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Editorial

For about four billion years the driving forces of natural origin have been responsible for changes on the Earth. At present, however, there are strong signals of expected changes in the habitability of our planet due to anthropogenic activities.

As evidence mounts, both the scientific community and the governments are posed with the challenge to understand the exact causes, nature, evolution and the possible impacts of these global environmental changes and to take preventative and remedial actions.

The European Commission has already pledged comprehensive action to the research on Global Change. One of the key areas of the proposed EC's Fourth Framework Programme of Research and Technological Development (1994-1998) is "the natural environment, environmental quality and global change". The objective is the understanding and modelling of the natural systems, the climate and its interactions with human activities and, in particular, the impact of socio-economic activities on the Earth's environment. The aim is to provide a major European research contribution to worldwide efforts and actions on Global Change research.

The Framework Programme also includes several initiatives for reinforcing the coordination of research activities at European level. One of these is the European Network for Research in Global CHange (ENRICH). Efforts in this context will be targeted towards the integration of research results to promote the objectives of the international programmes such as the International Geosphere-Biosphere Programme (IGBP), the World Climate Research Programme (WCRP), the Human Dimension Programme (HDP) and the DIVERSITAS programme of the International Council of Scientific Unions (ICSU). In addition, the aim is to incorporate the research results in the implementation of the European Union's Fifth Programme of Policy and Action in relation to the Environment and Sustainable Development. This policy seeks to improve the quality of life, in particular by ensuring that the environment dimension is taken into account in the formulation and implementation of various Union policies.

The research activities to be carried out in the context of Global Change will be partly the continuation of programmes carried out through shared cost and concerted actions, as well as those performed by the Joint Research Centre, and partly their extension to a stronger contribution to international programmes, including socio-economic aspects, and an increased emphasis on environmental observation (instrumental technologies, data management and space techniques). A close collaboration with relevant Directorates-General of the European Commission and the newly-established European Environment Agency will be ensured, as well as links established with international initiatives such as the Inter American Institute for Global Change Research (IAI) and the projected Asia-Pacific Network for Global Change (APN) through the ENRICH Office in Brussels.

On the international scene, these new EC actions will respond to the challenges of the Earth Summit where the European Community, now the European Union, committed itself to vigorous efforts related to environment protection by signing the Framework Convention on Climate Change and the Convention on Biodiversity. It is also currently participating in the negotiations on the Desertification Convention.

I am confident that the European Union's efforts in integrating the European research potential in the field of Global Change in collaboration with the global scientific community will bring fruitful results towards protection the environment of our fragile planet.

J.P. Contzen
Director General
Joint Research Centre

Programme News

MONITOR - SAST

The SAST activity (Strategic Analysis in Science and Technology) is part of the MONITOR Programme, which provides the European Commission with the means to carry out S&T policy research and evaluation. SAST's role is to examine specific areas of research and technological development as having immediate significance to the European Union (EU). Nine SAST projects have been launched to date, each of which involves consideration of the scientific and technological issues in the wider context of industrial competitiveness and societal needs.

SAST PROJECTS

The needs and possibilities for cooperation between selected advanced developing countries and the EU in the field of science and technology

This strategic policy study was launched to:

- assess the rationale for expanding S&T co-operation with the Advanced Developing Countries (ADCs);
- see whether this would be beneficial to Europe;
- identify areas where co-operation could take place;
- advise on appropriate modalities of co-operation; and
- examine possible new (EU) initiatives in this area.

Studies were carried out in six countries - the Republic of Korea, China, India, Brazil, Mexico and Thailand (the latter was complemented with an overview on other ASEAN countries). These involved desk research and interviews with senior policy makers, scientists and industrialists in each country, and provided the material for extentive consultations with EU governments' experts and European industrialist on the best strategies to adopt towards the ADCs.

Standards, technical regulations and quality assurance: what will change? What implications for Union S&T policy?

This strategic policy study addresses the two areas of EU intervention above mentioned:

- that of science and technology (S&T) programmes; and
- that of technical legislation, standardisation and quality assurance.

The latter is aimed primarily at harmonisation in view of the completion of the Single Market, the former at strengthening the scientific and technological basis of European industry and at encouraging it to become more competitive at internation level. Initiatives taken in either area must conform with the broader policy objectives of encouranging competition and ensuring a high level of health, safety, protection of the consumer and protection of the environment.

The objective of the investigation has been to evaluate inter-dependencies between the two areas, and in the first instance, as reflected in the project title, to understand the implications for S&T of the changes in the approch to harmonisation of laws, standards and quality assurance. It is evident however that implications arise in both directions: technology systems are becoming ever more complex and dynamic and pervasive, which necessitates adaptations in standards and technical legislation and in the way these are set.

Research and technology to help overcome the environmental problems in relation to transport

The aim of this strategic research study was to provide an assessment of the priorities for research and technology development (RTD) to ameliorate the environmental impacts of transportation in the Union, by means of a comparative assessment of existing and prospective transport technologies.

Four individual assessments were carried out using a common methodology, each of which addressed a specific set of environmental issues and considered particular "clusters" of technologies:

- local pollution: emissions which have an impact on the quality of water, air and soil with local and regional (eg. acid deposition) significance;
- global pollution: emissions which are of significance to global warming and stratospheric ozone depletion;
- resource uses: impacts relating to the use of materials in transportation including amenity and visual impacts;
- quality of life: impacts primarily relating to the urban environment encompassing noise, congestion, safety and constraints imposed by transport structures on living conditions.

An assessment was also made of developments which were likely to affect the **demand** for transport in the medium and long term. Both quantitative and qualitative measures were used to combine these assessments, into an **Overall Strategic Review**, which sets out conclusions and policy recommendations.

Innovation in agrobiotechnology

SAST Project 4 consists of six strategic policy studies, each of which addresses particular problems/goals in relation to agriculture and related sectors of industry, in the European Union and wider international context:

- the first investigation addresses the need to reduce the use of pesticides and fertilisers, known to represent a large percentage of farmers expenditure and to raise health and environmental questions;
- three of the other investigations are concerned with the up-grading and extension of the range of products manufactured from agriculture to better meet the requirements of the downstream economic operators or to respond to new market opportunities (the three domains covered are plant breeding technology, animal production and non-food uses of agricultural production);
- the fifth investigation is concerned with the use of biotechnology as an instrument of agricultural and agro-industrial development in less favoured areas of the Southern part of the Union, Portugal being taken as a case-study;
- the sixth study addresses the need for improved methods and tools for both the characterisation and measurement of quality "attributes" in agro-industrial production.

For each of these study areas the objective has been:

- to identify and evaluate the benefits that could be gained from the application of biotechnology;
- to highlight the pros and cons of biotechnology-based "solutions", as compared to other technological or management options;
- to characterise the major factors - of a social, economic, regulatory or institutional nature - which interact with those of a technical nature in the innovation process;
- to make recommendations on the strategic (re-)orientations to be taken within the context of the European Union Research and Technological Development (RTD) and, where appropriate, on necessary accompanying measures in other areas of EU policy intervention.

The identification of technology priorities for European RTD - a review of Technology Mapping and related techniques

The project objectives were to:

- review current expertise in technology mapping and related techniques and
- evaluate the usefulness and limitations of these techniques for

the identification of priorities in RTD policy and programmes. The study attempted to combine perspectives on both the *production and use of the techniques* in question.

An examination has been made of the various approaches to technology mapping, taxonomy and related issues, such as corporate procedures to evaluate and prioritise technologies in strategic planning.

The study has considered perspectives, and information from potential users of technology mapping throughout the EU, particularly in science and technology (S&T) policy making, examining the techniques used, their purpose, and field and manner of application. An ad-hoc working group was set up towards the end of the investigation to further examine the problem of the "articulation" between the production and use of technology maps.

Research and technological development for the supply and use of freshwater resources

This project explores research and technological development (RTD) options to achieve sustainable supply and use of freshwater resources in the EU. It shows that management approaches and technological options are interdependent and that both interact with the regulatory environment. Moreover, the problems faced in water management depend on circumstances which may be geographically rather localised; the appropriate responses - both managerial and technological - will vary accordingly.

