ocean and estuaries as sinks for persistent pollutants. Particular attention is given to precipitation and co-precipitation as well as incorporation in the sediments, considering the potential for remobilisation. It includes selected projects on the consequences of pollution specific to the marine and estuarine environment, such as the formation of algal blooms.

The shared-cost projects presently under study concern "Coastal Ecosystems" (3.3.1.) and "Aquatic and Wetlands Ecosystems" (3.3.2.).

3.3.1. Coastal Ecosystems

Dynamics of *Phaeocystis* blooms in coastal areas of the Southern North Sea

The objective is to study and predict environmental alterations (algal blooms) in coastal areas of the Southern North Sea in response to cumulated nutrient discharges from land-based sources (eutrophication).

Participating institutes are:

- Université Libre de Bruxelles (ULB), Belgium (G. Billen/C. Lancelot, project leaders);
- Unité de gestion du Modèle Mathématique de la Mer du Nord et de l'Estuaire de l'Escaut (UGMM), Bruxelles, Belgium (B.M. Jamart/G. Pichot);
- IFREMER, Centre de Boulogne, France (H. Grossel);
- Station d'Océanologie et de Biologie Marine, CNRS, Roscoff, France (D. Vaulot/J.-L. Birrien);
- Museum National d'Histoire Naturelle, Paris, France (A. Sournia);
- NERC, Plymouth Marine Laboratory, Plymouth, UK (A.G. Davies/N.J.P. Owens);
- Nederlands Instituut voor Onderzoek der Zee (NIOZ), Texel, The Netherlands (H. Lindeboom/M. Veldhuis);
- Rijksuniversiteit Groningen, Vakgroep Marine Biologie, Haren, The Netherlands (W.W.C. Gieskes);
- Institut fur Meereskunde an der Universität Kiel, FRG (J. Lenz/F. Hansen);
- Universität Konstanz, FRG (T. Weisse);
- Biologische Anstalt Helgoland, Universität Hamburg, FRG (W. Hickel);
- Forschungsstelle Küste des Nieders. LA. für Wasserwirtsdraft, Norderney, FRG (H. Michaelis)
- Universität Hamburg, Lehrs. f. Hygiene, Hamburg, FRG (K. Eberlein).

Workshop on "Eutrophication and Algal Blooms in North Sea Coastal Zones, the Baltic and Adjacent Areas: Prediction and Assessment of Preventive Actions", Brussels (Belgium), 26-28 October 1988.

The workshop was organised by the CEC after the occurence of a large and unexpected bloom of *Chrysochromulina polylepis* along the coasts of Denmark, Sweden and Norway. It included presentations and discussions on (i) ecological processes, environmental factors controlling algal blooms development and algal bloom modelling, (ii) processes determining nutrient inputs, (iii) assessment of impacts from exceptional algal blooms and (iv) economic assessment and optimization of actions.

Proceedings, edited by H. Barth, G. Billen and C. Lancelot, will be published by the CEC as Water Pollution Research Report N° 12.

A functional approach to the *Posidonia* ecosystems of the Mediterranean

The objective is to improve the understanding of the ecological functioning of coastal benthic communities of the Mediterranean.

Participants to the project are also contributing to the extension of COST Project 647: "Coastal Benthic Ecosystems" to the Mediterranean area (see 3.5.). They are:

- Université Libre de Bruxelles (ULB), Belgium (M. Jangoux, project leader);
- Université de Marseille, France (C.F. Boudouresque/Pergent);
- Universidad de Barcelona, Spain (F. Romero Martinengo);
- Stazione Zoologica "A. Dohrn" di Napoli, Ischia, Italy (L. Mazzella).

Vulnerability of Mediterranean benthic ecosystems to cumulative anthropogenic stresses

The objective is to develop and standardise a methodology for assessing the vulnerability of Mediterranean coastal benthic ecosystems to the various anthropogenic stresses, taking into account their potentialities for recovery and their dynamics.

Participating institutes are:

- Université de Aix-Marseille II, France (A. Arnoux, project leader);
- Station Marine d'Endoume, Marseille, France (G. Stora);
- Università di Catania, Italy (S. Di Geronimo);
- University of Athens, Greece (A. Nicolaidou).

3.3.2. Aquatic and Wetlands Ecosystems

Nutrient dynamics and functional evaluation of European wetland ecosystems

The objective is to identify and measure major functional processes in various wetland types in NW and S-Europe in relation to different land uses so as to provide a scientific basis for the development of management strategies for these habitats. It is also intended as a nucleus for a European Wetland Research Project.

Participating institutes are:

- University of Exeter, UK (E. Maltby, project leader);
- Forest and Wildlife Service, Wicklow, Ireland (J. Ryan);
- Universidad de Madrid, Spain (J.J. Sanz-Donaire).

Further collaboration, without funding includes scientists from the Nature Conservancy Council (UK), Trinity College Dublin (Ireland), Fundacion Jose Maria Blanc Madrid (Spain), and Associacion Naturalista Para La Defensa De Castilla, La Mancha (Spain).

Workshop on "Wetland Functions and Values", Exeter (UK), 27-30 April 1989.

The workshop organised jointly by the CEC and the University of Exeter included presentations and discussions on wetland functions such as hydrogeological and hydrological, nutrient and sedimentary, primary and secondary ones to identify priority functions and key processes in wetland ecosystems. Biodiversity and use of wetlands for wildlife and recreation were also considered. A session on functional analysis considered inter alia the potential transfer of experience from the United States (WET technique) to the European situation.

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

Comparative studies of salt marsh processes-Ecological processes and socio-economic implications

The objective is to contribute to the development of a common strategy for the integrated use and management of coastal salt marshes.

Participating institutes are:

- Université de Rennes I/Museum National d'Histoire Naturelle, Paris, France (J.F. Lefeuvre, project leader);
- INRA, Versaille, France (A. Neveu);
- Museum National d'Histoire Naturelle, Paris, France (J.L. Chapuis);
- CNRS- Groupe de Recherches Sociologiques, Nanterre, France (J.P. Billaud);
- CEMAGREF, Cestas Principal, France (Y. Brugierre);
- NERC- Institute of Terrestrial Ecology, Monkswood Exp. Station, UK (L.A. Boorman);
- Soil Survey of England and Wales, Rothamsted Exp. Station, UK (P.J. Loveland);
- University of East Anglia, Norwich, UK (R.K. Turner);
- Direcção Geral da Qualidade do Ambiente, Lisbon, Portugal (A.M.M. De Bettancourt);
- Research Institute for Nature Management, Den Burg/Texel, The Netherlands (W.J. Wolff).

Hydrobiological surveillance of selected hydrobiotopes of Aetoloakarnania, Greece

The objective is to develop an ecologically based integrated management system for lowland aquatic biotopes in the Eastern Mediterranean.

Participating institutes are:

- University of Athens, Greece (A. Economou-Amilli, project leader);
- Max-Planck Institut für Limnologie, Plon, FRG (J. Overbeck);
- State University of Ghent, Belgium (H. Dumont).

Other Publications

A. Nielsen and H. Barth (Eds), The Occurence of Chrysochromulina polylepis *in the Skagerrak and Kattegat in May/June 1988: an analysis of extent, effects and causes*, published by the CEC as Water Pollution Research Report N° 10, EUR 12069 EN, ISBN 92-825-9654-0, 1989.

Further information and reports can be obtained from:
H. Barth, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356452.

3.4. Conservation of Species

Research carried out during the 3rd Environmental R&D Programme (1981-1985) considered population dynamics, migration, behaviour and habitat management of different endangered species as well as the effects of environmental pollution and anthropological interventions and pressures. In particular, research on conservation of birds aimed at providing the Council Directive 79/409/EEC on the conservation of wild birds (see below) with the necessary background information for its implementation and application.

In addition to shared-cost contracts, concerted activities were organised in the field of wild birds, involving the compilation of an inventory of research projects implemented in the Member States. Two workshops were organised on "Shorebirds and large .vaterbirds conservation", Durham (UK), 17-18 September 1983 and on "Mathematical modelling of the management of bird populations", Paris (France), 26-27 March 1985.

Results obtained in the framework of the 3rd Environmental R&D Programme were reviewed in: *European Community Research on Conservation of Species-An Overview and Assessment of the Work carried out within the Framework of the 3rd Environmental R&D Programme (1981-1985).* To be printed at the end of 1989.

Research is presently limited to selected species, other than birds, of direct relevance to the Community Environmental Policy (e.g. Mediterranean Action Plan). A shared-cost project is:

Plant species protection in Eastern Mediterranean terrestrial ecosystems

The objective is to assess the ecological status of important species of Greek flora which are presently under threat or potentially endangered.

Participating institutes are:

- University of Patras, Greece (D. Phitos, project leader);
- University of Copenhagen, Denmark (A. Strid);
- University of Berlin, FRG (W. Greuter);
- University of Lund, Sweden (S. Snogerup).

Further information can be obtained from:

P. L'Hermite, DG XII/E1, CEC, 200 rue de la Loi, B-1049 Brussels. Tel + 32 2 2355163.

3.5. Cost Project 647: "Coastal Benthic Ecology"

This Concerted Action, managed by DG XII/E1, was implemented in 1984 as a continuation of the research carried out under COST Project 47 (1979-1984). Non-Member States, Norway and Sweden, also participate in this Project.

The Project originally had four distinct programmes studying selected communities in four coastal benthic habitats: (i) subtidal rock (Ascidiacea); (ii) intertidal rock (Patellidae, Trochidae, Cirripedia); (iii) subtidal sediment (*Amphiura/Abra*); and (iv) intertidal sediment (Macoma/Polychaeta). While the methods employed within these programmes are markedly different, the biological data being collected and processed are essentlially the same, i.e. community composition and dynamics; the population dynamics and lifespans of key or ecologically important species, with special emphasis on natural variation in their reproduction and recruitment; the identification of responses by the more important community constituents to environmental variability across their distributional spread.

In 1985 COST 647 was extended to the Mediterranean with the inauguration of a new and fifth subprogramme which focuses on the *Posidonia* community.

International symposia covering the overall activity and co-ordinating workshops relating to each programme (habitat) are organised.

Workshops and Symposia

Symposium on "Long-Term Changes in Coastal Benthic Communities", Brussels (Belgium), December 1985.

The symposium organised by the CEC reviewed the five first years of activity of COST 647.

Proceedings edited by C. Heip, B. Keegan and J. Lewis were published in a special issue of the international journal "Hydrobiologia" vol. 142, 1986. They were later issued in a separate commemorative volume "Development in Hydrobiologia 38", published by Dr. W. Junk Publishers, Dordrecht, ISBN 90-6193-637-3, 1987.

During the period 1985-1987, a co-ordinating workshop was organised for each habitat under investigation:

Subtidal Rock Workshop, Galway (Ireland), 30 September-3 October 1986.

Subtidal Sediment Workshop, La Coruna (Spain), 28-31 October 1986.

Intertidal Sediment Workshop, St Valery-sur-Somme (France), 7-10 Decembre 1986.

Intertidal Rock Workshop, San Sebastian (Spain), 14-16 August 1987.

The proceedings of these workshops were published in COST 647 - *Coastal Benthic Ecology, Report on the period 1985-1987, CEC, 1988.*

Symposium on "Space and Time Series in Coastal Benthic Ecology", Crete (Greece), 20-24 September 1988.

This symposium organised by the CEC provided a critical review of the four habitats studied to date, together with a separate session devoted to the Posidonia community. A formal statistical analysis of the space and time series data, generated within COST 647 was the central feature of the meeting.

Proceedings, edited by B.F. Keegan, will be published in a special issue of the international journal "Hydrobiology" in 1990, and thereafter in a special commemorative volume.

Further information can be obtained from

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

Climatology and Natural Hazards

This research programme aims at understanding the mechanisms governing the phenomena related to Climatology as well as studying the causes determining climate-related hazards and other Natural Hazards. It also aims at providing the means for predicitng or mitigating their consequences. It is managed by DG XII/E2.

A first R&D programme in the field of Climatology was adopted by the Council in 1979. Research in "Understanding Climate" (Reconstruction of Past Climates; Climate Modelling and Prediction) and "Man-Climate Interactions" (Climate Variability and European Resources; Man's Influence on Climate) was funded.

The second programme as defined in the framework of the Fourth Programme in the field of the Environment (1986-1990), was enlarged under the heading Climatology and Natural Hazards (OJ No L 159, 14.06.1986). Projects funded under **Climatology** cover (i) the physical basis of climate; (ii) climate sensitivity; and (iii) climatic impacts. Projects under **Natural Hazards** cover (i) causes, mechanisms and impacts of climatological anomalies and extreme or abrupt events, with the aim of reducing human and material losses; and (ii) seismic risk evaluation. Research under this latter area was implemented as a Community Concerted Action.

The Climatology and Natural Hazards Research Programme is implemented by ***shared cost-contracts***; they are listed below under the various research areas. Institutions concerned as well as responsible scientists are indicated.

Research coordination is carried out under five ***Coordination Groups*** which include all the leaders of the projects funded under the Climatology and Natural Hazards Programme, and, as far as practicable, other scientists engaged in similar activities.

The purposes of these Coordination Groups are:

- to focus upon a given problem or upon a series of interrelated ones to coordinate a research approach towards the needed solution(s);
- to provide the means for an efficient monitoring and coordination of European activities in the specified field;
- to provide a critical self-evaluation of the Climatology and Natural Hazards Research Programme;
- to identify emerging research needs and make suggestions on how to meet them;
- to produce periodic assessments of the available knowledge for future scientific or policy decisions.

Since the initiation of this programme, several ***workshops*** and ***symposia*** were organised. Proceedings published or in press are indicated below.

The implementation of the programme includes also ***training activities*** which consist of (i) ***courses*** organised in the frame of the European School of Climatology and Natural Hazards, and (ii) ***sectoral grants***, which are awarded to European students of Climatology and natural Hazards at graduate or post-graduate levels.

1. Climatology

The ongoing programme comprises three research areas: (1.1.) The Physical Basis of Climate; (1.2.) Climate Sensitivity; and (1.3.) Climatic Impacts.

1.1. The Physical Basis of Climate

To understand the mechanism of the complex global climate system, it is essential to study the atmosphere, the oceans, the snow and ice masses, the land surfaces and the biosphere. Considerable progress has been made in this direction, using new empirical and theoretical approaches involving the use of satellite remote sensing and computer mathematical modelling.

This research area includes four topics, namely (1.1.1.) Past Climates and Climate Change; (1.1.2.) Climatologically Significant Processes; (1.1.3.) Modelling and Predicting European Climates within a Global Context; and (1.1.4.) Forecasting of European Climates.Two multi-institutional projects for each of the first three topics are presently under study.

1.1.1. Past Climates and Climate Changes

Studies of past climate changes provide valuable information on the interactions of the atmosphere, oceans, ice masses and land surfaces. The responses of the climate system to such forcing factors as changes in the orbital parameters of the Earth are also studied.

Ongoing projects and participating institutes are:

Reconstruction of Past Mediterranean Climate in Historical Period

- CNR/ICTR, Padova, Italy (D. Camuffo);
- Girton College, Cambridge, UK (J. Grove);
- Universidad de Granada, Spain (J.I. Jimenez);
- University of Ioannina, Greece (D. Metaxas).

Past Climatic Changes in Europe and the Palaeoclimatology of Glacial/Interglacial Cycle

- Trinity College, Dublin, Ireland (W.A. Watts);
- Università "La Sapienza", Roma, Italy (M. Follieri);
- Université Catholique de Louvain, Louvain-la-Neuve, Belgium (G. Seret);
- Istituto Jaime Almera, C.S.I.C., Barcelona, Spain (R. Julia);
- Rijksuniversiteit Gent, Belgium (C. Verbruggen);
- Université de Marseille, France (A. Pons);
- Universität Hohenheim, Inst. Botanik, Stuttgart, FRG (B. Frenzel).