Technological innovation in the plastics industry and its influence on the environmental problems of plastic waste

Whilst a high potential for technological innovation exists in the plastics and associated industries to cope with certain types of waste (e.g. ex-factory scraps) shortcomings still remain with regard to basic scientific knowledge and waste management practices at the other stages of the plastic life cycle and in particular at the post consumer stage. This investigation provides an analysis of the trends and implications of technology changes in the plastics and related industries. It identifies the means to encourage innovation which is compatible with the objective of environmental protection, encompassing the most promising routes to *material* substitution and recycling. However, the analysis did not consider fully all possible routes to waste reduction and recycling (e.g. thermal recycling with energy recovery).

Research and technology management in enterprises: issues for Community policy

(This project is underway).

European priorities in science and technology with reference to freight logistics

The enlargement of markets, possibilities of easier European procurement, economies of scale for manufacturing and services are balanced by the risk of stronger competition in the Internal Market. Against this background, logistics assumes a key function for European enterprises as well as for national or European networks in adapting to new production, distribution and cooperation patterns.

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Environmental Protection

Environmental Chemicals

The European Chemicals Bureau

Following a Commission Communication to the Council and the European Parliament, the European Chemicals Bureau (ECB) was established within the Environment Institute of JRC Ispra with effect of 1st January, 1993 (O.J. N° C1, p. 3; 5/1/93).

The principal task of the Bureau is to carry out and coordinate the scientific/technical work which is needed for the implementation of EU legislation (directives, regulation) in the area of chemical control.

From a present staff level of about 15 persons the Bureau will be gradually reinforced and increased in order to reach its full capacity by 1995/97 with a staff complement of at least 50 persons.

In its tasks as a scientific focal point for the realization and coordination of the control of chemical substances in the EU, the Bureau has all prospects to develop into a center of excellence which is recognized internationally also beyond the scope of the EU.

The Bureau will assume an increasingly important role in the assessment, management and control of risks which may be posed by new and existing chemical substances which circulate in the EU.

In this context, five major work areas have been identified for the Bureau at present:

- Classification and Labelling of dangerous substances (Directive 67/548/EEC and subsequent amendments/modifications)
- Notification of new substances (6th and 7th amendment of the Directive)
- Testing Methods (annex V of the Directive)
- Existing Chemicals (Council Regulation N° 793/93)
- Export/Import Control (Council Regulation N° 2455/92)

Additional and complementary tasks can be expected at later stages.

Meetings with national experts concerned with the implementation and management of EU legislation on chemicals substances in the member states are organized and coordinated by the Bureau at Ispra at steadly increasing rate.

For the majority of the work areas, the Bureau has to become operational at short notice and some activities are already in progress and 14 meetings with national experts were organized and hosted by the Bureau in 1993.

Classification and Labelling of Dangerous Substances

Dangerous substances which are subject to classification and labelling requirements are listed in Annex I of the Directive. This Annex has to be continously adapted to technical progress in the light of new scientific information as more substances are added to the list and as the Commission progressively evalutes the thousands of potentially hazardous chemical substances which are on the market in the EU.

In this context, the Bureau is active in the classification and labelling of the following subjects and substance groups:

- man made mineral fibres;
- gases;
- sensitizing substances;
- substances dangerous for the environment;
- carcinogenic, mutagenic and teratogenic compounds.

EU Notification System for New Chemicals and New Chemicals Database

The Bureau has to ensure the exchange of summary notification dossiers sent by the EU Member States. This will include the receipt of dossiers on diskette, and on paper.

The Bureau is also responsible for the exchange of summary notification dossiers with the EFTA countries within the context of the agreement on the extended European economic space.

All incoming dossiers which are received on diskette, and the follow-up information and updates have to be down loaded into the New Chemicals Database (N.C.D.). The Bureau is responsible for N.C.D. maintenance, updating and management.

Following a modification of the polymer definition, the Bureau is processing submissions from industry with the aim to prepare the "list of No-longer Polymers" for the publication in the O.J. In addition, the Bureau is hosting expert meetings on "polymers", "control measures" and "informatic aspects" of the notification system.

Complete transfer of technical/scientific responsibilities for the EC new chemicals notification system to Ispra is foreseen in 1994.

Testing Methods

The Bureau has to coordinate also the development, updating and adaptation to technical progress of the experimental testing methods which have to be applied to determine the properties of hazardous or dangerous chemicals. This work is performed in coordination with OECD in order to lay dawn testing methods which can be used worldwide and are accepted also outside the EU.

A relevant example is the definition and adoption of a test method for the reproduction test of *Daphnia magna* which is supported by the Bureau.

Existing Chemicals

EUCLID Database

The EUCLID databank is the primary tool for the risk assessment and management of existing chemicals in the EU. The data are supplied in standard format in all nine Union languages on diskettes (Harmonized Electronic Dataset).

Data are all to be collected in 3 phases:

- for HPV chemicals (>1000+ /y) in annex 1 of the Regulation within 1 year of taking effect of the regulation;
- for remaining HPV chemicals within 2 years;
- for chemicals in EINECS in the production range between 10 and 1000 + /y within 5 years.

The database contains the following chapters: general information; physico-chemical data; environmental fate and pathways; ecotoxicity; toxicity.

As part of the data are of a proprietary and confidential nature, EUCLID has to be installed and operated in specially protected (controlled access, security surveyance and alarm system) security rooms.

Priority Setting and Risk Assessment

Based on the data collected and stored in the EUCLID databank, the Bureau participates in the elaboration of harmonized procedures for priority setting and for the risk assessment of existing chemicals. In this context, the Bureau takes part in the application and validation of Quantitative Structure-Activity Relationships (QSAR) to estimate fate and properties of existing chemicals in case of a lack of experimental data to permit screening and priority setting.

Export/Import of Dangerous Chemicals

Starting from 1994, the Bureau will be in charge also of the information exchange with the member states, third countries and UNEP/FAO and the monitoring of the export or import of chemicals which are subject to restrictions in their use and applications because of their potential hazard.

Quantitative Structure-Activity Relationships (QSAR)

The aim of the work in the field of QSAR is to develop models which can predict a large number of end points from chemical structure and other available data. To achieve this goal several activities are undertaken, i.e.:

- research in the field of statistical model evaluation and validation and in the field of statistical methodologies;
- research in the field of cluster analysis of large numbers of chemicals;
- participation in international efforts to validate, evaluate and recommend models.

In many case several models designed to predict a given end point for a certain class of chemicals exists. It is therefore necessary to develop methodologies for comparing models. Several such evaluation schemes are investigated and some new ones developed.

A compter program is available for clustering of a large number of structure. The algorithm is able to group sets of chemicals of the size of the EINECS inventory (more than 100,000 chemicals) into groups according to structural similarity.

This program will be applied to develop QSAR models in two international collaboration projects in this field. Thus, the Bureau participates in:

- a project sponsored by DG XII with the aim to validate QSAR models for the prediction of fate and effects of chemicals in the environment with participation of six laboratories from the EEC and Sweden;
- an extension of the EPA/EEC collaborative QSAR project on new chemicals to existing chemicals focussing on high production volume chemicals (annex 1 of the Existing Chemicals Regulation). This project is coordinated by ECB.

Expected developments

Once the Bureau is fully operative, the actual range of work areas can be gradually extended to include scientific and technical support to other pieces of legislation on chemicals, such as: biocides; plant protection products; preparations; consumer products.

This expansion will eventually lead to the integration and participation of other DG's in the work of the Bureau.

In its work, the Bureau in the future has to collaborate on a technical-scientific level with the EFTA (European Free Trade Association) countries for the notification of new chemicals and risk assessment of existing substances, with OECD for test guidelines and existing chemicals evaluation, with UNEP/FAO (United Nations Environment Programme/Food & Agricultural Organisation) for export/import control of certain dangerous or restricted substances; with EPA (Environment Protection Agency) for QSAR and existing chemicals evaluation. Also, the Bureau can provide technical assistance in the field of chemicals control to the responsible authorities for countries in the process of entering the Union or accepting EU legislation on chemical substances.

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Activities in the Field of Indoor Air Quality at the Environment Institute of the JRC

The European Collaborative Action (ECA) "Indoor Air Quality and Its Impact on Man" (formerly COST project 613/1)

Indoor air quality (IAQ) in residential and in non-industrial working environments has received growing attention over the past 20 years from the scientific community, and also at a public and political level. The Commission of the European Communities started taking an interest in indoor air quality at the beginning of the eighties when a small research activity was included in the Environment Programme of the Joint Research Centre (JRC) in Ispra, Italy. This activity has, from the beginning, been accompanied by an effort to organize a collaboration of European scientists in this new field of research. Such collaboration was deemed important for two main reasons:

- there are no scientific structures dedicated to indoor air quality research similar to those existing for research on outdoor air or water quality. Therefore research is fairly scattered and often performed by small groups in a wide range of different institutions;
- indoor air quality is an environmental issue which (more than any other) requires interdisciplinary collaboration. In fact, representatives from a wide range of scientific/technical disciplines are involved in indoor air quality research: heating and ventilation engineers, architects, psychologists, chemists, hygienists, microbiologists, toxicologists, medical doctors, epidemiologists - to name only those who are most frequently involved.

European collaboration in the field of IAQ started in 1986 as a Concerted Action which was part of the EU cost-shared Environmental Research Programme. At the end of 1987 the action became a COST activity (COST project 613/1) thereby opening it to the participation of EFTA countries. Since 1991 the European Collaborative Action "Indoor Air Quality and Its Impact on Man" has been continuing this work as part of the JRC-Ispra Environment Programme with the participation of fourteen countries and of the JRC's Environment Institute. Since its start in 1986 the Indoor Pollution Unit of the JRC's Environment Institute has been supplying the secretariat and scientific and managerial support to the action.

The European Collaborative Action examines indoor air quality (IAQ), defined as all features of indoor air having an impact on man. It deals with all aspects of the indoor environment including temperature, humidity and other environmental factors which may interact with indoor air quality.

The purpose of the action is to help construct and maintain healthy and energy efficient buildings within the EU. The activities focus on: sources of pollution and their emissions; ventilation; exposure to pollutants; the impact of IAQ on health/comfort - in residential, public and non-industrial occupational indoor environments. It will contribute to prenormative research needed by EU services in their mission to prevent pollution and to promote health, comfort and quality of life.

A Steering Committee composed of representatives from all participating countries, the JRC and other Commission Services decides on the working programme and discusses and evaluates the results of the work performed.

In view of the fact that the ECA has no research funds of its own, the Steering Committee has essentially three means to achieve its objectives:

- development and validation of guidelines and reference methods for indoor related investigations and measurements or for measures to improve indoor air quality;
- collation, synthesis and dissemination of knowledge and data;
- organization of workshops, symposia, seminars and similar venues.

In particular the **Steering Committee**:

- prepares reports summarizing available knowledge of important issues of indoor air quality;
- identifies ongoing research within the participating countries and the major research needs;
- establishes working groups for well defined tasks such as the development and/or validation of guidelines;
- provides for exchange of information and collaboration with other international and national organizations active in the field of indoor air quality (e.g. WHO, NATO/CCMS, U.S. EPA).

Typical tasks for **Working Groups** are to:

- develop working instruments like guidelines for measurements and investigations in order to promote the efficiency of research and the comparability of results;
- perform intercomparison exercises for the validation of measurement guidelines;
- assess the status of knowledge in specific areas and propose solutions for indoor air quality problems.

The work performed so far by the European Collaborative Action (and the former COST project) has been summarized in **thirteen reports** published by the Commission of the European Communities: five summary reports on key issues of indoor air pollution; four guidelines on how to perform complex measurements and investigations; a guideline on ventilation requirements; a report on an interlaboratory comparison experiment, and two editions of an inventory of ongoing research in the participating countries. The reports are briefly summarized in the following.

Summary Reports

In an attempt to overcome the increasing difficulty of having essential information at hand in a concise form, the Steering Committee, assisted by the Secretariat and by Working Groups, has issued summary reports on single pollutants with high priority. Three such reports have been published:

- **"Radon in Indoor Air"**
- **"Indoor Pollution by NO_2 in European Countries"**
- **"Indoor Air Pollution by Formaldehyde in European Countries"**.

In all these reports health effects, IAQ standards or guidelines, sources, occurring concentrations, preventive measures and (where applicable) national and EU policies are briefly addressed.

"Effects of indoor air pollution on human health" are addressed in a fourth summary report which describes in separate chapters broad categories of adverse health effects and relevant indoor exposures. The following health effect categories have been considered: effects on the respiratory system, allergy and other effects on the immune system, cancer and effects on reproduction, effects on the skin and mucous membranes in the eyes, nose and throat, sensory effects and other effects on the nervous system, effects on the cardiovascular system, and systemic effects on the liver, kidney and gastro-intestinal system. For each of these categories effects associated with IAP, the principal agents and sources, evidence linking IAP to the effect(s), susceptible groups, the public health relevance, methods for assessment, and major research needs are briefly discussed.

"Biological particles in indoor environments". This report summarizes knowledge on biological particles in indoor environments and makes some recommendations on how to conduct related indoor investigations, although the authors deemed present knowledge unsufficient for a guideline on sampling and analysis of biological particles in indoor environments. The report deals with four major categories of biological particles in the air of private houses, non-industrial workplaces and public buildings (excluding hospitals). These particles are mites and their faeces; dander from pets and other furred animals; fungi, including moulds and yeasts, and bacteria, including actinomycetes. For each of these categories the following items have been considered: health effects; occurrence; available sampling methods; available methods of analysis; recommendations for different studies; observed values and evaluation of results. Health effects, occurrence and sampling and analysis of Legionella are also discussed briefly.

Guidelines

The following guidelines have been published:

"Sick Building Syndrome (SBS) - a practical guide". The report describes the phenomenon of complaints on poor indoor air quality in large buildings, the extent of this problem, the symptomatology and diagnosis of SBS and related risk factors. Subsequently a procedure for conducting building-associated investigations is described which includes 4 steps: technical and hygiene investigations, inspection and guiding measurements, measurements of ventilation, climate indicators and other implicated factors, and medical examination and associated investigations.

"Strategy for sampling chemical substances in indoor air". This report focuses on the fact (often overlooked) that sampling and analysis of indoor pollutants are only the last steps in a process which primarily needs to establish why, where, when and under which environmental conditions an air sample should be analyzed. The report presents general considerations regarding the dynamics of the indoor environment, the sampling objectives, time of sampling, duration and frequency of sampling, the sampling location, and discusses briefly quality assurance. More specific recommendations are made on sampling strategies for formaldehyde, nitrogen dioxide, suspended particulate matter, asbestos, radon, and volatile organic compounds (VOCs).

"Formaldehyde emissions from wood based materials: guideline for the determination of steady state concentrations in test chambers". The guideline describes a method for the determination of formaldehyde emissions from wood based materials using large scale, walk-in type environmental chambers. The guideline describes essential features of the chambers to be used, such as size, inner wall and sealing materials, tightness, air circulation and position of sensors for temperature and humidity. Moreover values for temperature, relative humidity, air exchange rate, loading factor and air velocity in the chamber are recommended. The guideline also deals with sample preparation and positioning in the chamber, and with formaldehyde sampling and analysis. Questions of quality control are also discussed. The guideline is presently being validated by a CEN working group.

"Guideline for the characterization of volatile organic compounds emitted from indoor materials and products using small test chambers". The guideline describes and makes recommendations for: small test chambers and ancillary equipment, sample collection and analysis, experimental design and data analysis. The techniques described are useful for both routine product testing and for in depth investigations by indoor air quality researchers. This guideline is presently being validated by several interlaboratory comparison exercises organized by the JRC in the framework of the ECA with the additional participation of North American laboratories.