1.1.2. Climatologically Significant Processes

Research into the fundamental physical and chemical processes which influence climate is needed to understand the latter and predict its evolution. Studies are aimed at improving the physical formulation of processes for inclusion in preferably complete 3D models and as a basis for investigation in all the three research areas. The processes concerned include land surface and ocean ones, cloud and related radiation, and the sun-earth ones, as well as biogeochemical cycles, aerosols, and the cryosphere.

Ongoing projects and participating institutes are:

Parametrization of Surface Fluxes for Climate Modelling

- Institute of Geography, Copenhagen, Denmark (H. Sogaard);
- Landbouwuniversiteit Wageningen, The Netherlands (H.A.R. De Bruin);
- Groupement Scientifique de Télédétection, Strasbourg, France (F. Becker);
- Freie Universität Berlin, Inst. Meteorologie, FRG (H.J. Bolle);
- Aristotelian University, Thessaloniki, Greece (J. Diamantopoulos).

International Cirrus Experiment

- Universität Köln, Inst. Geophysik, FRG (E. Raschke);
- CNRS, Lab. de Météorolgie Dynamique, Palaiseau, France (R.S. Kandel);
- Meteorological Research Flight, Hants, UK (J.S. Foot).

1.1.3. Modelling and Predicting European Climates within a Global Context

Modelling and predicting climatic changes have acquired an urgency particularly since anthropogenic activities can induce or accelerate such changes. Models should therefore be developed and applied to provide accurate predictions of both natural and inadvertent climate variations, by including as many components of the system as possible. These should be coupled in realistic feedback processes. Interannual variability and teleconnections are priority study areas; model intercomparisons are considered.

Ongoing projects and participating institutes are:

Bidimensional Model of the Climate System

- Inst. Nat. des Sciences de L'Université, Paris, France (J.C. Gascard);
- Centre Nat. de Recherche Météorologique, Toulouse, France (J.F. Royer);
- UCL, Inst. d'Astronomie et de Géophysique, Louvain-la Neuve, Belgium (A. Berger);
- Scott Polar Research Institute, Cambridge, UK (P. Wadhams);
- CNRS, Lab. Météorologie Dynamique, Palaiseau, France (H. Le Treut);
- Meteorological Office, Bracknell Berks, UK (J.S. Foreman);
- IMOU, Rijksuniveriteit Utrecht, The Netherlands (J. Oerlemans).

Modelling Climate Variability on Interannual Timescales

- Meteorologisches Institut, Univ. Hamburg, FRG (G. Fischer);
- Univ. Pierre & Marie Curie, Paris, France (C. Frankignoul);
- Max-Planck Inst. für Meteorologie, Hamburg, FRG (K. Hasselmann);
- Royal Netherlands Meteor. Inst., De Bilt, The Netherlands (A. Kattenberg);
- Universidad de Alcala de Henares, Madrid, Spain (A. Ruiz de Elvira);
- Hooke Inst. f. Cooperative Atm. Res., Oxford, UK (D. Anderson).

1.1.4. Forecasting European Climates

A primary objective is the development of climate simulation and prediction models able to forecast the European climate. Of particular interest are seasonal (3-6 months) forecasts. Such efforts aim at providing approaches which could be used for policy decisions and resource management.

No projects are presently funded.

1.2. Climate Sensitivity

Important problems are the increase of carbon dioxide in the atmosphere and the possible response of the Earth's climate. Research strategy includes also the study of the radiative effects of other potentially active trace gases (e.g. H_2O, CH_4, O_3) and aerosols. Aspects of the global carbon cycle which could influence the climate as well as changes in land surface factors must be considered. Data relevant to the afore mentioned climatologically significant processes should be continuously evaluated and compared with model sensitivity studies.

In this way, a balanced approach based on modelling, monitoring and diagnostic studies could be developed to pave the way towards an early and reliable detection of climate change. Priority is given to studies related to the possible effects of human influences on the European climate.

This research area includes three topics namely (1.2.1.) changes in atmospheric composition; (1.2.2.) climatic effect of changes in land surface properties; and (1.2.3.) early detection of climate change. Only projects related to the first topic have so far been funded.

1.2.1. Changes in Atmospheric Composition

This topic includes the following items:

(i) Climatic effect of enhanced CO_2;
(ii) Aspects of the global carbon cycle important for climate prediction; and
(iii) The climatic effect of other trace gases and particulates.

Three ongoing projects dealing with some aspect of the carbon dioxide problem are:

Global Climate and CO_2: the Role of Oceanic Circulation

- Centre Faibles Radioactivités, Gif-sur-Yvette, France (L. Labeyrie);
- Max-Planck-Institut für Meteorologie, Hamburg, FRG (K. Hasselman);
- Univ. Cambridge, Godwin Laboratory, UK (N.J. Schackleton).

Modelling Changes in Climate due to Enhanced CO_2

- University of Reading, Whiteknights Reading, UK (B.J. Hoskins);
- Lab. Météorologie Dynamique, Palaiseau, France (H. Le Treut);
- Meteorological Office, Bracknell Berks, UK (J.F.B. Mitchell).

Interdisciplinary Study of the Carbon Cycle

- Centre Faibles Radioactivités, Gif-sur-Yvette, France (G. Lambert);
- Lab. Glaciologie et Géophysique, St. Martin d'Hères, France (D. Raynaud);
- Universität Osnabrück, FRG (G. Esser);
- Max-Planck-Institut für Meteorologie, Hamburg, FRG (K. Hasselmann);
- Université Pierre & Marie Curie, Paris, France (L. Merlivat).

1.2.2. Climatic Effect of Changes in Land-Surface Properties

No project on the effects of land surface property changes (including vegetation degradation) on climate in European regions are presently funded.

1.2.3. Early Detection of Climate Change

This topic considers the identification and study of parameters which could be used as early indicators of climate change. It also includes the improvement of techniques for the detection of signals above noise level.

No projects are presently funded.

1.3. Climatic Impacts

Studies of the long-term sensitivity of climate to various factors imply those of relevant parameters. Conversely, the impact that climate changes or variability could have on vital resources as soil, water and vegetation must be taken into account.

Three time and space scales may be considered in this context:

(1) Large-scale changes: the response to global long-term climate changes such as those resulting from natural or man-induced factors (CO_2 accumulation, energy policies, deforestations, etc.).

(2) Medium-scale fluctuations: regional responses to medium-term climatic events, such as droughts or severe cold or heat periods.

(3) Short-term events: response to extreme (low frequency, high intensity) phenomena such as severe storms and floods.

The results of research conducted under this area could provide the basis for policy decisions and strategies in terms of general preparation to the changes, fluctuations and hazards mentioned.

Research work under this area is therefore concerned with the impact of variations in the climate system, or in any of its components, on European land (1.3.1.), in water resources (1.3.2.), and on vegetation (1.3.3.) as well as the effects of extreme or abrupt events (1.3.4.).

1.3.1. Impact of Climate Change or Variability on Land Resources

This topic includes five projects on soil and ecosystems studies, with special attention to desertification problems in EEC Countries:

Crete and the Aegean Islands: Effects of Changing Climate on Environment

- University of the Aegean, Mytilene, Greece (N. Margaris);
- University of Cambridge, UK (A.T. Grove).

Climatic Variability in Semi-Arid Environment in Spain and Portugal

- Universidad de Murcia, Spain (F. Lopez-Bermudes);
- Instituto Nacional de Meteorologia e Geofisica, Lisbon, Protugal (J. Corte Real);
- University of Bristol, UK (J.B. Thornes);
- Univ. de Evora, Centro de Ecologia, Portugal (M. Feio);
- Univ. Nova de Lisboa, Portugal (R. Soeiro de Brito).

Modelling the Effects of Climate on Crop Productivity

- Rothamsted Experimental Station, Harpenden, UK (D. Lawlor);
- CESIA, Accademia dei Georgofili, Florence, Italy (F. Miglietta);
- Agricultural University Wageningen, The Netherlands (R. Rabbinge);
- Universität Hohenheim, Stuttgart, FRG (W.A. Muller).

Effects of CO_2 induced Climatic Change on EEC Agriculture

- University of Florence, Inst. of Agronomy, Italy (G. Maracchi);
- University of Birmingham, UK (M. Parry).

Spatial Variability of Land Surface Processes

- Agricultural University Wageningen, The Netherlands (J.N.M. Stricker);
- Centre Nat. de Recherche Météor., Toulouse, France (J.C. André);
- University of Bologna, Italy (A. Todini);
- LMD du CNRS, Ecole Normale Supérieure, Paris, France (K. Laval);
- Inst. de Mécanique de Grenoble, St. Martin d'Hères, France (M. Vauclin);
- Dept. of Civil Engineering, Dublin, Ireland (Ph. O'Kane);
- Meteorological Office, Bracknell Berks, UK (P.R. Rowntree).

1.3.2. Impact of Climate Change or Variability on European Water Resources

This topic includes the development of climate-based models for evaluation and forecasting. Under investigation is the

Variability of Water Budget over the Mediterranean Region

- CNRS, Lab. Météorologie Dynamique, Palaiseau, France (D.L. Cadet);
- Univ. de Lisboa, Inst. Geofisico Inf. D. Luis, Portugal (J. Pinto-Peixoto).

1.3.3. Physiological response of European Vegetation to increasing Atmospheric CO_2 in the Context of a Climate Change

A project under study is:

Impacts of Increasing CO_2 and Climate Change on European Agriculture

- University of Reading, Whiteknights, UK (J.L. Morison);
- Agricultural University Wageningen, The Netherlands (J. Goudriaan);
- University of East Anglia, Norwich, UK (T.M.L. Wigley).

1.3.4. Climatological Anomalies and Extreme or Abrupt Events

This topic includes the study of causes, mechanisms and impacts of climatological anomalies and extreme or abrupt events to reduce human and material losses. Four projects are under study:

Application of Weather Radar to the Alleviation of Climatic Hazards

- Università degli Studi di Padova, Italy (S. Fattorelli);
- NERC, Inst. of Hydrology, Wallingford, UK (R. Moore)
- Inst. de Mécanique de Grenoble, St. Martin d'Hères, France (J.C. Creutin);
- Direcção-Geral de Recursos e Aproveit. Hidraulicos, Lisbon, Portugal (F. Nunes Correia).

Investigation of Past and Future Sea-Level Changes and their Impacts

- CNRS, Intergeo, Paris, France (P.A. Pirazzoli);
- University of Cork, Dept. Geography, Ireland (R.J. Devoy);
- University of Durham, UK (I. Shennan);
- University of Naples, Italy (A. Palumbo);
- Rijkswaterstaat, 's Gravenhage, The Netherlands (J. Van Malde);
- University of East Anglia, Norwich, UK (T.M.L. Wigley);
- NERC, Inst. Oceanographic Sciences, Swindon Wilts, UK (P.L. Woodworth).

Temporal and Spatial Variability of Major Coastal Floods

- Coventry Lanchester Polytechnic, Coventry, UK (D.E. Smith);
- University of Durham, UK (I. Shennan);
- University of Athens, Greece (A. Lascaratos);
- Behorde fur Wiss. u. Forschung, Hamburg, FRG (G. Linke).

Coherence of Climatic Changes in Europe

- Patriarchal Inst. for Patristic Studies, Thessaloniki, Greece (C. Zerefos);
- Rijksuniversiteit Gent, Belgium (C. Vernemenn);
- Royal Netherlands Meteorological Institute, De Bilt, The Netherlands (H.J. Krijnen);
- University of Utrecht, The Netherlands (C.J.E. Schuurmans).

Symposia, Workshops and Courses

Symposium on "CO_2 and Other Greenhouse Gases: Climatic and Associated Impacts", Brussels (Belgium), 3-5 November 1986.

The workshop reviewed the whole issue of the climate change that may take place as a consequence of the accumulation of the atmospheric CO_2 and other greenhouse gases.

Proceedings edited by R. Fantechi and A. Ghazi were published by Kluwer Academic Publishers, P.O. Box 17, 3300 AA Dordrecht, The Netherlands, EUR 11797, 1989, ISBN 0-7923-0191-9. They are sold and distributed by Kluwer Academic Publishers, P.O. Box 322, 3300 AH Dordrecht, The Netherlands, or, in the USA and Canada, 101 Philip Drive, Norwell, MA 02061, USA.

Course on "Climatic Change and Impacts: A General Introduction", Florence (Italy), 11-18 September 1988.

Organised jointly by the CEC and Italian Authorities, the course dealt with (i) past climate changes; (ii) climate processes and climate modelling; (iii) the greenhouse-gas induced climate change; and (iv) climatic impacts. Twenty seven students from 8 Member States and twenty italian students attended the course.

Proceedings are in press.

Coordination Groups

Coordination Group on "Palaeoclimatology: Data and Modelling"

The Group held a meeting on 10-11 January 1989 in Barcelona (Spain) to discuss the topic "Towards a Quantitative Reconstruction of the Last Climatic Cycle: Data and Modelling". Forty scientists from 8 Member States, Norway and Sweden participated.

Coordination Group on "Climate Processes and Climate Change"

The group held a meeting on 28-29 November 1988 in Louvain-la-Neuve (Belgium) on "The Global Carbon Cycle and its Importance for Climate Change". It was attended by 31 scientists from 7 Member States.

Coordination Group on "Land Surface Processes, Hydrology and Desertification in Europe"

The group held a meeting in Barcelona (Spain) on 12-15 March 1989. Participants included scientists involved in a Field Experiment in a Desertification-Threatened Area (IFEDA) through the International Satellite Land-Surface Climatology Project (ISLSCP). They came from 11 Member States, Switzerland, the USA. Delegates of WMO and UNEP took also part in the meeting.

Coordination Group on "Impacts on land and Water Resources; direct effect of CO_2 on plants"

The group held a meeting on 30-31 May 1989 in Florence (Italy) on "Modelling the Effect of Climate Change on Land Resources". Scientists from 10 Member States as well as delegates from FAO and USDA participated.

A publication gathering the scientific papers presented to the meeting is in press.

Coordination Group on "Climatic Hazards

The Group held a meeting on 8-9 December 1988 at Noordwijkerhout (The Netherlands) on "Mean Sea Level Change and its Impacts". The meeting was attended by 33 scientists from 9 Member States.

A meeting was held in Naples (Italy) on 17-18 April 1989 to discuss the subject of "Causes and Consequences of Sea-Level Rise". It was attended by 50 scientists from 4 Member States. A compilation of the scientific papers presented to the meeting is in press.

A meeting on the subject "Coherence of Climate Change" was held in Norwich, UK, on 27th June 1989. Eigth scientists from 4 Member States contributed to the meeting.

A second annual meeting on the subject of "Mean Sea Level Change and its Impacts" was held at Cork (Ireland) on 30 September-3 October 1989. Thirty seven scientists from 10 Member States attended.

2. Natural Hazards

The ongoing programme concerns essentially seismic risk evaluation.

It also includes:

- Establishment of a research team network, with emphasis on a system of portable stations for measurement in high-seismicity areas and on the capability of intervening rapidly after a destructive earthquake.
- Establishment of a network of data banks of seismological, earthquake damage and strong motion data.

Seven projects involving the participation of several European institutions were established. They are listed below; the name of the leading institution is indicated.

Seismic Risk Evaluation in Central Greece

- University of Athens, Athens, Greece (J. Drakopoulos).

Destructive Earthquake and Tsunami Warning System

- Centro de Geofisica, Univ. de Lisboa, Lisboa,Portugal (L. Mendes Victor).

European Seismological Data Bank

- Centre Sismologique Euro-Mediterraneen, Strasbourg, France (J. Bonnin).

Strong-motion Data Bank and Dissemination Centre

- Imperial College, london, UK (N.N. Ambraseys).

Transfrontier Research in Low Seismicity Areas

- NERC, British Geological Surrey, Edinburgh, UK (C. Browitt).

Microzonation and Hazard Assessment Methodology with Application to Selected Areas (Italy)

- Istituto per la Geofisica della Litosfera, Milano, Italy (M. Marcellini).

Review of Historical Seismicity

- Istituto per la Geofisica della Litosfera, Milano, Italy (M. Stucchi).

Symposia, Workshops and Courses

Course on "Seismic Hazard in Mediterranean Regions", Strasbourg (France), 15 July-1 August 1986.

The CEC cosponsored this course whose programme included five main topics: (i) physics of earthquake sources; (ii) ground motion in the near field; (iii) engineering seismology; (iv) seismotectonics; and (v) historical seismicity.

Proceedings edited by J. Bonnin, M. Cara, A. Cisternas and R. Fantechi were published by Kluwer Academic Publishers, P.O. Box 17, 3300 AA Dordrecht, The Netherlands, EUR 10706, 1988, ISBN 90-277-2779-1. They are sold and distributed by Kluwer Academic Publishers, P.O. Box 322, 3300 AH Dordrecht, The Netherlands, or, in the USA and Canada, 101 Philip Drive, Norwell, MA 02061, USA.

Course on "Seismic Risk Assessment", Athens (Greece), 9-16 May 1988.

Organised by the CEC with the cooperation of the Council of Europe, the course dealt with (i) historical seismicity, (ii) analysis of strong ground motion and its parameters, (iii) assessment of long-term sismic hazards and prediction studies, (iv) modelling of impacts and evaluation of seismic hazards.

Twenty eight students from 7 Member States and a great number of local students attended the course.

Proceedings in press.

Most Recent Books Published

H. Flohn and R. Fantechi (Editors): The Climate of Europe: Past, Present and Future, Reidel, 1984.

H. Lieth, R. Fantechi and H. Schnitzler (Editors): Interactions between Climate and Biosphere, Swets and Zeitlinger, 1984.

R. Fantechi and N. Margaris (Editors): Desertification in Europe, Reidel, 1984.

R. Fantechi and A. Ghazi (Editors): first R&D Programme in the Field of Climatology: Report of Research sponsored under the first phase

1981-1983, EUR 9920, 1985.

A. Ghazi and R. Fantechi (Editors): Current Issues in Climate Research, Proceedings of EC Symposium on Climatology Programme, Sophia Antinopolis, 2-5 October 1984, Reidel, 1986.

Atmospheric Ozone 1985 - WMO Report 16 (NASA, FAA, NOAA, UNEP, WMO, CEC, BMFT), 1986.

J. Bonnin, M. Cara, A. Cisternas and R. Fantecchi (Editors): Seismic Hazards in Mediterranean Regions, Proceedings of the Summer School, Strasbourg, 15 July-1 August 1986, Kluwer, 1988.

R. Fantecchi and A. Ghazi (Editors): CO_2 and other Greenhouse Gases: Climatic and Associated Impacts, Symposium Proceedings, 3-5 November 1986, Brussels, Kluwer, 1989.

Further information on climatology and Natural Hazards can be obtained from:

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

Community-wide Coordination of Information on the Environment-CORINE Programme (1985-1989)

This programme was adopted by the ***Council Decision 85/338/EEC on an experimental project for gathering, coordinating and ensuring the consistency of information on the state of the environment and natural resources in the Community*** (OJ No L 176, 06.07.1985). It is managed by DG XI/A4.

To apply its environmental policy in a coherent manner, the CEC and the 12 Member States need comparable information on the state and evolution of the environment. CORINE is to supply this comparable data.

Main objectives

- gathering information on the state of the environment for a number of Community applications;
- coordination of initiatives in Member States or at international level to improve information;
- ensuring the consistency of nomenclatures, definitions, etc. and generally creating the conditions necessary to ensure comparability of data.

Priorities and areas of activity

- protect biotopes of major importance for nature conservation;
- combat local and transfrontier pollution (e.g. by acid deposition);
- conserve the environment in the Mediterranean region through a reduction of soil erosion, damage to water supply, etc.

Organisation

The organisational structure consists of thematic working groups which include more than 120 scientists from the twelve Member States. The programme is managed by the Commission with the guidance of the CORINE National Expert Group formed by national representatives.

Each project led to the establishment of a thematic data base. These bases form the CORINE Geographic Information System published as CORINE Data Base Manual in July 1989.

The information concern: Biotopes, Emissions into the Air, Land Cover, Water Resources and Quality, Soil Erosion Risk and Land Quality, Coastal Erosion Risk, and a Geographic Base (coastline, administrative units, rivers network, slopes, climate, settlements).

Achievements and results of operational nature

Although the programme did not get underway until the end of 1985, numerous interesting results have been obtained to date.

The Commission has passed collaboration agreements with various international organisations to ensure the complementarity and coherence of their projects within CORINE's activity. These concern:

- the development of a common methodology to set up a computerised inventory of biotopes of significant importance for nature conservation (with Council of Europe).
  A Map of Natural Vegetation of the Member States of the European Communities and of the Council of Europe has been published by the CEC, EUR 10970, ISBN 92-825-7266-8 or 92-825-7352-4, 1987. It is available from the Office des Publications Officielles des Communautés Européennes, 2 rue Mercier, L-2985 Luxembourg.
- a common method to establish a European inventory of atmospheric emissions, CORINAIR, in cooperation with OECD.

The data already assembled are of an operational nature for the activities of the Commission's services. This is particularly the case for the biotopes inventory specifically used for the application and development of the nature protection policy (proposed by a Directive on the protection of habitats).

Other results (land cover, coastal erosion risk) are used by research groups. Some are also used in national and regional management processes.

A notable example is the land cover map of Portugal obtained using satellite images, resulting from the CORINE pilot project, which led to the creation of the first available European cover data base functional for a whole country. Information obtained can be used for detailed map production, statistical studies, location and description of specific areas which will allow decision making in large-scale management programmes. Its success has stimulated the initiation of similar work in other Member Countries.

Futur development

An amendment to Council Decision 85/338/EEC has been adopted on 22 september 1989 which will extend CORINE activity for two more years and further develop it in the pespective of the establishment of a European Environment Agency.

Further information can be obtained from:

G. Schneider, DG XI/A4, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2351682.

Greenhouse Issue: Energy and Environment

The European Community Environment Action Programme in 1973 identified air pollution as a particularly important topic. The necessity to control emissions resulting from the production of energy from stationary and mobile sources have led to the adoption of measures influencing energy usage and costs.

The "Greenhouse Effect" has become a very important energy related environmental issue. The combustion of fossil fuels is contributing to the emission of greenhouse gases like CO_2, CH_4 and N_2O. Carbon dioxide is presently thought to be responsible for slightly more than 50% of the greenhouse effect and most antropogenic CO_2 emissions are due to commercial fuel burning.

Council Resolution 89/C 183/03 on the "Greenhouse Effect and the Com-

munity'' adopted in June 1989 (OJ No C 183,20.07.1989) welcomed the Commission's initiative to launch a vast study programme on the analysis of policy options to deal with risks associated with the greenhouse issue. This resolution invites the Commission and its Member States to inter alia increase energy efficiency and the use of non fossil fuels to reduce emissions of greenhouse gases. It also aims at promoting worldwide cooperation, especially through the Intergovernmental Panel of Climate Change (IPCC).

Following the Commsission's decision as contained in the Communication to the Council on the Greenhouse Effect and the Community (COM (88) 656 final), Directorates-General for Environment, Nuclear Safety and Civil Protection (DG XI), for Science, Research and Development (DG XII) and for Energy (DG XVII) have launched studies, analytical projects, etc. in the frame of the Greenhouse Issue and when necessary in cooperation with other national or international institutes. The Commission has been invited by the Council to present first study results by the end of 1990.

Within the Commission's overall work-programme on the Greenhouse Issue, the Community's energy sector is of special importance since energy production is the major source of greenhouse gas emissions. A specific programme on the analysis of alternative policy options to reduce CO_2 emission has been defined by DG XVII. Four consecutive interlinked work phases are foreseen:

- future community CO_2 emission trend analysis and definition of suitable CO_2 emission reduction targets;
- identification of possible CO_2 emission control options and their technical economic reduction potential;
- cost-efficiency analysis of available control options by system analysis; and
- analysis of effects of identified cost efficient policy options on the economy, social structure, international competition and security of energy supply.

First preliminary results on the Community's energy and emission trends up to the year 2010 (work phase one) have been elaborated in the frame of DG XVII's ongoing Energy 2010 exercise. A first presentation of these results was given in the special issue of "Energy in Europe", September 1989.

With regard to work phase II, a call for tender has been issued by DG XVII.

Work phases III and IV will be undertaken in close cooperation with DG XII in the frame of the so called Joule sub-programme on Models for Energy and Environment. It is indeed the mandate of the Community R&D programme on system analysis to collect information, build tools and test approaches allowing to elaborate and analyse energy and environment policies. This research activity on system analysis will be carried out in close collaboration with teams in the Member States. Simulation of models will be carried out in general on Commission computers.

Study results should be used for the elaboration of future policies.

Further information can be obtained from:
- B. Delogu, DG XI/B2, Tel. + 32 2 2357172.
- P. Valette, DG XII/E5, Tel. + 32 2 2356356.
- P. Faross, DG XVII, Tel. + 32 2 2359566.
  CEC, 200 rue de la Loi, B-1049 Brussels.

EC Regulatory Actions

1. Protection and Management of Water

The European Community has promoted a policy on water quality in the early seventies taking into consideration discussions and resolutions of the UN Stockolm Conference. Topics of major concern were the presence of heavy metals (mercury and cadmium) influencing the quality of drinking and bathing waters.

Limited improvements have been observed since, but results of actions taken by the various States have not always been satisfactory. Some Member States have not transposed European directives into their national legislation, nor have they implemented the improvement schemes provided for by the rough legal framework.

An increase in efforts to protect water has been requested during the Ministerial Seminar on Community Water Policy in Frankfurt (FRG) in June 1988. The water policy for the nineties will be characterized by its preventive nature and will take into account the interactions between soil, air and water. It is hoped that the general public which calls for positive improvements in the global aquatic environment will be actively involved.

The Commission's Fourth Action programme (1987-1992) continues the activities in the field of pollution by dangerous substances in the marine environment as well as the control and improvement of water quality in general.

As far as the discharge of dangerous substances in the aquatic environment, the Commission is considering proposals for a more coherent control policy. It should cover specific point and diffuse sources of pollution and involve the more discriminating use of either one, or both, parallel approaches based on emission norms or quality objectives.

In marine pollution, priority is given to non petroleum-substances. Particular attention is given to a more efficient application of international conventions, and to a better integration of environmental protection requirements in maritime transport policy. Pilot projects for demonstrative purposes in the field of sea protection from petroleum and other dangerous substances are being carried out.

The Commission has presented new proposals concerning the control and reduction of water pollution resulting from the disposal of livestock effluents and the excessive use of fertilizers and pesticides in agriculture. Particular attention is given to the supply and management of waters in some regions, in Greece, Spain and Portugal. Community actions will be in the framework of the environmental protection programme of the Mediterranean (MEDSPA)

1.1. Quality objectives - Quality standards

A number of directives have been adopted establishing minimum levels of quality for fresh and sea water taking into account the various uses it will be put to. Directives have been approved setting minimum quality standards for surface water, drinking water, bathing water and water supporting fish life ans shellfish. Systems for regular surveillance and monitoring of water resources have also been set up.

1.1.1. Drinking water

Council Directive 75/440/EEC on the quality required of surface water intended for the abstraction of drinking water in the Member States
(OJ No L 194, 15.07.1975)

This Directive concerns the quality requirements which surface fresh water, used or intended for use in the abstraction of drinking water, must meet after application of appropriate treatment.

Surface water must be divided according to limiting values into three categories (A1, A2 and A3) which correspond to the appropriate standard methods of treatment given in Annex I of the Directive. The physical, chemical and microbiological parameters corresponding to imperative (I) and Guide (G) values of the three categories of water are set out in Annex II.

Member States must define values for I and G parameters. Surface water having a quality lower than category A3 may not be used for drinking, except in special circumstances and after suitable processing. A prior notification to the Commission must be submitted.

Member States must draw up a plan of action including a timetable of

10 years to achieve the improvement of surface water, especially that falling into category A_3. The plan of action must take into account the need to improve the quality of the environment, and of water in particular, and economic and technical constraints.
Until adoption of Directive 79/869/EEC (see below), the frequency of sampling and the analysis of each parameter, together with the methods of measurements, are the reponsability of Member States.

Council Directive 79/869/EEC concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water in the Member States
(OJ No L 271, 29.10.1979)
This Directive (supplement to 75/440/EEC) recommends reference methods for measuring the I and/or G values of the parameters for surface water quality (Annex I) and sets the minimum annual frequency of sampling and analysis for each parameter (Annex II).
It was amended by the Acts of Accession of Greece in 1979, and Spain and Portugal in 1985 to increase the number of members of the Committee on Adaptation to Technical Progress.

Council Directive 80/778/EEC relating to the quality of water intended for human consumption
(OJ No L 229,30.8.1980)
This Directive concerns standards for water intended for human consumption, either in its original state or after treatment, regardless of origin. It does not apply to natural mineral waters or medicinal waters recognized or defined as such by the competent national authorities.
Annex I gives the maximum admissible concentrations (MAC) and the guide levels (GL) for organoleptic, physico-chemical and microbiological parameters as well as substances toxic or undesirable in excessive amounts. It also fixes the minimum required concentration for softened water intended for human consumption.
Rules for analysis are given in Annex II (patterns and frequency of standard analysis) and III (reference methods of analysis for the various parameters listed in Annex I).
It was amended by the Acts of Accession of Greece in 1979, and Spain and Portugal in 1985 to increase the number of members of the Committee on Adaptation to Technical Progress.

1.1.2. Bathing water

Council Directive 76/160/EEC concerning the quality of bathing water
(OJ No L 31, 05.02.1976)
This Directive defines "bathing water" as fresh or sea water in which:

- bathing is explicitely authorised by the Member State, or
- is not prohibited and is traditionally practised by a large number of bathers.

The Directive sets out imperative (I) and guide (G) values for 19 physical, chemical and microbiological parameters, the most important parameters being the coliform count. Conditions for sampling, sampling frequencies and reference methods of analysis and inspections are also given.
Member States were given ten years to bring the quality of bathing water up to the prescribed standards.
Regular reports on the quality of bathing waters must be provided by the Member States (see below).
This Directive was amended by the Acts of Accession of Greece in 1979 and of Spain and Portugal in 1985 to increase the number of members of the Committee on Adaptation to Technical Progress. The deadline for compliance for Portugal was set by the Act of Accession at 1 January 1989.

The latest two reports were published and are available as mentioned below. They contain maps indicating the microbiological quality of bathing waters during the bathing seasons.

- *Quality of bathing water-La qualite des eaux de baignade 1983-1986 published by the CEC, Directorate-General for Environment, Consumer Protection and Nuclear Safety, Office for Official Publications of the European Communities, Luxembourg, EUR 11588, 1988, ISBN 92-825-8380-5.*
- *Quality of bathing water-La qualite des eaux de baignade1987 published by the CEC, Directorate-General for Environment, Nuclear Safety and Civil Protection, Office for Official Publications of the European Communities, Luxembourg, EUR 11921, 1989, ISBN 92-825-9487-4.*

1.1.3. Fishing waters

Council Directive 78/659/EEC on the quality of freshwaters needing protection or improvement in order to support fish life
(OJ No L 222, 14.08.1978)
This Directive concerns the quality of fresh waters and applies to those waters designated by the Member States as needing protection or improvement in order to support fish life. It makes distinction between

- salmonid waters (salmon, trout and whitefish);
- cyprinid waters (cyprinids and other species such as pike, perch, eel).