"Guidelines for ventilation requirements in buildings". The guidelines presented in this report introduce a new concept for the assessment of ventilation requirements: it considers not only the occupants but also the building and its equipment as sources of pollution. Ventilation requirements are established in two steps: In the first step ventilation requirements for avoiding adverse health effects are determined. In the second step a decision is made on the level of perceived air quality aimed for in the ventilated space. Three different comfort levels are suggested. Subsequently the pollution load on the air is determined by adding the loads caused by the building and by the occupants. Based on these loads, the available outdoor air quality and the ventilation effectiveness, the ventilation rate required to provide the desired indoor air quality is calculated. The two separately determined ventilation rates required for health and for comfort are compared and the highest value is used for design.

In addition to these guidelines the report **"Determination of VOCs emitted from indoor materials and products: interlaboratory comparison of small chamber measurements"** summarizes the results of three experiments jointly perfomed by twenty laboratories in Europe and the U.S.A. and aimed at validating the *guideline for the characterization of volatile organic compounds emitted from indoor materials and products using small test chambers.*

Project Inventory

Condensed information on investigations and research projects in the field of indoor air quality currently ongoing or recently concluded in the countries participating in the Concerted Action and at the JRC has been made available in a project inventory, of which two editions have been published.

Information/education activity

More than a thousand copies of each of the above mentioned reports have been distributed among researchers in the field of indoor air quality, public administrations, libraries, environmental enterprises and a variety of other people who have requested them.

Three seminars have been organized, one in Athens (Greece) offering to scientists interested a survey on major issues regarding indoor air quality and its impact on man, one in Bern (Switzerland) informing scientists and practitioners interested in the activities and results of the ECA "Indoor Air Quality and its Impact on Man" and a EUROCOURSES seminar on "Chemical, microbiological, health and comfort aspects of indoor air quality - state-of-the-art in SBS" for experts actively involved in indoor air quality investigations.

The ECA is also sponsoring the triennial international conferences on Indoor Air Quality and Climate, the last of which was held in 1993 in Helsinki. Steering Committee members have been actively involved in it as advisors, session chairmen, workshop organizers and invited speakers. Moreover the Steering Committee provides for information exchange and coordination with other international activities in the field of indoor air quality such as work of the World Health Organization (WHO) and the NATO/CCMS pilot study on indoor air quality.

Ongoing and Future Work

The ECA is presently engaged in various projects the most important of which is aimed at a procedure for the evaluation of VOC emissions from building materials taking in consideration chemical, sensory, biological, toxicological, exposure and public health aspects. Further ongoing projects are aimed at

- the improvement of a small chamber method for the characterization of VOC emissions from indoor materials and products;
- identifying ways to integrate good IAQ and a safe and efficient use of energy;
- proposing strategies for VOC measurements in indoor air;
- making recommendations for the design of intervention studies in cases of "Sick Building Syndrome";

"Total volatile organic compounds" (TVOC) is a quantity which is often used to characterize indoor pollution by VOCs or VOC emissions from indoor materials and products. Yet no satisfying definition of this quantity exists. Together with WHO-Euro the ECA is preparing a working group which should address this problem. Further issues which have been envisaged for future work are methodologies for identifying high risk population groups (in collaboration with the Concerted Action "Air Pollution Epidemiology") and traffic related indoor pollution problems.

A new laboratory at the Indoor Pollution Unit of the JRC's Environment Institute

In November 1993 the "Indoortron" laboratory was inaugurated at the JRC's Environment Institute. This new facility features a double-walled environmental test chamber of 30 m^3 volume. A stainless steel chamber with electropolished inner walls is surrounded by a jacket chamber which serves as a thermostat for the inner chamber. Only stainless steel, glass and teflon have been used for the construction of the inner chamber in order to reduce to a minimum sorption of indoor pollutants on and emissions from the inner walls of the chamber. The chamber allows a broad range of experiments at controlled temperature, relative humidity, air change rate, and air composition.

Intended uses are e.g. measurement of exposures during activities giving rise to pollutant emissions, emission testing of equipment or large pieces of materials, testing of air cleaning devices, validation of analytical methods using known atmospheres with low pollution levels, testing of exposure models, human exposure experiments.

Further information and reports can be obtained from:

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Air Pollution Epidemiology (COST 613/2)

The objective of the formerly COST 613/2, presently European Concerted Action (ECA) "Air Pollution Epidemiology", is to facilitate co-ordinated high quality epidemiological research in Europe to assess the exposure levels to air pollutants at which health effects appear, and the proportion of the general population and of special risk groups for which these occur.

Further technical objectives include; organising workshops and producing expert reviews on the effects of air pollution on health, recommended study designs, and technical research methods. In the practice of this Concerted Action regional and issues are dealt with in regional workshops, and technical/methodological issues are dealt with in working parties.

Special goals for the second year were to finalise the third methodological report "Study Designs in Air Pollution Epidemiology" (WP3); to finalise the first and second workshop reports "East European, COST Workshop on Air Pollution Epidemiology, May 22-25, 1991, Budapest", and "Workshop on Air Pollution and Health in the Mediterranean Countries of Europe, October 8-10, 1992, Athens" and to initiate new working parties with defined tasks and a new regional workshop.

The ECA Air Pollution Epidemiology was begun as COST 613/2 in January, 1990. The meetings and achievements of this European Concerted Action are summarised in this and three previous annual Activity Reports: January 1990 - July 1990, August 1990-July 1991, and August 1991 - July 1992.

The workshop report "East European - COST Workshop on Air Pollution Epidemiology, May 22-25, 1991, Budapest", became available from the Bela Johann National Institute of Hygiene in the beginning of 1993. The working party on Study Designs in Air Pollution Epidemiology (WP3), chaired by Klea Katsouyanni - University of Athens -, finalised its document and it was accepted in the Steering Committee meeting on April 27, 1993 and is available from CEC/DG XII/JRC Brussels. The second workshop report "Air Pollution and Health in the Mediterranean Countries of Europe October 8-10, 1992, Athens" was finalised about the same time as the Study Designs report, and is also available from the same source.

During this third year two European multicenter research projects have emerged from this Air Pollution epidemiology group. A 15 Centre Panel Study on Acute Effects of Winter Smog on Children, is directed by *Bert Brunekreef* in the University of Wageningen. The idea is to continuously observe in each centre 2 panels (one in polluted and another in background area) of children with respiratory symptoms through 8 weeks of winter. The main pollutants of concern are PM10 and NO_2, and the symptoms followed are respiratory. The minimum protocol is the same in each Centre. Another study on Short-Term Effects of Air Pollution on Mortality and Morbidity: A European Approach Using Epidemiological Time-Series Data is coordinated by Klea Katsouyanni. 8 groups from EC countries, one from Finland and one from Poland are now participating. The main objective is to standardise a time-series modelling analysis procedure for investigation of air pollution effects on mortality (total and cause-specific) and hospital admissions (total and cause specific, emergency and routine) and then perform a meta-analysis using the results of the analyses done in each centre. This will be a very complicated time-series analysis with special analysis of confounding.

The countries, which have nominated delegates for the Steering Committee and WP's, are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland and The United Kingdom. The Steering Committee also has a delegate representing the WHO, and Hungary, Czechoslovakia and Poland have been invited to join in 1993 as observers.

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Water

Water Quality Research at the Environment Institute of the JRC-Ispra

The activities, carried out at JRC-Ispra, contribute to the Specific Research Programme in the framework of the research area **"Environmental Studies in the Mediterranean Basin"** and provide Technical and Scientific Support to the Directorate General XI and to Third-Party Work.

Specific Programme: MITO Project

The JRC-Ispra has promoted, in close collaboration with institutions of five Member States (Portugal, Spain, France, Italy and Greece) a Joint European Project on algal blooms, i.e. MITO Project (**Mi**crophyte **TO**xins (see also ERN n° 8).

The project focusses on: analytical cytology of phytoplankton; development of sensitive methods for toxin detection; algal taxonomy and physiology; development and application of models for the prediction of toxin occurrence.