Annex I lays down imperative (I) and guide (G) values for 14 physical and chemical parameters for both categories of water as well as conditions for sampling, sampling frequency, and reference methods of analysis or inspection.
Member States must not set values less stringent than the I values and must endeavour to respect the G values. They must establish pollution reduction programmes to ensure that the waters will be brought into conformity with the set values within five years following designation.
Fresh waters that cross or form national boarders are designated by Member States after formal consultations with the participation of the Commission.
Member States must designate salmonid and cyprinid waters within a two year-period following the notification of the Directive. They must submit a detailed report on implementation within five years following the initial designation and at regular interval thereafter.

Council Directive 79/923/EEC on the quality required of shellfish waters
(OJ No L281, 10.11.1979)
This Directive concerns the protection and quality improvement of coastal and brackish waters designated by the Member States for the support of shellfish (bivalve and gasteropod molluscs) life and growth.
The Directive sets out imperative (I) and guide (G) values for 11 physical and chemical parameters supplemented with faecal coliforms count. Conditions for sampling, sampling frequencies and reference methods of analysis are also given.
Member States must not set less stringent values than the I values, and must endeavour to observe the G values. They must establish pollution reduction programmes to ensure that the waters will be brought into conformity with the set values within six years following designation.
Fresh waters that cross or form national boarders are designated by Member States after formal consultations with the participation of the Commission.
Member States must designate shellfish waters within a two years-period following the notification of the Directive. They must submit a detailed report on implementation within six years following the initial designation and at regular interval thereafter.

1.1.4. Information exchange on fresh water quality

Council Decision 77/795/EEC establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community
(OJ No L 334, 24.12.1977)
This Decision sets up a list of sampling or measuring stations involved in the exchange of information (Annex I). This list was amended under the request of some Member States (***Commission Decision 84/422/EEC***, OJ No L 237, 05.09.1984) and by the Acts of Adhesion of Greece in 1979, Portugal and Spain in 1985. The physical, chemical, microbiological and biological parameters in respect of which information is to be exchanged are specified in Annex II.

Council Decision 86/574/EEC amending Decision 77/795/EEC establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community
(OJ No L 335, 28.11.1986)
This Decision requires that the Commission forwards annually information to the Member States under request. The Commission must publish a report every three years starting in 1987. The first report was published in 1989.
This amendment contains an additional Annex III which specifies the reference methods of measurement of the various parameters.

1.1.5. Pollution from municipal waste water

Proposal for a Council Directive on treatment of municipal waste waters
(COM 89/ 518 final, 13.11.1989)
A proposal for the definition of minimum requirements for the treatment of municipal waste waters has been made by the Commission to deal with their disposal.
Because of the varied nature of the waters into which treated waste waters are discharged it is proposed to classify receiving waters into three types (estuarian, coastal and fresh water). It is also proposed that, in general, secondary (biological) treatment will be required as a minimum

level of treatment. For insensitive areas, additional treatment will be required to meet specific environmental needs such as reduction of nutrients.
Concerning the disposal in coastal waters, simple primary treatment can be used if the considered zones present favorable hydrographic conditions and if well established studies indicate that the discharge of waste waters can comply with the directives pertinent to water quality and other requirements connected to the environment. The Commission feels that the construction of waste water treatment plants adapted or entirely new will bring forth significant improvements to the problems of the aquatic environment.

1.2. Control of pollution by dangerous substances Emission standards

The Community has taken many measures to prohibit or limit the discharge of a certain number of dangerous substances and polluting agents which may reach the aquatic environment, whilst not hindering fair competition between European industrial concerns.

1.2.1. Framework Directive

Council Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community
(OJ No L 129, 18.05.1976)
This is a "framework Directive" which aims at the elimination or reduction of pollution of inland, coastal and territorial waters through the establishment of a regime of prior authorization for the discharge of dangerous substances in aquatic environment. It is supplemented with a number of directives of application (see below).
Member States must take appropiate steps to eliminate and reduce pollution by substances listed respectively on Lists I and II in the Annex of the Directive.
List I or "black list" contains sustances selected mainly on the basis of their toxicity, persistence and bioaccumulation. It includes organohalogen, organophosphorus and organotin compounds; carcinogenic substances; mercury, cadmium and their compounds; persistent mineral oils and hydrocarbons of petroleum origin; persistent synthetic substances which may interfere with any use of the waters. In addition 129 candidate substances by 1982 are also listed.
List II or "grey list" contains substances belonging to the families and groups of substances in List I for which the limit values and quality objectives have not been determined as well as certain individual substances (candidates to be) and categories of substances of which the deleterious effect on the aquatic environment can be kept down.
For list I substances, Member States must request prior authorisation for all discharges into waters. The authorisation, limited in time, must lay down emission standards determining the maximum concentration and quantity of the substances allowed to be discharged. Alternatively, Member States may establish emission standards set by reference to water quality objectives laid down by the Council if it can prove to the Commission, in accordance with a monitoring procedure set up by the Council, that the quality objectives are being met and continuously maintained.
Member States must draw up an inventory of the discharges which may contain substances within List I to which emission standards are applicable.
For List II substances, Member States must establish pollution reduction programmes, including the establisment of quality objectives, with deadlines for implementation. All discharges of these substances into waters must require prior authorisation containing emission standards set by the competent authority in the Member States. The emission standards must be based on quality objectives which must respect existing Community directives.
Summaries of the programmes and results of their implementation must be communicated to the Commission which can arrange, together with the Member States, for regular comparisons to ensure a coordinated implementation.

Council Directives for the application of the "framework" Directive 76/464/EEC for list I substances:

- ***Council Directive 82/176/EEC on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry***
  (OJ No L 81, 27.03.1982).
- ***Council Directive 83/513/EEC on limit values and quality objectives for cadmium discharges***
  (OJ No L 291, 24.10.1983).
- ***Council Directive 84/156/EEC on limit values and quality objectives for mercury discharges by sectors other than the chlor-alkali electrolysis industry***
  (OJ No L 47, 17.03.1984).
- ***Council Directive 84/491/EEC on limit values and quality objectives for discharges of hexachlorocyclohexane***
  (OJ No L 274, 17.10.1984)
  These directives specify:
  - the limit values and the time limits for compliance with these values for different industrial sectors and the procedure for monitoring discharges (Annex I);
  - the quality objectives for different types of water (Annex II);
  - the reference methods of measurement (Annex III); and
  - the monitoring procedures for quality objectives (Annex IV).
- ***Council Directive 86/280/EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC***
  (OJ No L 181, 04.07.1986)
  This Directive lays down in Annex I a set of general provisions applicable to all the list I substances. It includes limit values, dates set for compliance and procedures for monitoring discharges (heading A). In heading B one finds quality objectives, dates set for compliance and procedure for monitoring. Reference methods of measurement and limit of detection are given in heading C.
  Annex II of the Directive lays down a set of specific provisions (limit values for emission standards, quality objectives, reference method of measurement) relating to *carbon tetrachloride, DDT* and *pentachlorophenol*.
- ***Council Directive 88/347/EEC amending Annex II to Directive 86/280/EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC* (First Amendment)**
  (OJ No L 158. 35, 25.06.1988)
  This amendment lays down a set of specific provisions (limit values for emission standards, quality objectives, reference method of measurement) relating to *aldrin, dieldrin, endrin and isodrin, hexachlorobenzene, hexachlorobutadiene* and *chloroform*.
- ***Proposal for second amendment to Directive 86/280/EEC on limit values and Quality objectives for 4 substances, EDC (1-2 dichloroethane), TRI (trichloroethylene), PER (tetrachloroethylene), TCB (trichlorobenzene).***
  (COM 88/432 final)

Council Directives for the application of the "framework" Directive 76/464/EEC for list II substances:

- ***Proposal for a Council Directive on water quality objectives for chromium***
  (OJ No C 351, 31.12.1985)
  Considering the gaps and the lack of precision concerning the quality objectives in the Member States programmes for the reduction of pollution by list II substances, the Commission elaborated a proposal for a Directive setting out the water quality objectives for chromium (Annex I) and a reference method of measurement (Annex II).
  This Directive will be followed by a number of other Directives concerning Zn, Ni, Pb, As, etc.

1.2.2. Protection of groundwater

Council Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances
(OJ No L 20, 26.01.1980)
The purpose of this Directive is to protect groundwater by preventing or limiting the direct or indirect introduction of substances in lists I or II of the Annex of the Directive.
List I or "black list" contains sustances selected mainly on the basis of their toxicity, persistence and bioaccumulation. It includes organohalogen, organophosphorus and organotin compounds; carcinogenic, mutagenic and teratogenic substances; mercury, cadmium and their compounds; mineral oils and hydrocarbons; cyanides.
List II or "grey list" contains individual or categories of substances which could have a harmful effect on groundwater.
The Directive does not apply to discharges of domestic effluents from isolated dwellings situated outside areas protected for the abstraction of water for human consumption, to trace quantities of list I or list II substances, or to radioactive materials.

Member States must prohibit all direct discharge of list I substances, and subject to prior investigation, any disposal or tipping which might lead to indirect discharge (infiltration through the ground or subsoil).
Member States must subject to prior investigation all direct or indirect discharges of list II substances into groundwaters.
The prior investigations include the examination of the hydrogeological conditions of the area concerned, the possible purifying powers of the soil and subsoil and the risk of pollution and alteration of the quality of the groundwater from the discharge.
If conceded, the authorisation must specify the place and the method of discharge, the maximum quantity permissible, the essential precautions to be taken and the measures for monitoring. The authorisations must be limited in time and reviewed every four years. They must be registered in a regularly updated inventory in order to supply the Commission with all necessary information.
In the case of discharges into transfrontier groundwater, the Member States must inform and consult their neighbours before an authorisation is issued.

1.2.3. Pollution by detergents

Council Directive 73/404/EEC on the approximation of the laws of the Member States relating to detergents
(OJ No L 347, 17.12.1973)
This Directive prohibits the placing on the market and use of detergents containing anionic, cationic, non-ionic and amphotytic surfactants with average levels of biodegradability less than 90%. These surfactants must also not be harmful to human or animal health under normal conditions of use.
The marketing of detergents which comply with the provisions of this Directive must not be prohibited, nor restricted, nor hindered by the Member States. The test methods for determining compliance with the Directive are laid down in later directives (see below).
If the non compliance is established, Member States must prohibit the marketing and use of the detergent concerned in its territory. In this case, a procedure is provided which leads to recommendations by the Commission.

Council Directives for the application of the Directive relating to detergents:

- ***Council Directive 82/242/EEC on the approximation of the laws of the Member States relating to methods for testing the biodegradability of non-ionic surfactants and amending Directive 73/404/EEC.***
  (OJ No L 109, 22.04.1982).
- ***Council Directive 73/405/EEC- on the approximation of the laws of the Member States relating to methods of testing the biodegradability of anionic surfactants***
  (OJ No L 347, 17.12.1973).
- ***Council Directive 82/243/EEC amending Directive 73/405/EEC on the approximation of the laws of the Member States relating to methods of testing the biodegrabability of anionic surfactants***
  (OJ No L 109, 22.04.1982)
  These Directives lay down reference methods for the determination of the biodegradability of either non-ionic or anionic surfactants. A preliminary treatment of products to be tested and a method for the determination of surface active agents in biodegradability tests are also included.
- ***Council Directive 86/94/EEC amending for the second time Directive 73/404/EEC on the approximation of the laws of the Member States relating to detergents***
  (OJ No L 80, 25.03.86)
  This Directive extends the time limit for the exemption for complaining to community rules for some detergents until 31 December 1989.

1.3. Pollution from the industrial sector

Some industries are responsible for harmful water pollution due to the nature of their production processes. The titanium dioxide industry is a significative example.
Measures are also envisaged to reduce potential water pollution by energy-producing industries through discharges of cooling water from power stations into the sea or rivers.

1.3.1. Paper production industry sector

In 1975 the Commission presented to the Council a proposal on the pollution of water by paper pulp industries which produce great quantities of solids in suspension reponsible for the alteration of oxygen content of water streams and for the production of foam. It elaborated a Directive proposal, still pending, aiming at fixing emission standards.

1.3.2. Titanium dioxyde industry sector

In 1975 the Commission presented to the Council a proposal on waste from the titanium dioxyde industry with a technical report on the hazardous effects on the marine ecosystem. It elaborated three Directives to prevent and progressively reduce pollution caused in this field.

Council Directive 78/176/EEC on waste from the titanium dioxide industry
(OJ No L 54, 25.02.1978)
This Directive lays down the system of prior authorisation concerning the discharge, dumping, storage, tipping or injection of waste from the titanium dioxide industry. The issue of this authorisation is subject to specific conditions regarding the matter, the site and the methods for the various types of disposal, as specified in Annex I. Irrespective of the method and extent of treatment of the waste, its disposal must be accompanied both by monitoring of the waste and surveillance of the environment concerned, as specified in Annex II.
Member States must draw up programmes for the progressive reduction and eventual elimination of pollution caused by existing industrial establishments. The provisions related to this point were amended by ***Council Directive 83/29/EEC amending Directive 78/176/EEC on waste from the titanium dioxide industry*** (OJ No 32, 03.02.1983).
New industrial establishments must be subject to applications for prior authorisation preceded by an environmental impact study.

Council Directive 82/883/EEC on procedures for the surveillance and monitoring of environments concerned by waste from the titanium dioxide industry
(OJ No L 378, 31.12.1982)
This Directive lays down the procedures for the surveillance and monitoring of the effects of waste from the titanium dioxide industry on the environment. It considers the physical, chemical, biological and ecological aspects of the discharge, dumping, storage, tipping or injection in the ground. The Annexes of the Directive specify the parameters to be determined for the various disposal methods (discharge into or immersion in salt water, discharge into fresh surface water, storage and dumping on land, injection into soil). These are mandatory or optional and concern the minimum annual sampling, the frequency of analysis and refence method of measurement used. The Directive considers also the control of the atmospheric pollution caused by discharge into air.
Member States must forward to the Commission a report containing details of the surveillance and monitoring operations. A summary of this report will be published by the Commission.

Council Directive on procedure for harmonizing the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry
(OJ No L 201, 14.07.1989)
Considering article 9 of Directive 78/176/EEC the Commission has submitted in 1983 a proposal concerning the harmonization of programmes for the reduction of pollution from the titanium dioxide industry.
This Directive distinguishes industrial establishments employing the sulphate or the chloride processes as well as the environment receiving the waste, i.e. sea waters (estuary, coastal, open sea waters) or surface freshwaters. Member States must take the necessary measures to prohibit the dicharge of the most polluting wastes, i.e. all forms of "copperas" and of insoluble matter, and to reduce the discharge of liquid acid waste below limit values as specified for the various instances.

1.4. Marine pollution

Marine pollution can occur from land-based-sources, dumping of wastes, exploitation of marine resources and transport, atmospheric pollution, etc. Policy in marine pollution is based on Council Directives and Council Decisions concluding international conventions.

1.4.1. Marine pollution from land-based sources

The control of marine pollution from land-based sources is regulated by several Directives aiming at reducing the impact of pollutants discharged directly or indirectly into the aquatic environment (see 1.2.). Council Decisions concluding international conventions on this matter ("Paris Convention" on marine pollution from land-based sources, "Barcelona Convention" on the protection of the Mediterranean Sea against pollution, etc.) are reported in 1.5.

1.4.2. Marine pollution by dumping at sea

A number of international conventions aim at protecting the marine environment against this specific source of pollution. In particular, the "Barcelona Convention" on the protection of the Mediterranean Sea against pollution and the Protocol for the prevention of the pollution of the Mediterranean Sea by dumping from ships and aircraft was the object of a Council Decision (see 1.5.).

The Commission submitted to the Council in 1985 a proposal for a Directive controling the dumping at sea substituting the earlier one of 1976. It aims at introducing at Community level a number of provisions already considered in various international conventions (Barcelona Convention, Bonn Agreement, London Convention, Marpol Convention, Oslo Convention).

Proposal for a Council Directive on the dumping of waste at sea
(OJ No C 245, 26.09.1985; OJ No C 72, 18.03.1988)

The purpose of this Directive is to prevent and reduce marine pollution caused by dumping of waste or other materials at sea from ships and aircraft. This directive includes pollution from incineration.

Dumping at sea is prohibited in the case of waste or other materials containing substances listed in Annex I; it is forbidden without prior issue by the competent authorities of a special or general permit in the cases of substances listed in Annex II or any other substances, respectively. In the latter case the permits are issued on the basis of criteria concerning the characteristics and composition of the matter, characteristics of dumping site and method of deposit, possible effects on marine ecosystem (Annex III). From 1 January 1990, and over a period of five consecutive years, Member States must reduce each year the quantities of waste authorised to be dumped by 10% of the quantity authorised in 1989 in the case of waste or other materials listed in Annex II.

The incineration at sea is prohibited or submitted to the a prior authorisation as specified in Annex IV. Member States must not permit the incineration of substances and materials for which practical alternative land-based methods of treatment and disposal are available. A date for the termination of incineration at sea will be fixed by the Commission and proposed to the Council by June 1991.

1.4.3. Marine pollution by exploitation of marine resources and transport by sea

The incident at the Ecofisk production platform in 1977 and the shipwreck of the Amoco-Cadiz in 1978, have heightened public awareness to accidental pollution of the sea by hydrocarbons. The Commission has responded in 1978 by launching, and progressively reinforcing, an extensive action plan to fight against such accidental pollution, as specified in the ***Council Resolution of 26 June 1978 setting up an action programme of the European Communities on the control and reduction of pollution caused by hydrocarbons discharged at sea*** (OJ No C 162, 08.07.1978).

An advisory committee on the control and reduction of pollution caused by hydrocarbons and other dangerous substances discharged at sea was created in 1980 to assist the Commission.

One of the main task of the action plan was the establishment of a Community information system on marine pollution. A first step in 1981 concerned the pollution by hydrocarbons and was enlarged in 1986 to include other dangerous substances covered by the European Directives, as specified in the Coucil Decisions below.

Council Decision 81/971/EEC establishing a Community information system for the control and reduction of pollution caused by hydrocarbons discharged at sea
(OJ No L 335, 10.12.1981)

The information system includes

- an inventory of resources for combating pollution of the sea by hydrocarbons, including data on their characteristics, location sites and delays (Annex I);
- a list of national and joint contingency plans comprising brief descriptions of their content and details of the authorities responsible;
- a compendium of hydrocarbon properties and their behaviour and of methods of treatment and end uses of mixtures of water-hydrocarbon solid matter recoverd from the sea or along the coast (Annex II).

Member States must forward to the Commission the information and update it annually. The Commission is responsible for implementing the decision and make available a copy to each Member State. Every two years, the Commission must draw up and forward to the Council and the European Parliament a report on the operation of the information system and the use made of it by Member States. The first report was published in 1985.

Council Decision 86/85/EEC establishing a Community information system for the control and reduction of pollution caused by the spillage of hydrocarbons and other harmful substances
(OJ No L 77, 22.03.1986)

This Decision which repeats the content of that of 1981 concerning pollution by hydrocarbons, is supplemented with an inventory of resources for intervention in the event of a spillage of harmful substances other than hydrocarbons (Annex III). This inventory contains data on manpower (specialist staff, task forces, etc.) and material resources including characteristics, location sites and delays.

In the framework of the action plan of the European Communities on the control and reduction of pollution caused by hydrocarbons discharged at sea, the Commission submitted to the Council a ***proposal for a Council Directive on the drawing up of contingency plans to combat accidental oil spills at sea*** (OJ No C 273, 12.10.1983) and an ***amended proposal for a Council directive on the drawing up of contingency plans to combat accidental spills of oil and other harmful substances at sea*** (OJ No 215, 16.08.1984). These Directives are still pending.

Moreover the control of marine pollution from accidental discharge is also regulated by Council Decisions concluding international conventions:

Council Decision 81/420/EEC concluding the Protocol to the "Barcelona Convention" concerning cooperation in combating pollution of the Mediterranean Sea by oil and other harmful substances in case of emergency

Council Decision 84/358/EEC concerning the conclusion of the "Bonn Agreement" for cooperation in dealing with pollution of the North Sea by oil and other harmful substances (see 1.5.).

1.5. Participation in International Conventions

The Commission was authorized by the Council to participate on its behalf in the negotiations of international conventions in several areas where the Community has competence. After signature, these conventions and subsequent protocols or actions are ratified by means of Council Decisions. The texts of the conventions are annexed to the Council Decisions.

1.5.1. Convention on the marine pollution from land-based sources (Paris Convention 1974)

The Paris Convention covers aspects of marine pollution occuring from land-based sources through watercourses, underwater or other pipelines from the coast, etc. It was followed by the adoption of programmes and measures for the application of the Convention as well as a protocol containing provisions regarding the prevention of pollution of the maritime area through the atmosphere. The following Council Decisions state the adhesion of the Community.

Council Decision 75/437/EEC concluding the convention for the prevention of marine pollution from land-based sources
(OJ No L 194, 25.07.1975)

This Decision concludes the so called "Paris Convention" which aims at preventing pollution of the North East Atlantic and the North Sea from land-based sources.

The Contracting Parties pledge

- to eliminate, as a matter of urgency, the pollution by substances listed in Part I of Annex A, including persistant chemical families or materials;
- to reduce, or eliminate, as appropriate, the pollution by substances listed in Part II of Annex A, including less noxious or less persistent organic substances and heavy metals; discharges must be approved by the Contracting Parties;
- to adopt measures to forestall and, as appropriate, eliminate the pollution by radioactive substances, including wastes, referred to in Part III of Annex A.

The Contracting Parties agree to set up a permanent monitoring network to assess the level of marine pollution and the effectiveness of reduction measures.

A Commission of representatives of the Contracting Parties is entrusted with the application of the clauses of the Convention.

Council Decision 85/613/EEC concerning the adoption, on behalf of the Community, of programmes and measures relating to mercury and cadmium discharges under the Convention for the prevention of marine pollution from land-based sources
(OJ No L 375, 31.12.1985)

The Council approved on behalf of the Community a first series of programmes and measures of specific applications in the framework of the Paris Convention, namely PARCOM Decisions 85/1 and 85/2. The provi-

sions of these programmes relating respectively to mercury and cadmium discharges are in line with those of Council Directives 76/464/EEC, 83/513/EEC, and 84/156/EEC (see 1.2.).

Council Decision 87/57/EEC concluding the Protocol amending the Convention for the prevention of marine pollution from land-based sources
(OJ No L 24, 27.01.87)
This Decision approved on behalf of the Community the Protocol amending the Convention for the prevention of marine pollution from land-based sources to extend its scope so as to include marine pollution through the atmosphere.

1.5.2. Convention for the protection of the marine environment of the Baltic Sea (Helsinki Convention 1974)

In 1974 the States bordering the Baltic Sea (Denmark, Finland, FRG, DDR, Poland, Sweden and USSR) signed an International Convention on the Protection of the Marine Environment of the Baltic Sea. This convention concerns the main sources of marine pollution including land-based sources and dumping at sea of dangerous substances. In 1977 the Council authorised the Commission to negotiate its participation to the Convention. Sofar however the EC is not yet full contracting party

1.5.3. Convention for the prevention of marine pollution by dumping from ships and (Oslo Convention 1972)

The Commission participates with observer status to the management committee of the Convention pending approval by the Council of its participation.

1.5.4. Convention on the protection of the Mediterranean Sea against pollution (Barcelona Conventional 1976)

A plan of action for the protection of the Mediterranean Sea was adopted at a first international Conference organised at Barcelona in 1975 by the United Nations Environment Programme (UNEP) with the participation of the states bordering the Mediterranean Sea. This plan included the elaboration of a framework convention, which was signed in 1976, and of four protocols concerning the principal sources of pollution. The following Council Decisions confirm the adhesion of the Community.

Council Decision 77/585/EEC concluding the Convention for the protection of the Mediterranean Sea against pollution and the Protocol for the prevention of the pollution of the Mediterranean Sea by dumping from ships and aircraft
(OJ No L 240, 19.09.1977)
This Decision approves the Convention and the Protocol concerning dumping from ships and aircraft.
The Contracting Parties pledge to take all appropriate measures to prevent, abate and combat pollution and protect and enhance the marine environment.
The Convention covers pollution caused by dumping from ships and aircraft, discharges from ships, exploration and exploitation of the continental shelf and the seabed and its subsoil, and land-based sources. It also lays down provisions concerning joint monitoring programmes, scientific and technological cooperation, appropriate procedures for the determination of liability and compensation of damage, settlement of disputes and arbitration (Annex A).
The ***Protocol*** for the prevention of the pollution of the Mediterranean Sea by dumping from ships and aircraft requires the Contracting Parties to take all appropriate measures to reach this goal.Substances and materials listed in Annex I must not be dumped; those listed in Annex II, as well as all other wastes and matter, are subject to a prior special permit from the competent national authorities. Permits must be issued only after careful considerations of factors regarding the matter, the dumping site and the method of deposit as set forth in Annex III.

Council Decision 81/420/EEC on the conclusion of the Protocol concerning cooperation in combating pollution of the Mediterranean Sea by oil and other harmful substances in case of emergency
(OJ No L 162, 19.06.1981)
This Decision approves the second Protocol to the "Barcelona Convention" concerning cooperation in combating pollution of the Mediterranean Sea by oil and other harmful substances in case of emergency.
The Contracting Parties agree to maintain and promote contingency plans and means for combating pollution, to develop and apply monitoring activities covering the Mediterranean Sea, and to cooperate in the removal or recovery of harmful substances.
They must require all ships and aircraft to report, by the most rapid and adequate channels according to Annex I to this protocol, accidents or the noted presence of harmful substances.

Council Decision 83/101/EEC concluding the Protocol for the protection of the Mediterranean Sea against pollution from land-based sources
(OJ No L 67, 12.03.1983)
This Decision approves the third Protocol to the "Barcelona Convention" concerning the protection of the Mediterranean Sea against pollution from land-based sources through outfalls, coastal disposal, rivers, canals or other watercourses, including underground watercourses as well as land-based sources transported by the atmosphere.
Contracting Parties undertake to eliminate pollution by substances listed in Annex I and to strictly limit pollution by substances or sources listed in Annex II. Discharges of waste containing substances referred to in Annex II must be subject to a strict previous authorisation taking due account of the provisions listed in Annex III.
Contracting Parties undertake to formulate and adopt common guidelines and standards for the installation of pipelines for coastal outfalls, the treatment of effluents, the quality of sea water used for specific purposes, the control and replacement of dangerous products and specific requirements for the control of substances listed in Annexes I and II. They agree to carry out monitoring activities to assess the levels of pollution along the coasts by substances or sources listed in Annexes I and II and to evaluate the effects of measures to reduce pollution. They intend to cooperate in the study of inputs, pathways and effects of pollutants and in the development of new methods for the treatment, reduction and elimination of pollutants.
Various recommendations in the framework of this protocol have already been adopted by parties to the Barcelona Convention.

Council Decision 84/132/EEC on the conclusion of the Protocol concerning Mediterranean specially protected areas
(OJ No L 68, 10.03.1984)
This Decision approves the fourth Protocol to the "Barcelona Convention" concerning protected areas of the Mediterranean.
Contracting Parties must establish protected areas and undertake the action necessary to protect and eventually restore them.
The areas are established to safeguard the sites of biological and ecological value and those of particular scientific, aesthetic, historical, archaeological, cultural or educational importance. The conservation of genetic diversity and of representative types of ecosystems and ecological processes are also considered.
The protocol outlines the criteria to be adopted and the steps to be taken to select, establish and manage the protected areas.
Contracting Parties must supply to the Commission all the information which will allow to compile a directory of protected areas.
In the framework of the "Barcelona Convention", the Commission is also participating, since 1985, in negotiations to establish quality standards of bathing and shellfish waters.

1.5.5. Convention for the protection of the Rhine (1976)

The establishment of an International Commission for the Protection of the Rhine against Pollution was decided in Bern in 1963. It elaborated the Convention for the protection of the Rhine against chemical pollution which was signed in 1976. The Community adhered to this Convention in 1977 through a Council Decision which was amended several times following the supplements proposed by the Rhine Commission regarding mercury, cadmium and carbon tetrachloride.

Council Decision 77/586/EEC concluding the Convention for the protection of the Rhine against chemical pollution and an Additional Agreement to the Agreement, signed in Berne on 29 April 1963, concerning the International Commission for the Protection of the Rhine against Pollution
(OJ No L 240, 19.09.1977)
This Decision ratifies the signature of the Convention in December 1976.
Contracting Parties agree to take the appropriate measures to gradually eliminate discharges of dangerous substances listed in Annex I and to reduce pollution by substances listed in annex II. Pursuant to Annex III, Contracting Parties establish updated inventories of discharges containing substances listed in Annex I which are subject to emission standards.
The International Commission for the Protection of the Rhine against Pollution publishes the monitoring results annually and proposes the limit values to be included in Annex IV.
The Additional Agreement ratifies the participation of the European Community to the International Commission for the Protection of the Rhine against pollution.

Council Decisions amending Council Decision 77/586/EEC concluding the Convention for the protection of the Rhine against chemical pollution:

- ***Council Decision 82/460/EEC on a supplement to Annex IV to the Convention on the protection of the Rhine against chemical pollution***
  (OJ No L 210, 19.07.1982)
- ***Council Decision 85/336/EEC concerning a supplement in respect of cadmium to Annex IV to the Convention for the protection of the Rhine against chemical pollution***
  (OJ No L 175, 05.07.1985)
- ***Council Decision 88/381/EEC concerning a supplement, in respect of carbon tetrachloride, to Annex IV to the Convention for the protection of the Rhine against chemical pollution***
  (OJ No L 183, 14.07.1988)
- ***Council Decision 88/382/EEC concerning a supplement, in respect of mercury originating in sectors other than the chlor-alkali electrolysis industry, to Annex IV to the Convention for the protection of the Rhine against chemical pollution***
  (OJ No L 183, 14.07.1988)

  These Decisions adopt the proposals from the International Commission for the Protection of the Rhine against Pollution to supplement Annex IV to the Convention on the protection of the Rhine against chemical pollution with limit values for mercury from chlor-alkali electrolysis industry and others sources, cadmium and carbon tetrachloride. These limit values are identical to those set out in Council Directives for the application of the "framework" Directive 76/464/EEC for list I substances (see 1.2.1.).

1.5.6. Agreement for cooperation in the management of Danube waters (1980)

The Commission was authorised by the Council to participate to the negotiation of an agreement for cooperation in the management of Danube waters between the FRG and Austria. In December 1986 the Council decided to sign this Convention subject to ratification.

1.5.7. Bonn Agreement for the protection of the North Sea (1983)

The Bonn Agreement of 1983 is a continuation and extension of the first Agreement of 1969 concerning the pollution risks by hydrocarbons. The extension to other harmful substances was justified by a consistent development of transport of dangerous substances by sea increasing the risk of accident. The adhesion of the Community to this agreement in 1984 was stated by the following Council Decision.

Council Decision 84/358/EEC concerning the conclusion of the agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances
(OJ No L 188, 16.07.1984)

This Decision approves the Bonn Agreement which provides for exchange of information, mutual assistance and cooperation in combating pollution. It applies whenever the presence or the prospective presence of oil or other harmful substances polluting or threatening to pollute the sea within the North Sea area presents a serious and imminent danger to the coast or related interests of one or more Contracting Parties.
For the purpose of the Agreement, the North sea is divided into zones as specified in the Annex.