As regards the development of fast and easy-to-use systems for the enumeration of phytoplanktonic populations, JRC-Ispra organized an experimental campaign in the Adriatic Sea (Italy), in September 1993. The main goal was the study of the horizontal and vertical distribution of phytoplanktonic communities and their pigments comparing classical (microscopic inspection) and innovative (flow cytometry) methods of analysis. The quantification and identification of phytoplankton in sea waters were carried out by a flow cytometer Partec PAS III, a portable instrument and by fluorescence microscopy on fresh (live) and fixed samples. The campaign was carried out in collaboration with Partec Industry and Munster University (Germany) and the Istituto di Biologia del Mare (University of Bologna)

As regards the aquatic biotoxins, at JRC laboratories it was decided to develop a methodology that could be applied to Diarrheic Shellfish Poisoning (DSP) measurements. The methods should take advantage of the measurements of biochemical parameters related to the death or to the sublethal damages induced by the exposure of the mouse hepatocytes to the algal toxins.
In the present period of method standardization, the mouse hepatocytes recovered from the liver after the collagenase perfusion are let to grow in the presence of okadaic acid for 24-72 h. At the end of these exposures, the increase of lactate dehydrogenase (LDH) in the culture media are measured. These values are then computed in relation to the number of the hepatocytes actually attached to the bottom of the Petri dishes, thus obtaining the dose-effect relationship curve that characterize the nocivity of the okadaic acid in this specific biological system. The determination of the LDH allowed to put into evidence concentrations as low as 10^{-8} M (ID_{50}). The manual for toxin detection, environmental monitoring and therapies to counteract intoxications has been published **(Microphyte Toxins September 1993, EUR 14854 EN, ISBN, 92826-2731-4).** The study aimed at comparing the dimension and diffusion of toxic algal phenomena in Member States and countries outside the European Union. In a chapter of the book are illustrated the main marine, brackish and freshwater toxins, and their relevant characteristics (e.g. origin, chemical structures, pharmacological action, ecophysiology). The

taxonomy of some microalgae, relevant in determining human and animal diseases, is also described. The analytical methods (biological, biochemical and chemical) to detect algal toxins are summarized. Finally, environmental monitoring, shellfish detoxification and possible therapies to counteract intoxications are discussed.
Modelling related to the MITO-Project is based on a baroclinic 3D ocean circulation model developed in Ispra, which for the MITO application is supplemented by a biological module. The biological module consists of a number of subroutines describing the concentration fields of 3 compartments: nutrients, phytoplankton, and the herbivorous zooplankton. Also the time depending inflow of the Po river is modelled, which is especially important for the level of the nutrient (phosphate) concentration. The topographical model includes the whole Adriatic. It is relatively fine grided in the Northern Adriatic (3 km). The grid size increases up to the strait of Otranto to about 17 km. The total number of wet points is about 70000, the CPU time is about 1% of the simulated time on the fastest work stations Present test computation show quite satisfactory results.

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Support activities

The Environment Institute provides scientific support to the DG XI for the implementation of existing water Directives and for the preparation of new ones.

In response to a request of DG XI concerning the Directive on ecological quality of surface waters, JRC-Ispra prepared a report on **"Restoration and Management techniques for lake and reservoirs"**. The report gives an overview of common lake and reservoir problems in Member States and other European countries. A case-by-case analysis for internal restoration measures, i.e. techniques with short-term and long term effectiveness, for the different types of lake/reservoir problems such as nuisance algae, excessive rooted plants, drinking water taste, poor fishing and acidic conditions, was made. Practical experiences in Member States and in countries outside the EU to control nuisance algae, phosphorus release from sediments and to mitigate acidic conditions were also summarized.

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Work for Third Parties

Within a cooperative agreement with the Italian Ministry of the Environment, the Regione Lombardia and the University of Milan, the trophic conditions of Lake Como have been assessed.

This study, financed by the italian Ministry of the Environment under Law No. 7 of 2411/86 and M.D. N° 70 of 31/12/90 was performed to fill the gaps which exist in the knowledge of the limnological conditions of lake Como. It thus represents the reference point for setting up a correct safeguarding plan and prevention of pollution scheme and the rational management of the waterbody.

The enquiry, which began in September 1991 and finished in September 1992, examined six pelagic stations: Como, Argegno, Colico, Menaggio, Lierna and Lecco. 7 on-the-spot investigations were carried out in which 900 samples were collected and a total of over 9000 analytical determinations were made.

The research concerned the main ecosystem components, i.e.:
- chemical characteristics of riverine waters;
- physical, chemical and biological characteristics of the lake waters;
- structure of the phytoplanktonic and zooplanktonic populations;
- lake sediments with reference to the content of eutrophicating substances, internal P loadings, heavy metals, organochlorinated compounds and radionuclides.

The elements which are useful in evaluating the quantity of the loads of eutrophicating substances generated in the catchment basin were also collected and analysed to obtain the information needed to reconstruct the trophic evolution of lake Como waters.

The picture which emerges from this research shows how the Lario's actual trophic state is situated in the limit of eutrophy. Previsional mathematical models suggest that final objectives of the restoration can be approximately reached in 20 years at a higher level. These models should contribute to a revision of the intermediate and final objectives of the 1984 Water Clean-up Plan of Lombardia Region.

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Ecosystems

Biogeochemical cycles and ecosystem dynamics

In the following a series of projects launched to cover the topic.

The projects have started at the end of 1992/beginning of 1993 their duration ranging from 24 to 36 months, and are funded within the framework of the 1990-94 Environment Programme.

Physico-chemical forms of aluminium in non-equilibrium aquatic systems and related biological effects.
Liming is extensively used in the restoration of acidified lakes and rivers, not only to increase the water pH and alkalinity, but also to reduce the amount of "toxic" aluminium species to fish and other sensitive organisms.

This project will address the chemical/geochemical processes leading to enhanced toxicity towards fish in mixing zones between neutral or limited rivers and their acid tributaries. The chemical studies will include aluminium speciation, transformation processes and the kinetics involved, and will be complemented by biological and physiological studies on possible toxic mechanisms responsible for the observed fish mortality.

Experiments will be carried out both in field (two catchments in Norway and Scotland) and in laboratories under controlled exposure (Norway, UK, Belgium, and in the Netherlands).

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Effects of interaction between eutrophication and major environmental factors on the ecosystem stability of reed vegetation in European land-water ecotones (EUREED)
The project will examine the effects of interactions between eutrophication, water table management and temperature on

ecophysiological processes in reed plants and biogeochemical processes in the rhizosphere of reed.

The following tasks will be addressed:

- determination of growth and productivity of reed populations at contrasting European localities;
- field investigation of carbon and nutrient (especially nitrogen) cycles within reed stands in relation to the trophy status and the water table management of the sites;
- determination of the effects of eutrophication, water table fluctuations and oxygen demand in the sediment on oxygen transport within the reed plants, architectural and anatomical structures related to O_2 transport, and viability and growth of rhizomes and roots;
- examination of the impacts of nutrient enrichment, temperature, and water table fluctuations on biogeochemical fluxes of C and N compounds, and on the characteristics of dominant nitrate-reducing bacteria;
- determination of the genetic variability within and between European reed populations in relation to the trophic status of the site, hydrological situation, and the performance of the reed to progress or to be subject to die-back.

Coordinator: Dr. W.H. Van der Putten, Netherlands Institute of Ecology Centre for Terrestrial Ecology - Heteren, NL
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Assessment of the two main and connected human influences, river disturbance and subsequent fish stocking, on the genetic diversity and stability of natural riverine fish populations

This project will investigate the possible impact of the restriction and greater uniformity of habitats, and of connections between catchments via artificial canals and the introduction of foreign strains by stocking on the genetic diversity of freshwater fishes.

The exploitation of space and territories by fish populations in large, medium and small rivers in western, central and southern Europe (e.g. Rhône, Danube, Acheloos, Hérault, Tejo tributaries) will be investigated, and the genetic importance of natural and man-made barriers to the movements of "non-migrating" species will be quantified. The following fish species will be included in the investigations: brown trout, grayling, roach, nase, chub and barbel.

The project will comprise the following specific topics:

- identification of the colonization of western and southern Europe from the Danube basin;
- identification of the local strains, aiming for their conservation;
- establishment of the influence of the equipment of large rivers on the biodiversity of species, considering spatial scales of genetic structures, means of dispersion, kinds of rivers, habitat partitioning, river bed alteration, water pollution and stocking.