1.5.8. The Convention on sea law (1982)

Following the first meeting in 1958, a third international conference on sea law in 1973 led to the adoption in 1982 of an international convention which includes more than 300 articles and 9 annexes. It determines the respective rights of the flag, the harbour and the sea coast states concerning the application of the different regulations instituted on protection of the marine environment.
The EC has also signed the Convention in conformity to Annex 9 which regulates the participation of international organisations.

1.5.9. Plan of action for an environment programme in the Caribean- Convention for the protection and development of the marine and coastal environment (Cathagene Convention 1983)

The European Community participated to the negotiations for the elaboration of a Convention concerning the aquatic environment of the Caraibes which it signed subject to ratification in March 1973. The participation to this Convention was justified by legal and political considerations.

1.5.10. Convention for the protection of the marine and coastal environment of the Eastern African region (Nairobi Convention 1985)

An action plan for the protection, management and development of the marine and coastal environment of the eastern African region as well as a Convention and two protocols were adopted at the Conference organised at Nairobi in 1985 by the United Nations Environment Programme (UNEP).
The European Community decided to participate to these instruments the provisions of which may affect the Community laws applicable to the French Department of Reunion. In June 1986, the Council decided to sign this Convention subject to ratification. The texts of the agreements are annexed to the

Proposal for a Council Decision concerning the conclusion, on behalf of the Community, of the Convention for the protection, management and development of the marine and coastal environment of the Eastern African region and the two Protocols annexed thereto.
(OJ No C 253, 10.10.1986).

1.5.11. The marine Conventions on ships safety

A number of Conventions on ship-generated pollution were elaborated by the International Maritime Organisation (IMO).

Convention Marpol (1973/1978)

This Convention, elaborated in 1973, lays down severe construction rules for oil tankers and delimits certain zones, such as Baltic and Mediterranean Seas, where deballasting is prohibited. A protocol to this Convention, adopted in 1978, strengthened the preventive measures such as the equipment of the new tankers fitted with protectively located special ballasting tanks (segregated ballast tanks) and the use of crude oil washing system.

Convention Solas (1974/1978)

This Convention lays down precise norms for the construction and stability of ships, for the radio and safety equipment installed, etc... A Protocol adopted in 1978 lays down the modalities for the inspection and control of the weak parts of tankers.

1.6. Action plan for the protection of the environment in the Mediterranean basin (MEDSPA).

During the Third Action Programme (1982-1986), the Commission undertook a plan for the protection of the environment in the Mediterranean basin.

Commission Communication to the Council on the protection of the environment in the Mediterranean basin
(OJ No C 133, 21.05.1984)

The strategy and plan of action includes short-term measures regarding water quality and supply (Annex I), waste management (Annex II), rational use of land Annex III), international action (Annex IV) and specific measures relating to specific needs (Annex V). An Advisory Committee was set up in order to advise the Commission and the Member States on the kind of information to be gathered, the studies to be carried out, the strategy to be adopted and the criteria for selecting specific projects to be implemented to ensure a rational management of environmental resources in the Mediterranean region (Annex VI).

To gain sufficient experience, the above initiative was implemented between 1986 and 1988 by a preparatory series of demonstration projects financed by the EC.

On the basis of results obtained a ***communication setting out the objectives of and defining a strategy for Community action to protect the environment in the Mediterranean was adopted by the Commission in November 1988*** (Communication to the Council, European Parliament and Economic and Social Committee, COM (88) 392 final of 14.11.1989).

On 29 November 1989, the Commission approved the ***proposal for a Council Regulation for the protection of the environment in the Mediterranean region, MEDSPA,*** (COM (89) 598 of 29.11.89).
The programme aims at coordinating initiatives in the field of the protection of the Mediterranean environment in the framework of the existing Community policy as well as to enforce cooperation with other international organizations e.g. the World Bank, European Investment Bank and Mediterranean Action Plan.

MEDSPA will complement the ENVIREG Programme of regional development for the financing of actions, particularly in less developed regions of the Community, in the following priority areas:

- rational management of waste water and solid waste in coastal cities with less than 100.000 inhabitants;
- rational management of dangerous and toxic waste and of sewage sludge produced by treatment plants;
- treatment of water from ships' tanks containing residues of oil and other chemicals; and
- integrated management of biotopes of Community interest in coastal regions.

MEDSPA also aims to provide technical assistance for the establishment of environmental policies, encourage interregional and international cooperation, favour transfer of technologies and their adaptation to Mediterranean conditions and supplement administrative structures in non-Community Mediterranean countries.

The programme, set for the period 1990-1999, is divided into two phases with a reassessment of priorities by the end of 1994. Estimated budget for the first three years is 37 MECUS.

1.7. Investment support

The European Investment Bank (EIB) grants long term loans for investments in waste-water treatment and to improve the quality of drinking water. Using non-reimbursable subsidies which are financed by the Community budget, the Commission supports a number of activities which aim to increase the availability of water and improve its quality.

To this end the European Regional Development Fund (FEDER) has granted over 700 million Ecus to more than 1300 infrastructure projects within the water sector: dams, water collection and distribution systems, waste-water treatment, site cleanup and protection, anti pollution devices, etc. It is expected that financial support from the FEDER will increase in favour of activities which aim at protecting the environment in economically disadvantaged areas. This could be carried out through the "ENVIREG" programme which the Commission is planning to launch in conjunction with the reform of its strutural funds.

Furthermore, the European Fund for Orientation and Agricultural Guarantees (FEOGA) gives financial support to operations aiming at improving agricultural structures in accordance with the demands of environmental protection. It subsidizes for example water supply schemes for rural areas.

1.8. New Community Water Policy of the 90's

The need for an expansion and intensification of the Community policy and legislation on the protection and management of Community water resources, within the context of the European Single Act, was stressed on the occasion of the European Council in Hannovre, the Environment Council (Resolution of 28 June) and the Ministerial Seminar on the Future Community Water Policy in Frankfurt, in June 1988.

Key issues and related actions to be addressed by the EC in the 90's were identified:

- **Ecological quality of Community waters**
  Proposal for a Council Directive in preparation.
- **Waste water treatment**
  A common approach at Community level of adequate treatment of municipal and industrial waste to be considered by the Coucil has been approved by the Commission.
- **Dangerous substances**
  A simultaneous approach to emission standards and complementary quality objectives has been developed; emission norms should be defined on the basis of best available technology.
- **Diffuse sources**
  A Directive concerning the protection of fresh, coastal and marine waters against pollution caused by nitrates from diffuse sources has been proposed to the Council.
- **Water resources**
  Water resources must be part of a global policy.
- **Integrated water management**
  Efforts will be made to integrate water policy in an overall environmental approach including industrial, agricultural and regional aspects in the Community.

Following the Ministerial Seminar of Frankfurt the European Commission decided to prepare a directive concerning the ecological quality of surface water. This would be an umbrella directive complementing, not replacing, existing directives in the water quality area.

Preliminary discussions concerning the new directive were held during the conference organised jointly by the CEC and the European Institute for Water in Como, Italy, 18-19 May 1989.

Further information can be obtained from:
V. Mandl, DG XI/B1,CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2354249.

2. Soil Protection

The EEC Fourth Environmental Action Programme (1987-1992) pays particular attention to the protection of the soil (OJ No C 328, 7.12.1987, p. 31). The latter being a complex medium with multiple interralionships with other media (and vice versa) and serving multiple functions its protection is a difficult venture.

A study of the problems related to soils and soil protection leads to the identification of three categories of threats:

- Contamination by harmful substances of various origins -urban, agricultural, industrial wastes, agrochemical products, acid deposition, etc.;
- Degradation of the physical or chemical structure;
- Misuse and waste as a result of space consuming activities (land use planning).

To account for these characteristics and respond to the possible threats a global approach to soil protection is necessary. The Commission in its activities follows such an approach.

The description of the past, present and future activities in this field according to the classification of the threats is given below.

2.1. Contamination by harmful substances

2.1.1. Correct use of sewage sludge in agriculture

Council Directive 86/278/EEC on the protection of the environment and in particular of the soil when sewage sludge is used in agriculture
(OJ No L 181, 04.07.1986)

One of the aims of this Directive was to establish initial Community measures in connection with soil protection by fixing specific conditions concerning the use of sewage sludge. Considering the valuable agronomic properties of the latter, but also the fact that it may contain high amounts of heavy metals considered dangerous for plant growth as well as for human nutrition, this Directive lays down the necessary provisions for their correct application in agriculture.

Maximum permissible values for the concentrations of heavy metals in soil (including Cd, Cu, Ni, Pb, Zn, Hg, while there is a proposal actually for Cr as well) are set in Annex I A of the Directive.

Two approaches are proposed aiming at limiting the amounts of heavy metals added to cultivated soils through sludge additions:

- either maximum quantities for the amounts of sludge used per annum are set by Member States (expressed in tonnes of dry matter per unit of area per year) while observing limit values for heavy metal concentration in sludge laid down in accordance with Annex I B of the Directive. It gives limit values for heavy metal concentrations in sludge for use in agriculture expressed in mg/kg of dry matter;
- or Member States ensure that limit values for the quantities of heavy metals that can be added to the soil on the basis of a 10-years average are not exceeded. These values are stated in kg per ha per year in Annex I C of the Directive.

In addition, Member States have to ensure that up-to-date records are kept, which register:

(a) the quantities of sludge produced and the quantities supplied for use in agriculture;

(b) the composition and properties of sludge in relation to the parameters described in Annex II A;

(c) the type of treatment carried out (sludge from sewage plants treating domestic or urban waste waters or residual sludge from septic tanks, etc.);

(d) the names and addresses of the recipients of the sludge and the place where the sludge is used.

Every four years and in 1991 for the first time, Member States have to prepare a comprehensive report on the use of sludge in agriculture setting out the quantities used, the criteria followed and the difficulties encountered. The Commission shall publish the information forwarded by Member States and examine the need for submitting appropriate proposals for an increased protection of the soil and the environment.

This Directive which is in force since June 1989, refers only to agricultural use of sewage sludge. The need to include forest soils has been stated since sewage sludge may be used in these areas. The Commission services have already given attention to this matter.

2.1.2. Monitoring of soil conditions (pollution) in the framework of the CORINE Programme

Responding to increasing concern with regards to soil pollution by dangerous substances and recognizing the need to improve our knowledge on soil pollution, evolution and control of the state and health of soils, the Commission has initiated a project within the framework of CORINE programme on monitoring soil conditions (see above).

Such monitoring is considered to be an important key element for improving and increasing current knowledge with respect to soil pollution and soil health.

A first meeting was held on 26-27 October 1989 in Brussels in which experts from Member States exchanged views and experiences to establish a European system.

2.2. Degradation of the physical or chemical structure

2.2.1. Community action relating to the environment

Council Regulation (EEC) No 2243/87 on the action by the Community relating to the environment
(OJ No L 207, 29.07.1987)

Community action relating to the environment should preserve, protect and improve the quality of the environment to contribute to the protection of human health and ensure a careful and rational utilization of natural resources.

On this basis the Commission proposed, and the Council approved, the above mentioned regulation which provides Community financial support for certain projects. These include in particular: "projects providing an incentive and aimed at contributing towards the protection or re-establishment of land threatened or damaged by fire, erosion and desertification".

Unfortunately so far no request for such financing has been submitted to the Commission, despite the obvious interest of certain Member States in particular those of the Mediterranean basin where erosion problems are significant.

2.2.2. Soil erosion-risk assessment- CORINE programme

In setting up the CORINE programme, the Council Decision of 1985 mentioned above, specified a number of problems of the Mediterranean Region which required further information. Two problems related directly to land resources, namely soil erosion and protection of land quality, the latter referring to the inherent quality of the land to produce biomass or be used for agricultural production.

Soil erosion risk in particular is being assessed and mapped at a 1:1,000,000 scale across the whole of the southern region of the Community, using a methodology based exclusively on the Universal Loss Equation. Soil erodibility factors (Fournier Index and Aridity Index) as well as slope characteristics give the potential soil erosion risk from which the actual one is calculated taking into account the vegetative cover.

It is of interest to note that soils data have been digitized from the 1:1,000,000 scale soil map of the European Community, offering thus an opportunity for compilation of various other thematic maps, useful for soil protection policy making.

2.3. Misuse or waste of soils/land use planning

Environmental Impact Assessment

Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment
(OJ No L 175, 05.07.1985)

This Directive in force since June 1988 applies to the assessment of the environmental effects of those public and private projects which are likely to have significant effects on the environment.

Though it does not directly aim at protecting soils, its correct application may contribute to improving land use planning procedures to avoid misuse or waste of soils.

According to the provisions of this Directive the environmental impact assessment should identify, describe and assess the direct and indirect effects of a project on several factors among which "soil, water, air climate and the landscape".

Projects are classified in two categories:

- Annex I includes those which should be subjected to an assessment with regards to their effects on the environment. Examples are: crude oil refineries, large thermal power stations, nuclear power stations, etc.
- Annex II includes those which are subjected to an assessment with regards to their effects on the environment where Member States consider that their characteristics require it by virtue of their nature, size or location. Examples in agriculture include: restructuring of rural land holdings, land reclamation, etc.; in extractive industry: extraction of peat, coal, lignite, ores, etc. and in infrastructure projects: industrial estate, urban developments, etc.

With regards to the agricultural projects which are directly related to soil resources the Commission will submit a modification to this Directive, as announced in the Document Environment and Agriculture (COM (88) 338 final, 08.06.1988). It would make it mandatory to carry out environmental impact assessments where decisions are required concerning large scale agricultural projects such as the restructuring of holdings, changes in the water regime, etc.

Such assessment should be envisaged for this purpose particularly where public funding criteria or size thresholds are necessary.

Further information on Soil Protection can be obtained from:
A. Nychas, DGXI/B3, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel + 32 2 2359209.

3. Nature Protection

The First Environmental Action Programme, adopted in 1973, contained important chapters on the protection of the natural environment and this emphasis was maintained in the two subsequent programmes.

The Fourth Environmental Action programme (1987-1992) intends to further develop various aspects in the field of nature conservation and take positive measures to protect all forms of wildlife and their habitats. These measures should be aimed at the three main objectives of the World Conservation Strategy, i.e. the maintenance of essential ecological processes and life support systems, the preservation of genetic diversity and the sustainable utilization of species and ecosystems. The Commission will make appropriate proposals on these lines. The Commission is also working on the preparation of a comprehensive list of sites throughout the Community that are protected under the various categories of protected areas. Priorities will include the better enforcement of existing Community Directives relating to animal protection and the proposal of new Community measures where appropriate, e.g. for the protection of laboratory animals and the welfare of farm animals.

The main acts are listed below with reference to the Official Journal. When available, more complete information will be included in a next issue.

Council Directive 79/409/EEC on the conservation of wild birds
(OJ No L 103, 25.04.1979)

Council Regulation (EEC) No 348/81 on common rules for imports of whales or other cetacean products
(OJ No L 39, 12.02.1981)

Council Decision 81/691/EEC on the conclusion of the Convention on the conservation of Antarctic marine living resources
(OJ No L 252, 05.09.1981)

Council Regulation (EEC) No 3786/81 laying down provisions for the implementation of the common rules for imports of whales or other cetacean products
(OJ No L 377, 31.1981)

Council Decision 82/72/EEC concerning the conclusion of the Convention on the conservation of Europe wildlife and natural habitats
(OJ No L 38, 10.02.1982)

Council Decision 82/461/EEC on the conclusion of the Convention on the conservation of migratory species of wild animals
(OJ No L 210, 19.07.1982)

Council Regulation (EEC) No 3626/82 on the implementation in the Community of the Convention on international trade in endangered species of wild fauna and flora
(OJ No L 384, 31.12.1982)

Commission Regulation (EEC) No 3418/83 laying down provisions for the uniform issue and use of the documents required for the implementation in the Community of the Convention on international trade in endangered species of wild fauna and flora.
(OJ No L 344, 07.12.1983)

Council Directive 83/129/EEC concerning the importation into Member States of skins of certain seal pups and products derived from
(OJ No L 91, 09.04.1983; L 282, 14.10.1983)

Council Regulation (EEC) No 3528/86 on the protection of the Community's forests against atmospheric pollution
(OJ No L 326, 21.11.1986)

Council Regulation (EEC) No 3529/86 on the protection of the Community's forests against fires
(OJ No L 326, 21.11.1986)

Further information can be obtained from:
C. Stuffmann, DG DXI/B3, CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2354116.

Other Activities Relevant to EC Environmental Programmes

1. Remote Sensing Application Techniques at the EC Joint Research Centre

Orbiting satellites give pictures of the earth from space which are by definition beyond national boundaries. These so-called remote sensing pictures reveal much useful information on the extent of pollution of oceans, on crops and forests as well as changes and forecasts of climates. They can obviously help in land use formulations. The interpretation of these observations has been and is a subject of research at the Institute for Remote Sensing Applications at the Joint Research Centre at Ispra.

Research has developed in land monitoring and management of marine environment and resources as well as for the establishment of agricultural statistics. New techniques and tests form part of this research.

Remote sensing at the JRC in Ispra on the marine environment and resources is centered on:

- surveillance of the sea pollution (development and testing of suitable instrumentation and methods for detection, identification and quantification of spills of hydrocarbons and other chemicals in the sea);
- coastal transport of pollution (monitoring and analysis of physical and biological processes related to anthopogenic pollutants in coastal areas, also used to develop and validate computer models describing the complex dynamic conditions of the sea in coastal areas);
- study of upwelling areas (potential application of remote sensing data to the analysis of physical and biological processes connected with coastal upwelling and marine productivity).

The programme of remote sensing application techniques of the JRC also includes studies in support to the Directorate-General for agriculture and the statistical office of the Commission. It covers in particular crop and yield estimation and prediction. Other activities cover vegetation dynamics which include in turn environmental degradation phenomena such as desertification and deforestation.

In an effort to further develop and test new remote sensing techniques the JRC at Ispra has allocated to this aspect part of the research programme. It includes at present, laser induced fluorescence for the possible applications for the identification and characterization of oil pollution at sea, the determination of water quality and possible vegetation stress factors. Microwave remote sensing R&D focuses on the application of a radar cross section data base, development of information based algorithms, carrying out of European campaigns for data acquisition and training of users, as well as the participation in pilot projects using data from the first European remote sensing satellite (ERS-1).

More detailed information on the problem of environmental research through remote sensing techniques will be included in the next issue of Environmental Research Newsletter.

Further information can be obtained from:
R.L. Klersy, Director, Institute for Remote Sensing Applications, CEC-JRC Ispra, I-21020. Tel. + 39 332 789765.

2. Environment and Agriculture

The Commission has on a number of occasions, in particular in the Green Paper of July 1985, underlined the need for an agricultural policy which takes into account the environment.

In its Fourth Action programme on the Environment (1987-1992) the Commission stressed the need to integrate the environmental dimension into the agricultural policy and to establish a proper balance between agricultural development and the sometimes conflicting needs of environmental conservation. It has thus announced proposals aimed at reducing the damage caused by agriculture to the ecological infrastructure. These proposals refer in particular to pollution resulting from intensive animal breeding and excessive use of fertilizers and pesticides as well as the protection of natural habitats.

The following specific problems have been identified:

- Water quality problems (eutrophication, nitrate and pesticide pollution) resulting from misuse and/or overuse of chemicals, animal manures and other organic material.
- Soil degradation by long-term accumulation of heavy metals and acidification making soils unsuitable for farming or by erosion resulting

either from intensive farming or abandonment of agricultural activity in hilly or mountainous areas.
- Deterioration of air quality due to increased ammonia evaporation resulting from intensive lifestock rearing and use of certain types of fertilizers.
- Landscape changes, deterioration of some terrestrial habitats and extinction of wildlife species due to habit disturbance, deforestation, drainage of wetlands, pollution, etc.

3. EUREKA Environmental Projects

The objectives of EUREKA is to raise the productivity and competitiveness of Europe's industries and national economies in the world market through a closer cooperation among industrial concerns and research institutes in the field of advanced technologies. Established in Paris in 1985, the initiative was signed by nineteen Western-European countries and the CEC.

To day, among others, 32 EUREKA projects are classified in the environment sector. They have a total estimated cost of more than 600 million ECU and involve over 340 participants, of which 110 are commercial concerns and more than 200 are research institutes or universities. Five organisations come from non-member countries. In addtion, many other EUREKA projects have a strong environmental impact.

The 32 EUREKA environmental projects can be grouped in four categories:
- Large scale research and systems studies.
- Development of clean and purifying technologies.
- Protection applications.
- Development of instrumentation.

3.1. Large scale research and systems studies

[5 projects; 240 participants; 380 MECU]

Three are large and long-duration **"umbrella projects"** aiming at increasing knowledge thus preparing the ground to fight the negative consequences of:
- the transport and transformation of pollutants in the atmosphere over Europe, *Project EU 7* (EUROTRAC)
- the vertical and lateral exchanges between ocean, atmosphere, sea shelf and the coastal zone, *Project EU 37* (EUROMAR)
- the effects of pollution on historic objects and monuments, *Project EU 140* (EUROCARE).

In addition, there are two **independant projects**:
- *Project EU 53* aims at reducing environmental contamination, especially of surface, ground and sea water, due to industrial effluents by utilising local pre-treatment and final central process treatment.
- *Project EU 315* concentrates on the option of redepositing hazardous waste underground in caverns of granite or similar rocks using new geophysical methods for the scanning and monitoring of geomechanical stability and hydrology of ground waters in hard rock.

3.2. Development of clean and purifying technologies

[9 projects; 32 participants; 150 MECU]

These projects aim at developing new or improved technologies, either clean or purifying, to solve environmental problems. They concern water treatment and specific industrial processes or products.

Water treatment:
- *Project EU 5*: development of membranes for the production of drinking water and treatment of waste waters.
- *Project EU 25*: development of new clean technologies to reduce water contamination by chromium salts during the tanning of leather.
- *Project 161 (ZEOL)*: development of new filters (zeolites) for a more acurate absorption of solvents in the purification of air and water effluents especially from industry.
- *Project 195 (RESTORE)*: R&D of hydrocyclonic and non-selective flotation techniques including a full-scale experimental sludge treatment plant with particular focus on higly contaminated harbour sludge.
- *Project EU 253 (HYPRO)*: development and integration of three different technologies (chemical precipitation, sludge hydrolysis and biological nitrogen removal) to achieve an efficient, reliable and controllable wastewater treatment process.

When available, more complete information will be included in a next issue.

Further information can be obtained from:
- C. Anz, DG VI/FII 2. Tel. + 32 2 2356763.
- A. Nychas, DG XI/B3. Tel. + 32 2 2359209.

CEC, 200 rue de la Loi, B-1049 Brussels.

Industrial processes:
- *Project EU 375*: development of an environmentally clean and economically competitive process to replace current dry-cleaning methods of heavy duty laundry overalls.
- *Project EU 27*: development of an accurate and automated method to identify principal noise sources in vehicles.

EUROENVIRON "umbrella project":
- *Project 330 (EUROENVIRON)* emphasises environmental technology to solve or prevent environmental problems. The scope of this "Umbrella Project" is to generate research activities on high technology products, processes, systems or services.
- *Project 350 (EUROENVIRON-FOAM)* should develop a new biodegradable foaming liquid used in fire fighting and foam recovery processes.

3.3. Protection applications

[10 projects; 46 participants; 50 MECU]

These projects aim at protecting the environment against the threats imposed on it. They cover a broad field from e.g. Roman mosaics to wave attenuators on beaches.

Five projects are under the **EUROCARE "umbrella project":**
- *Project EU 316 (EUROCARE-COPAL)*: research on corrosion processes of several copper alloys in diverse environments to eventually develop special conservation treatments for bronze monuments.
- *Project EU 341 (EUROCARE-FOUNDATION)*: research on preservation of grids and piles of timber in old buildings using chemical methods.
- *Project EU 367 (EUROCARE)*: development of conservation methods for monuments in granitic rocks.
- *Project EU 396 (EUROCARE-PROMOS)* deals with methods and products for cleaning, removal and growth prevention of organisms, especially lichens, on Roman mosaics.
- *Project EU 401 (EUROCARE-CONCRETE)* concerns technologies for the **in situ** measurement of the corrosion rate of steel reinforcements in concrete structures.

Three projects aim at developing **research and monitoring vessels or vehicles** for various applications:
- *Project EU 356 (MAC)*: design and construction of a prototype of multi-purpose vessel fully equipped to carry out various operations both along sea shorelines and inland waterways for monitoring water and sediments and for the removal of solid waste and oil.
- *Project EU 357 (APECS)*: construction of a multi-purpose amphibious vehicle for use in difficult areas such as marshland and unstable ground.
- *Project EU 409 (EUROMAR-SMURV)*: advanced prototype of a highly efficient and flexible multi-purpose research vessel to be used in European seas, especially in the Mediterranean.

The two last projects concern the **protection of beaches** with a new type of wave attenuator and the **protection of plants**:
- *Project EU 394*: development and construction of new wave attenuators based on the phenomenon of oscillating water to protect the beaches against erosion without altering the site.
- *Project EU 386*: use of microorganisms to increase the resistance of plants to various diseases and improve the quantity and quality of yields.

3.4. Development of instrumentation

[8 projects; 42 participants; 33 MECU]

These projects aim at developing advanced instrumentation for collecting data to increase the knowledge on ecosystems and for detecting various pollutants.

Six of them are under the **EUROMAR "Umbrella Project"**:

- *Project EU 344 (EUROMAR-CHARISMA)*: development of instrumentation to measure the acoustical parameters of suspended matter and sediments in the seabed with applications in geotechnical engineering.
- *Project 372 (EUROMAR-DISC)*: development of a self-contained, computer-controlled underwater system dynamically positioned while towed at high velocity by a vessel.
- *Project EU 405 (EUROMAR-SEDIFLUX)*: development of a sonar instrument to measure the velocity, concentration and transport of suspended material in water, especially shallow waters and near bottom fluxes.
- *Project EU 407 (EUROMAR-ARMS)*: development of an acoustic, wide bandwidth instrument and an associated signal processing system for simultaneously mapping seabed topology and materials.
- *Project EU 408 (EUROMAR-BIMS)*: development of an integrated instrumentation system to investigate physical, chemical and geotechnical properties of seabed water sediment interface.
- *Project EU 410 (EUROMAR-MOSES)*: design and implementation of mobile laboratories having the same standard dimensions as industrial containers to be installed on board ships for specific environmental marine activities.

In addition, there are **two independant projects**:

- *Project EU 94*: development of low-weight, easily operated equipment to identify and simultaneously measure several gases.
- *Project EU 380 (LASFLEUR)*: development of an instrument to measure the status of vegetation from an aeroplane.

Under the rotating chairmanship starting on 1 July 1989, the EUREKA initiative was coordinated by Italy. Guidelines adopted by the Ministerial Conference were implemented to develop a widespread unifying process of European technology market under the aegis of "High Tech Europe".

The programme of the Italian chairmanship has three main objectives:

- to promote new projects through a better knowledge of the technological capabilities present in Europe including the issuing of an inventory of the latter;
- to promote the development of infrastructural projects in the areas of environment, education, development and transport;
- to facilitate the success of large scale EUREKA projects through adequate supportive measures to stimulate a better harmonisation of national standards and financial incentives.

Besides promotion, thematic technological exhibitions and specialised meetings are programmed to facilitate the exchange of information and the launching of new ideas. A "forum" called to work out technological solutions concerning problems deriving from production versus environment was held in Venice, Italy, in October 1989. A seminar on the use of advanced technologies for developing countries is scheduled for March 1990 in Florence, Italy.

Further information can be obtained from:
Secretariat EUREKA, 19 H Avenue des Arts, Bte 3, B-1040 Brussels.
Tel. + 32 2 2170030. Telefax + 32 2 2187906.

4. Programme of the Council of Europe for the Protection of Soils and Ecosystems

4.1. Protection of soils

On the occasion of the 5th Ministerial Conference on the Environment, held in Lisbon, Portugal, on June 1987, the Ministers of the Environment adopted a resolution concerning the protection and management of the natural heritage in rural areas. The Comittee of Ministers of the Council of Europe was requested to consider the elaboration of a draft Convention on soil protection.

Following this resolution, a feasibility study was initiated on national and/or international level of actions to be undertaken for the protection of soils and underground waters. This study contains definitions of the concept and functions of soil, a brief overview of the causes of degradation of natural or man made origin and an analysis of the various measures adopted for the protection of soils at national level. A chapter describes the actions of international organisations on specific problems such as regional/spatial planning policies, the incidence on the environment of decisions regarding land use, the inventory of soil resources, the conservation of soils, etc. From this study it appears that an international instrument considering all the aspects of soil conservation is lacking. Therefore, it is proposed that the Council of Europe, being the author of the European Soil Charter, set up a series of actions. Three possibilities are presently considered: (i) the elaboration of a draft framework convention on the protection of European soils, (ii) the preparation of a draft recommendation concerning the protection of European soils, or (iii) the setting up of a specific programme of the Council of Europe on soil protection.
This feasibility study will be discussed by the European Ministers of the Environment at the next Conference in Brussels in 1990. Proposals will then be made to the Committee of Ministers of the Council of Europe to examine approaches for the solution of this problem.

A technical study on the pollution of soils by heavy metals, considering their effects on agricultural yields as well as on the quality of groundwater, has also been undertaken.

4.2. Protection of ecosystems

In the past, several studies on typical ecosystems of the natural European heritage were carried out to establish the causes of their degradation and to set up common measures for their protection. They aimed also at determining the zones to be registered in the European Network of Biogenetic Reserves. The latter was created by the Council of Europe to ensure the conservation, potential, genetical diversity of particularly representative biotopes. At present the Network includes 161 sites designated by the Member States.

The Council of Europe created in1966 a European Diploma to be granted to natural areas, sites or monuments for their scientific, cultural, aesthetic and/or recreative value. Awarded for a five year-period, it can be renewed according to established rules. Thirty two Diplomas have so far been conferred setting such areas, sites or monuments under the patronage of the Council of Europe.

The Committee of the Bern Convention on the conservation of European wild life and natural habitats is at present studying the modalities of application of article 4 of the convention concerning the protection of habitats.

The Council of Europe has launched an action concerning the agricultural land which has been abandoned or set aside. An ongoing study will aim at stating the problems relating to the future utilization of agricultural land for nature conservation or landscape restoration purposes.

Further information can be obtained from:
Dr. F. Albanese, Director of Environment and Local Authorities,
Council of Europe, BP 431 R6, F-67006 Strasbourg Cedex.

The Council of Europe provides information on the situation of the environment and the measures for its preservation through its Documentation and Information Centre on Environment and Nature. Among other things it publishes in several languages a monthly "Naturopa Newsletter" and a quarterly "Naturopa".

For further information, contact:
Centre NATUROPA, Council of Europe, address as above.

Information

European Environment Agency - European Environment Monitoring and Information Network

The Commission has approved on 21.06.1989 for transmission to the Council a proposal concerning the establishment of both entities grouped in the "European Environment Agency". It will have the task to evaluate the protection and improve environment on the whole EC territory. It shall:

- provide the Community, the Member States and participating third countries with the objective information requested for the formulation and implementation of sound and effective environmental policies;
- provide technical scientific and economic information requested by the Commission in its tasks of identification, preparation and implementation of relevant legislation;
- develop and apply techniques of environmental modelling to forecast adequate preventive action; and
- ensure the integration of European environmental data in international programmes, e.g. UN and its system of agencies.