Finally, the project will present a valid and coordinated overview of the present genetical status of several European riverine fishes, and general management principles applicable to most southern and western/central European countries for fish populations will be proposed.

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The effects of environmental changes on European salt marshes: structure functioning and exchange potentialities with marine coastal water

This project will conduct comparative investigations on sediment, nutrients and particulate organic matter exchanges between salt marshes and estuarine or coastal marine waters on different types of representative European salt marshes, considering both the structure and functioning of the component ecosystems.

The following features will be considered:

- inter-annual variations of community dynamics and organic matter, silt and nutrient exchanges in salt marshes in France (Mont St. Michel Bay), UK (Old Hall, Tollesbury, Essex), Netherlands (Texel) and in Portugal (Mira estuary);
- role of vegetation composition and structure in the processes of accretion and erosion and their consecutive effects;
- direction and magnitude of existing dynamic processes within the salt marsh and role of changes in environmental pressures;
- influence of mowing or grazing on the vegetation composition and structure and their effects on accretion or erosion;
- simulation and prediction of the effects of geomorphological and hydrological changes in estuarine and/or coastal ecosystems: emphasis will be placed on the evaluation of possible sea level rise impacts on the salt marsh's function as source or sink of sediments and pollutants;
- localization by specific markers of sources and sinks of organic matter produced in salt marshes;
- role of the soil compartment in terms of storage for organic matter and nutrients and as source of nutrients during specific events (high tides, heavy rain).
- classification of major European salt marshes on the basis of their function in the coastal ecosystem, and to formulate management proposals for the maintenance or increase of salt marsh functions.

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European river margins as indicators of global change (ERMAS)

The project will test the hypothesis that river margin ecosystems are more sensitive to environmental change than the adjacent aquatic or terrestrial systems by comparing the rates of three biological processes occurring in the terrestrial, river margin and aquatic habitats of 5 rivers along a latitudinal gradient from northern Sweden at 64°N latitude to Southern France at 43°N. These processes are plant colonisation, litter decomposition and denitrification. The comparison will be based on the local temperature, soil moisture, and flooding variation during the annual cycle typical for the 5 rivers

For each river, measurements will be taken along a transect from within the river, through the margin wetland, into the terrestrial system. Additional studies regarding hydrology, hyporheic processes, biodiversity, ecoregions, landscape, and socio-economic considerations will complement the core investigations.

The ERMAS project will provide the base line on biogeochemical processes occurring in river margin habitats as well as for recommendations on river margin wetland management at the European level.

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"Extended HUMOR" (Extension of project HUMOR - Humic substances, modifiers for the response of aquatic ecosystems to acidification)

The "EXTENDED HUMOR" project will expand the scope of the ongoing "HUMOR" project, implemented in the STEP Programme, mainly by elucidating to which extent Humic Substances (HS) are modifying the chemical and biological processes which are taking place during the passage of acid precipitation water through the soil in a catchment towards a lake.

The investigations will include the chemical characterization of acidified and non-acidified humic substances; the determination of the effect of pH and HS on lipid solubility, microbial respiration and macroinvertebrate physiology and the characterisation of the hydrology, chemistry and biology of the land-water interface.

Field work will focus on the 6.5 ha catchment area of Lake Skervatjern, a 2.4 ha dystrophic lake located in Western Norway. This field site is also subject to the Norwegian/international project "HUMEX" (Humic Lake Acidification Experiment).

The experiments will contribute to a better understanding how HS are modifying the acidification processes in the terrestrial and aquatic compartments of catchments subject to air pollution loads.

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ALPE 2. Acidification of mountain lakes: palaelimnology and ecology, remote mountain lakes as indicators of air pollution and climate change

The "ALPE 2" project represents an enlargement in scope and geographical coverage of the ongoing "ALPE 1" project in the STEP Programme. In addition to the remote mountain lakes in the highlands of Norway and Scotland, in the Italian and South Tyrolian parts of the Alps and the French part of the Pyrenees considered in "ALPE 1", the "ALPE 2" project extends the investigations on lake sediments, water chemistry, diatom, invertebrate and fish fauna on lakes in Spitzbergen (Svalbard), the Irish highlands, Austrian Alps, the Czecoslovakian and Polish parts of the High Tatra mountains, the Spanish part of the Pyrenees, the Sierra Nevada in Spain and the Sierra d'Estrela in Portugal. Seasonal changes in major limnological, chemical and biological parameters will be studied in function of the air pollution deposition and of climate factors.

The whole coordinated measurement programme is aimed at:

- quantitatively reconstructing the historical development and estimating future development of lake water pH;
- quantifying the relationships between invertebrate assemblages and water chemistry;
- quantifying the relationships between fish populations and environmental conditions;
- testing for patterns of variation in lake-water chemistry within and between lakes over time.

Finally it is intended to identify "critical sulphur and nitrogen loads" and "recommended target loads" for those remote mountain areas, to apply biological data to the establishment of guidelines for good monitoring and management practices, to establish baseline conditions for the long-term evaluation of impacts of climatic and environmental change.

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Activities in the field of the protection of Community's forests against atmospheric pollution

Based on the respective EU Regulations (Regulation EEC N° 3528/86 and 2157/92) and on the resolution N° 1 of the Ministerial Conference on the protection of forests in Europe (Strasburg 1990), the Commission intensified its efforts in the field of the protection of forests against atmospheric pollution.

In 1987 a systematic network of 16x16 km was built up. This network covers the entire forest area of the EU.

Since 1988 all Member States and several other European countries have been assessing the forest vitality on the annual basis.

The results of the 1992 EU forest damage survey indicated that 19.1% of all sample trees a clear indication of needle- or leaf loss. For the total sample including 23 European countries this percentage of damaged trees was 23.5%. Comparing the survey results since 1988, the damage of 11 out of 12 main tree species in Europe increased and, for most of these species, reached the highest percentage in 1992. Further details can be obtained from the Forest Condition Report 1992.

With Commission Regulation EEC N° 926/93 a forest soil inventory was implemented. By the end of 1995 results from this inventory will be available. The main objective of this inventory is to get basic information on the condition of forest soils in the EU.

As an optional inventory the Member States will carry out on some of these plots also an analysis of the chemical content of the needle and leaves. These results will be available by mid of 1993.

In 1994 an additional network of permanent observation plots for intensive and continous monitoring will be established. On more than 300 plots in all Member States the following surveys will be carried out; crown condition, soil analysis, analysis of needle and leaves, increment changes assessment, deposition measurements, information on meteological parameters.

The main objective of this network is to obtain detailed data on the evolution of forest ecosystems in the EU. This approach allows correlations to be established between the variation of environmental factors, especially atmospheric pollution and the condition of forest ecosystem.

In addition to the monitoring activities, Regulation EEC N° 3528/86 foresees a financial participation by the EU in pilot projects and experiment in the field aiming at the improvement of knowledge on atmospheric pollution in forests and its effects aswell as the development of methods for the restoring of damaged forests.

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Terrestrial ecosystems

As a part of the 1994-95 Environment Programme managed by DG XII, terrestrial ecosystems research has the following objectives:

- to increase the understanding of biogeochemical cycles and ecosystem processes, structures, and functions;
- to identify indicators of environmental change and to predict the responses of ecosystems to anthropogenic and natural perturbations;
- to assess the interactions between ecosystems and economic developments and their feedbacks;
- to recommend normative measures and appropriate management, protection and remediation practices.

This is of particular relevance to EU policies in agriculture, fisheries, waste management, forestry, environmental protection and conservation.

Thus, the main goals of this EU programme are on the one hand to understand changes occurring in ecosystem functions and patterns at the European scale, and on the other hand, to generate the scientific basis, needed to define and implement the Community action (regulations, directives), in the field of terrestrial ecosystem management, protection and restoration (see the report "Decomposition and accumulation of organic matter in terrestrial ecosystems: Research priorities and approaches" edited by N. Van Ballmen, Department of Soil Science, Agriculture University, Wageningen, NL).

The first call for tenders, published in 1991 to implement the programme, yielded 120 research proposals in the area of terrestrial ecosystems, each of them constituing a consortium of 2 to 15 European research institutions associated, for a duration of 2 or 3 years, for implementing a common science programme. The peer review process set up by the Commission to evaluate the proposals, led to the selection of 13 projects. The most relevant to the functioning of ecosystems are briefly described hereafter. Many of these projects are interlinked with some scientific institutions being part of 2 or more of them. Thus, the overall structure constitutes a dense research network covering a large geographical area in Europe, sparring a range of environment conditions that should allow models to be developed:

Experimental manipulation of forest ecosystems in Europe (EXMAN)

The project aims to increase the understanding of biogeochemical cycling of elements, hydrology, turnover of biomass and the effects of atmospheric deposition on forest ecosystems. Special emphasis is placed on soil conditions. The scientific approach is to perform comparable manipulations of forest ecosystems under a wide range of soil, atmospheric and ecological conditions, and thereby to improve understanding of human impact on basic ecosystem functioning and dynamics.
Manipulation experiments are established under the frame of long-term basic ecosystem studies at several sites in Europe. As far as possible the same experimental approach, methods, type of forest etc. is used, but the atmospheric inputs of S and N compounds are different. The manipulations comprise drought, fertigation to arrive at optimal soil chemical conditions for tree growth, liming, fertilization, experimental acidification, irrigation, and water- and nutrient removal.

Variation of the organic matter pool in soils (VAMOS)

VAMOS endeavours to understand the effects of global warming on soil organic matter stability.

The project focuses on the stock and the turnover of the soil organic matter in boreal, atlantic and mediterranean forest ecosystems and assess the sensitivity of litter and soil organic matter pools to predict patterns of climate changes taking into account the effects of the below-ground environmental conditions and soil organic matter stability. While emphasizing the carbon cycle, it takes into account the interactions between carbon and nitrogen and point out how carbon dynamic drives the nitrogen availability.

The innovation of this project is to perform a set of integrated experiments using standard labelled (^{13}C and ^{15}N) plant material in coniferous forest ecosystems to study its decomposition rate and the fate of its carbon and nitrogen in relation to climate and to measure, by labelling different humus, the turnover of the soil organic matter pools.

Effects of rapid climatic change on plant biodiversity in boreal and montane Ecosystems

The objective of the project is to predict changes in plant biodiversity that could be induced by climatic changes in boreal and mountaineous European areas.

Biodiversity, defined as the number of species present in the landscape, can be diminished by rapid climatic change if species either do not have a sufficient area of potentially suitable new habitat to which to retreat, or if poor dispersal prevents them from reaching their new habitat in time. Enhanced greenhouse warming could, in the next century, diminish the extent of boreo-alpine habitat. A similar reduction occurred during the Holocene thermal maximum. The project examines, the extent of these readjustments in four mountane 20-km squares, situated in Norway, Scotland, western Alps and Appennino Abruzzese, and assesses their consequences for local biodiversity.

Altitudinal limits of species in the mountains are related to their geographic limits at the continental scale. Predictions of biodiversity based on reconstructions of past climate at the continental scale are verified by macrofossil analysis of sediment cores. The magnitude of the bottleneck at the thermal maximum will be assessed.

Influence of nitrogen deposition on the carbon balance in peatland ecosystems

The project aims to improve the understanding of the processes of plant growth and decomposition of plant residues in peatland ecosystems. The main objective is to determine the influence of nitrogen (N) deposition on the carbon balance in nutrient poor peat bogs.

The effects of different forms and rates of inorganic nitrogen (N) on different moss species is studied in glasshouse experiments in Switzerland using newly developed techniques for growing Sphagnum mosses. Information already obtained in this way will be used to set up field experiments on nutrient poor bogs in Finland, France and Scotland, which represent the widest latitude range of climatic conditions favouring oligotrophic peat development in Western Europe. Atmospheric N deposition which ranges from 2 in Finland to 22 kg N/ha/yr in S.E. France will be measured at each site. Different parts of the problem will be studied at each site and hydrological, ecological and climatic measurements made at all three field experiments.

The results from each research group will be integrated into a mathematical model of peat accumulation which will link the C and N cycles in peatland ecosystems. This will provide a basis for predicting the long term effects of N on oligotrophic peat and also improve the scientific foundation for the application of a critical load concept to atmospheric nitrogen deposition to peatlands.

Nitrogen physiology of forest plants and soils (NIPHYS)

NIPHYS (Nitrogen Physiology of Forest Plants and Soils) is an investigation of the present effects of soilborne and deposited nitrogen on forest organisms and soils along a climatic transect through Europe in order to substantiate predictions on effects of changing depositions and global climate on broad-leaved and coniferous trees.

Investigations on forest decline have demonstrated the importance of nitrogen deposition in enhancing various nutritional imbalances in trees and soil acidification. NIPHYS aims at answering several basic questions:

- what form of nitrogen is used by trees in different environments;
- what roles are played by soil properties, mycorrhiza, and microorganisms in the transformation of nitrogen in forest soils;
- which processes regulate the ammonium/nitrate ratio in soil solution. NIPHYS addresses these issues by investigating plant, microbial, and abiotic processes involved in the transformation of ammonium and nitrate in forest soils of different climatic regions.

The Mediterranean oak ecosystem: a basis for an appropriate protection strategy

The project is to achieve a comparative study of the ecological functions and of the responses to management practices and environmental changes of the two main oak forest landscapes found in the Western Mediterranean region: the coppices of Southern France and Italy and the savannalike oak woodland of the Iberian peninsula.

The working hypothesis considers that the main ecological factor controlling the dynamics of these ecosystems is water availability, which varies greatly in time and space. Moreover, this constraint can be aggravated by inadequate management practices. In order to cope with the temporal variability, the forest plant species react principally by changes in leaf-area, depth of root and opening of stomata. The modifications of the leaf-area index allow an adaptation to the alternance of wet and dry year cycles typical of the mediterranean climate.

During the ecosystem dynamics (decline of agricultural practices, coppices), this control results in an overall adjustment of the leaf-area index. In the edaphic or water resource gradients, this index changes and tends to decrease in parallel with the water resource. The understanding of this adjustment mechanism implies consideration of both this function equilibrium and, secondly, its interpretation in terms of ecosystem vulnerability to management practices and climatic stresses. In the mediterranean region, even small changes in annual rainfall or temperature increases considerably, the frequency of occurrence of high risk events for the forest vegetation.

Nitrogen saturation experiments (NITREX)

The objective of NITREX is to obtain direct experimental data at the ecosystem scale regarding the risk of nitrogen saturation due to nitrogen deposition and the recovery of nitrogen saturated systems in response to decreased nitrogen deposition.

This objective is to be achieved by experimentally changing nitrogen deposition to entire forest ecosystems - either catchments (Norway, Sweden and Switzerland) or forest stands (Denmark, West Germany, the Netherlands, and the United Kingdom).

Thus, a European network spans the gradient in nitrogen deposition from high deposition in the Netherlands to low deposition in Norway. Nitrogen is added or removed to stimulate natural precipitation.

Measurements include precipitation, throughfall, soil, soil solution and runoff volume and chemical composition using standard procedures. In additional, the growth and vitality of the above-ground vegetation will be monitored and the nutrient status and cycling in the forest will be followed (litterfall, needle composition, soil organic matter composition and mass, fine root biomass). Nitrogen-15 will be added to follow the fate of nitrogen within the ecosystems and to trace the source of nitrogen leached from the ecosystem.

These experimental data will form the basis for extensive cross-European comparisons and for the development and refinement of process-oriented models for nitrogen in coniferous ecosystems. These comparisons and the modelling work will provide information regarding the potential for nitrogen saturation, the reversibility of nitrogen saturation, critical loads for nitrogen in coniferous forests, and the potential combined effects of forest use, atmospheric pollution and climate change.

Mechanisms of nutrient turnover in the soil compartment of forests (CORE)

This research represents Phase III of the ongoing coordinated project (CORE) initiated under the 4th EC Environmental R&D Programme and continued under STEP.