The agency shall be a Community organisation, the membership of which would be open to third neighbouring European countries considering the multinational aspects of the problems. It shall have a broad autonomy. A management board made up of national delegates as well as commission representatives shall be responsible for its activities.

The EC Heads of State Meeting held in June 1989 in Madrid, Spain, has requested the Council of Ministers to give a high priority to this proposal.

The Joint Research Centre of the European Community shall contribute to this agency and shall help with the harmonisation of environmental measurement methods, the intercalibration of instruments, the standardisation of data formats, the development of new methods and instruments, as well as other tasks to be agreed upon by the executive director of the agency and the director general of the Joint Research Centre.

Further information can be obtained from:
S. Johnson, DG XI, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2351111.

Work for third parties in the Joint Research Centre.

On 3 May 1989, the Research Council decided that, for the purpose of fulfilling the overall objectives of the Community relating to research and technological development, the Commission may place the installations, equipment or expert assistance of the Joint Research Centre at the disposal of third parties whether public or private, as appropiate, against payment. The decision is effective following its publication in OJ No L 142, 25.05 1989.

The main contributions of the JRC for third parties have sofar been on:

- Atmospheric Models Evaluation Study (ATMES) initiated jointly with the IAEA and WMO. The project aims at utilising data on radioactivity levels in air and precipitations after the Chernobyl accident to evaluate models designed for the management of nuclear accidents.
- Probabilistic risk assessmnet for site specific disposal of radioactive wastes making use of the LISA code developed by the JRC as well as an experimental study on the migration of radionuclides in crystalline rocks are carried out in cooperation with the Spanish Agency for Radioactive Waste Management (ENRESA).

Further information can be obtained from:
F. Geiss, Director f.f., Institute for the Environment, CEC-JRC Ispra, I-21020 Ispra. Tel. + 39 332 789834.

Civil Protection School at the JRC Ispra.

The first higher Civil Protection School has been set up at the JRC Ispra, Italy. Civil protection, here, covers coordination of activities in specialised fields in case of catastrophies. The formation of specialised teams in the management of such civil protection problems has led to the establishment of an eighteen months course. The latter deals with the training of coordinators at civil protection operating centers (twenty graduates) and the training of civil protection operators for the public and private sectors (twenty five qualified persons and university students).

The training programme has been divided into four sectors, i.e. legal, scientific, organisational and technological.

The school which refers to the assessor of the Lombardy region for teaching and professional training in Italy is guided by a general coordinator with the collaboration of sector coordinators. The effectiveness of the course is evaluated by a technical and scientific committee.

It is understood that civil protection operating center coordinators will be responsible for the collection of risk data for his or her area of competence; the collection of data on available resources; the definition of risk basins; the setting up of procedures for action; the setting up of operation and alarm centers; the initiation and coordination of operations; the prediction, prevention and reconstruction strategies.

Civil protection operators in the public/private sector should identify sources of risks, set up alarm systems, prepare emergency procedures for industry, buisenesses or establishments, coordinate and apply these procedures and be responsible for the training and exercise of staff.

Further information can be obtained from:
S. Facchetti, Institute for the Environment, CEC-JRC Ispra, I-21020 Ispra.
Tel. + 39 332 789969.

Eurocourses at the JRC Ispra

Eurocourses, previously known as "Ispra Courses", are intended to train scientific and technical staff in advanced sectors of science. The training courses are linked with EC R&D programmes, in particular with those carried out by the institutes of the JRC. They include basic or advanced courses in specialized disciplines as well as seminars, at research level, to discuss the state-of-the-art in scientific sectors of rapid development. Courses are based on the specific competences available in the various institutes, e.g. measurements for nuclear safety, reference methods and materials, advanced materials, structural integrity analysis, techniques for the control of environmental pollution, observation of the earth from satellites, fluid dynamics, computer technologies, technological forecasting, etc.

The more recent courses organised in the framework of the Environmental Protection programme have been reviewed in Environmental Research Newsletter No 2, p. 13.

The 1990 programme includes, in particular for environmental protection, courses in:

Remote Sensing

- Remote sensing and geographical information systems for management of natural resources in developing countries (14-25 May 1989).
- Application of remote sensing to agricultural statistics. Crop inventories and area frame sampling (24-29 September 1989).

Chemical and Environmental Science

- Practical Applications of Quantitative Structure-Activity Relationships (QSAR) in environmental chemistry and toxicology (11-15 June 1990).
- Sulphur dioxide and nitrogen oxides in industrial waste gases: emission, legislation and abatement (3-7 September 1990).

Further information and documentation on the courses can be obtained from:
Secretariat EUROCOURSES, CEC- JRC Ispra, I-21020 ISPRA.
Tel + 39 332 789819/781128. Telefax + 39 332 789839.
Telex 380043 - 380058 EUR I.

Co-ordination of EC/EFTA Stratospheric Ozone Research Vacancy announcement for a Junior Scientist

The co-ordination of EC/EFTA stratospheric ozone research is supported by a Task Group consisting of a Science Panel and a Coordinating Unit. The Task Group has been installed in the frame of the COST 611 Project "Physico-Chemical Behaviour of Atmospheric Pollutants".

The Science Panel consists of 14 European senior scientists from EC- and EFTA-Member States.

The Co-ordinating Unit has -in close liaison with the Science Panel- the following tasks:

- To elaborate a co-operative European research programme. This includes the compilation of existing research, the identification of gaps and of requirements for new research.

- To encourage participation in projects and the optimisation of national programmes to fulfill project objectives. The Task Force will liaise with existing national programmes and coordinators as appropriate.
- To identify project leaders for major field programmes, by agreement with participants.
- To identify possible "Satellite Units" within which specific projects would be organized.
- To utilize the expertise available within EC/EFTA countries to give a European view on scientific matters relating to stratospheric ozone.
- To organise workshops, conferences, etc. and to provide an annual report.
- To establish and utilize contact points to relevant non EC/EFTA international bodies.

Within these terms of reference the Co-ordinating Unit will provide all relevant links between the Commission and the scientific community.

The Co-ordinating Unit, hosted by the University of Cambridge and located at the British Antarctic Survey in Cambridge, has been operational since April 1989.

To support the Co-ordinating Unit in its manifold tasks, the Commission would like to announce the vacancy for a

Junior SCIENTIST

interested in science administration within the European Stratospheric Ozone Research Programme. The support scientist will provide assistance to the senior scientist in reviewing stratospheric ozone research in Europe, developing a co-ordinated programme, organising meetings, co-ordinate research projects and special campaigns.

His/her scientific background could be Chemistry, Physics, or Meteorology. This challenging task will be initially limited to a two year period. One third of the working time could be allocated to scientific studies within the area of air chemistry/physics and/or meteorology related to stratospheric ozone research. This would be possible either at the British Antarctic Survey or at Cambridge University.

Maximum salary is 16.975 Pound Sterling per annum.

Applications should be sent to:

Dr John Pyle, Department of Physical Chemistry, University of Cambridge, Lensfield Road, Cambridge CB2 7EP, United Kingdom.

European Better Environment Awards for Industry

The European Better Environment Awards for Industry are organised by the CEC and co-sponsored by the United Nations Environment Programme, Industry and Environment Office (UNEP-IEO). They are organised at two levels: national and European. The Awards are given for specific projects and not for the Company's activities in general. They consist in trophies and/or certificates.

The first competition was held in 1987, the European Year of the Environment. In 1988, national awards were made in France, Denmark and the United Kingdom and the winning entries were submitted for the 1989 European Awards, together with direct entries from Belgium, Greece and Ireland.

The entries for the third competition (1989-1990) involving the twelve Member States will be closed at the end of October 1989. National final selections will be made before the end of 1989. Winners or specially recommended entries from the national schemes (up to six per country) will be entered for the European level Competition. Judging by an international panel will take place in March 1990.

There are four categories of award:

- *The Good Environmental Management Award* for the integration of environmental considerations into overall corporate or site management policy.
- *The Clean Technology Award* for the development and adoption of clean production processes to reduce industry's negative impact on the environment.
- *The Eco-Product Award* for products which have incorporated environmental considerations especially recycling and waste reduction into the earliest stages of product planning and design.
- *The Environmental Technology Transfer Award* for the development and transfer of environmentally sound technological innovation, specifically adapted to the needs of developing technologies.

Further informationcan be obtained from:

DG XI/3, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2351909.

Future activities of the Forest Ecosystem Research Network (FERN)

Information on FERN was given in Environmental Research Newsletter No 2, September 1988.

Scheduled workshops and conferences:

- Conference on "Effects of Site Management on the N-cycle of Forest Ecosystems", München (FRG), 9-12 May 1990.
- Workshop on "Ancient Woodlands", Münster (FRG), June 1990.
- Workshop on "Organic Matter Turnover in a European Climatic Transect of Coniferous Forest", Warsaw (Poland), 1990.
- Conference on "Forest Regeneration in relation with History, Land Management and Landscape", Italy, 1991.
- Joint Symposium with CEC on "Terrestrial Ecosystems", Florence (Italy), Spring 1991.

Further information can be obtained from:

A. Teller, Scientific Secretary of FERN, DG XII/E,
CEC, 200 rue de la Loi, B-1049 Brussels. Tel. + 32 2 2358446.

Master's Degree in Human Ecology- Vrije Universiteit Brussel (Belgium)

This postgraduate course is organized under the auspices of the World Health Organization and the Man and Biosphere Programme of UNESCO. It is open to all holders of an academic degree, obtained at a university or equivalent institution.

The two-year program intends to reach an international audience of participants with different scientific background. It is similar to that of other European Universities (Aix-Marseille III, Bordeaux I, Evora, Geneve, Padua, Paris V, Toulouse III) coordinated by the "Centre International d'Ecologie Humaine" of Geneva, Switzerland.

The first year covers three fundamental areas (introduction to human ecology; biosphere structure and processes; and statistical approach) complemented by a limited number of topical courses on pollution, climatology and relationship between ecology and industry. The second year program includes basic courses on human ecology, 11 topical courses and a thesis work.

Further information can be obtained from:

Prof. C. Susanne, Human Ecology, Vrije Universiteit Brussel, 2 Pleilaan, B-1050 Brussels.

Conferences

Sixth Economic Summit Conference on Bio-Ethics Environmental Ethics. Val Duchesse, Brussels (Belgium),

10-12 May 1989.

A group of experts from the seven economic summit countries met in Brussels to discuss the principles and priorities which should govern the ethics of the environment and the role of human beings in it. The participation of contributors from different cultures, East and West, and a wide variety of disciplines including scientists, engineers, lawyers, philosophers and historians led to particularly interesting conclusions. A summary of the discussion results can be obtained on written request from:

Mr. O. von Schwerin, DG XII/A, CEC, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2352559.

Contribution of Remote Sensing to the Study of Desertification Application to the Mediterranean Basin. Valencia (Spain), 29-30 May 1989.

This seminar was organised jointly by the Joint Research Centre of the CEC and the Ministry of Science and Education of Spain with the collaboration of the Presidency of the Generalitat Valenciana.

The purpose of the seminar was to analyse the desertification problem and to evaluate the potential contribution of present and future remote sensing methods to its solution. It also aimed at defining research priorities to improve the knowledge of the desertification processes.

Proceedings will be published by the Generalitat Valenciana, Tel. + 34 6 3863487.

International Conference on Research and Environment in Europe. Brussels (Belgium), 25-26 May 1989.

This seminar was organised jointly by the European Environmental Bureau (EEB), the Standing Conference of Rectors, Presidents and Vice-Chancellors of the European Universities (CRE) with the support of the CEC, DG XII.

The theme of the seminar focused on European environmental research: its needs, means and orientations. The first communications introduced the EC Framework Programme for Research and Technological Development, with particular emphasis by Mr. F.M. Pandolfi, European Commissioner for Science, Research and Development, to the new Framework Programme (1990-1994) in preparation. The successive presentations concerned the EC research programmes in the field of environment: Science and Technology for Environmental Protection (STEP); European Programme on Climatology and Natural Hazards (EPOCH); Marine Science and Technology (MAST); Environment Research Programme of the EC Joint Research Centre: Protection of the environment, remote sensing and industrial hazards; Forecasting and assessment in the field of Science and technology (FAST); Environment and Agricultural Research; Biotechnology programmes (BAP, BRIDGE); European Collaborative Linkage of Agriculture and Industry through Research (ECLAIR); Food-Linked Agro-Industrial Research (FLAIR); Research and Technological Development Programme in the Field of Energy. Information on EUREKA was also given. A presentation by the Director of DG XI concerned the Community Policy in the field of Environmental Protection.

A report of this conference including the opinion of the EEB and CRE concerning the Community's Framework Programme for Research will be published in the issue of October of Metamorphosis, the Newsletter on Environment published by the EEB, 20 rue du Luxembourg, B-1040 Brussels, Tel. + 32 2 5141250.

First NETT International Conference: "Environmental Industry and Services '92, Markets, Standards, Perspectives in the European Community"

This conference was organised by the Network for Environmental Technology Transfer (NETT) with the support of the CEC in Brussels (Belgium), on 23-24 November 1989.

The purpose of the conference, as indicated by its title, was to define and take stock of the approaches possible in view of the projected European Single Market. The relation to the evaluation of European legislation, new technological developments and market opportunities, as well as joint ventures in Europe in the environmental sector were considered.

Further information on NETT activities can be found in Eenv. Res. Newsl. No 3 p. 24 and obtained from:

NETT Secretariat, 25 Square de Meeus, B-1040 Brussels.
Tel. + 32 2 5112462. Telefax + 32 2 5112522.

Publications

First Report on the State of Science and Technology in Europe

This report is a first response to the request of the European Parliament for regular reviews by the Commission of the state of science and technology in Europe.

The main aim of the report is to provide a factual basis for further discussions, both inside and outside the Community institutions, on Europe's needs in science and technology and how they can be best satisfied.

As far as research areas are concerned, the report highlights five areas of major relevance to the European economy: information technology and telecommunications; new materials and technologies for use in manufacturing industry, aeronautics; biology and biotechnology; and energy.

In terms of the quality of life there are major research needs in the fields of environment, health research and industrial, road and nuclear safety.

Copies of this report can be obtained from Mrs A. Dissy, DG XII, CEC, SDME 1/34, 200 rue de la Loi, B-1049 Brussels.
Tel. + 32 2 2356419. Tlx 21877 COMEUR B.

European Community Research Programmes-Inventory of cost-shared programmes in progress or proposed within the framework programme for Community activities in the field of research and technological development 1987-1991 (status 16 January 1989).

Copies of this inventory can be obtained from Mrs A. Dissy, see above.

Publications on Science and Technology

This booklet provides information on recent scientific and technical publications resulting from the research and technological development programmes of the European Communities and is issued by the Scientific and Technical Communication Unit of the Commission of the European Communities, Directorate-General Telecommunications, Information Industries and Innovation, Luxembourg.

Full details of all publications from these programmes are listed in the periodical Euroabstracts; for details of subscriptions to Euroabstracts please write to:

Scientific and Technical Communication Unit,
DG XIII/C.3, CEC, Jean Monnet Building, L-2920 Luxembourg.

Proceedings of the 8th EARSeL Symposium- Alpine and Mediterranean Areas: a challenge for remote sensing. Capri (Italy) 17-20 May 1988.

Edited by the CEC-JRC Ispra, Italy. Published and distributed by the CEC, DG XIII, B4/O78,
Jean Monnet Building, L-2920 Luxembourg, 1988.
Copies can be obtained from the Publisher.

European Community Forest Health Report 1987-1988. Directorate- General for Agriculture, CEC.

The aim of the report is to give an overview of the state of forest health in the European Community. It includes the results of national forest health reports and the Community forest damage survey in 1987 and 1988.

It has been published by the CEC, ISBN 92-826-0949-9, 1989. It is available from the Office for Official Publications of the European Communities, 2 rue Mercier, L-2985 Luxembourg.

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.

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