In **Phase I** the hypothesis that the chemistry of European forest soils is markedly affected by deposition of air pollutants in rainfall and throughfall was tested using a series of reciprocal soil transplants. This was achieved using a transect of forest sites across Europe with different nitrogen (N) and sulphur (S) inputs.

In **Phase II**, which is due for completion in 1993, the importance of root uptake and forest N saturation in modifying soil solution responses have been examined. It was also realised in Phase I that quantification of N losses from forest ecosystems through denitrification is crucial.

From these previous Phases a rule-based model has been constructed which appears to describe one of the major underlying mechanisms in causing forest die-back. In **Phase III** the key interactions in this model will be validated through laboratory and field experiments. The main objective is to verify this process model which describes the turnover of nitrogen in forest soils and the responses to changes in pollutant inputs and climate.

Biogeochemical cycling in agriforestry systems network (BAFNET)

The objective of this research project is to increase understanding of the fundamental processes important in the biogeochemical cycling of the major compounds of nitrogen, phosphorous and carbon within model broadleaved forest ecosystems and, with the aid of this knowledge, produce models which predict the likely impact of climate change on biogeochemical cycles.

Specific aims are to:

- quantify the partitioning and cycling of nitrogen, phosphorus and carbon within identical tree based model ecosystems at a range of geographical locations with contrasting climates;
- identify the importance of plant root systems and arbuscular mycorrhizal (AM) fungi in transfers between major ecosystem nutrient and carbon pools and the influence of temperature on these processes;
- develop a series of quantitative process-based models to describe biogeochemical cycling within tree-based ecosystems and predict related responses to climate change.

The project is centred around a network of agriforestry sites which were established in 1991 and provide model systems to study fundamental processes important in the functioning of tree-based ecosystems. These sites will continue to provide the basis for studies and a further site will be established in Eire by Kinsealy Research Centre.

The approach will be to use a combination of field and laboratory studies.

These various networks are complemented by more specified research projects, for instance, in the area of tree physiology.

Further information can be obtained from:

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Climatology and Natural Hazards

Research activities in the area of Climatology and Natural Hazards are developed within the framework of both EPOCH (European Programme on Climatology and Natural Hazards) and Environmental Programme managed by DG XII.

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

The research results archieved by some of the EPOCH contracts are briefly descrived in the following:

EPOC-0013
An investigation into the impact of elevated CO_2 upon the response of European forests

The substancial increase in CO_2 concentration in the atmosphere is likely to have large implications for the functioning and management of European forest ecosystems. This project aims at elucidating, in particular what changes in physiological processes, tree and stand structure will occur as a result of the environmental changes. Studies of sub-cellular processes, whole leaf and tree responses have been performed on controlled environment facilities and open-top chamber and responses of increased CO_2 concentrations on major physiological and biochemical parameters were obtained. Three new approaches (branch cags on mature trees, microcosm of forest stands, and enclosure of a part of an ecosystem) have been adopted. A major achievement has been to bring together eight participating teams from six european countries into a common programme and progressively to unify their approach towards the objective. Highlighting the dependence of results on methods i.e. many of the diverse results reported in the literature depend on the methods used. Progress has also been made with the modelling of canopy structure and growth, and on the prediction and measurement of stand scale processes. The most important general conclusion, is that responses vary not only between species and clones but also vary very substantialy between juvenile an mature tissue and that even with juvenile seedlings, responses change as the plants age. This project has been accepted as one of the IGBP-GCTE core research programme and fits weel with other international programmes on global environmental changes.

Coordinator: Prof. P. Jarvis University of Edimburgh - Forestry Natural Resource

EPOC-0014
Mediterranean Desertification and Land Use (MEDALUS)

Seventeen institutions from eight member states are cooperating to get a sound working knowledge of the ecological and soil systemes and their interactions both on-and off-site in the European Mediterranean in view of assisting in the developments of policy and strategies to accomodate desertification trends. Characterisations of the past and presente climate around the seven experimental sites and potential scenarios for important climatological variables was developed. A consistent multi-disciplinary data-set on Mediterranean desertification is being built up according to a standardised sampling programme and an experimental field lay-out enabling the comparison between the different sites. Advanced modelling of the physical and biological responses of the desertification have been conducted in the local, hillslope or catena and basin scale. An explanatory physical model which forecasts hillslope vegetation hydrology and solid changes from known climate and land use data has been constructed and validated identifyind the main physical routes towards desertification (feedback loops). Full catchment scale simulation were successfully carried out and plausible predictions of changes in catchment response and sediment yield were obtained. Remote sensing and field radiometry were performed to characterize the spectral response of different response of different exposed lithological classes to the desertification process and land loss. The concept of Desertification Response Units has been developed in order to identify how field and satellite investigations, models of physical processes and socio-economic investigations act together

over specific areas. By identifying the susceptibility of these different units of desertification processes, a basis for regional scale management is provided. Based on a pilot study, alternative scenarios on the environmental degradation that can ensue from land use change driven by short-term economic incentives were provided.

Coordinator: Prof. J.B. Thornes, University of Bristol - Dept. of Geography

EPOC-0024
HAPEX-SAHEL: Investigation of climatological-hydrological interactions between vegetation atmosphere and land surfaces

The HAPEX-Sahel experiment is a part of large scale pilot studies in climaticaly important areas to study the energy and water balance of a region with a view to deloping parametrisations of land surface processes necessary for studying the climate system and its evolution. This project is a direct contribution to the international, WCRP and IGBP, research programmes. The experimental strategy consist of a long term monitoring for 1991-93, of an area 100 x 100 Km in the Sahelian region of West-Africa in Niger. This is a semi-arid, marginal area with a well marked rainy season and related variations in soil moisture and vegetation cover and therefore very important climatologically. Observations were made at three representative sites and investigations on meteorology and mesoscale modelling, hydrology and soil moisture, surface fluxes and vegetation, and remote sensing were made. Althougt the whole assessment of the experimental data has not yet been completed; it can be said that these studies permitted the development and verification of experimental strategies and the construction of coprehensive data bases which allow direct access to the desired quantities and parameters for global scale validation of general circulation models. One important feature is that airborne measurements of turbulent fluxes agree fairly well with ground measurements, in contrast with many experiments in the past.

Coordinator: Mr. J.P. Goutorbe, C.N.R.S. - Centre Nationale Recherches Météo

EPOC-0030
Echival Field Experiment in a Desertification threatened area (EFEDA)

The EFEDA project is a first major European activity on climatic and hydrological interactions between the vegetation, the atmosphere and the land-surface in the Mediterranean area involving about 150 scientists from more than 30 groups from seven European member states and the USA. An important data set covering practically all parameters neded for the interpretation of complex land-surface phenomena was compiled during an intensive experiment carried out in a large semi-arid area, with a variety of land uses. The hydrological field work confirmed the severe ground water situation with a sinking ground water level. The evaporation measured above surface is compared to the decrease in soil moisture. Both sets of measurements confirmed the influence of the sparce vegetation on th evaporation. Aircraft and ballon measurements provided new insights into the structure of the atmospheric boundary layer and its influence on the water vapor transport in the atmosphere. Satellite and aircraft remote sensing data have been compared with ground based spectro-radiometric reflectance measurements and area-averaged albedo, temperature as well as vegetation index values could be derived. Mesoscale modelling and one-dimensional modelling of the soil-vegetation-atmosphere transfer of water and energy have been calibrated and validated against the experimental data. Investigations carried out under this project fit well into the research strategy of the WCRP and IGBP international programmes on Global Change, especially the IGBP-BAHC core project.

Coordinator: Prof. H.J. Bolle, Freie Universität Berlin - Institut fuer Meteorologie

EPOC-0031
The effect of climate change on agricultural and horticultural potential in Europe

Global warming may have profound effects on the world wide pattern of agricultural potential, and thus on the suitability of land for agricultural production. Effects of climate change on agriculture and horticulture in the European Community, has been investigated through this project involving scientists from nine research institute in EC. A number of climate changes scenarios were constructed using data from general circulation models (GCM). None of the GCMs used are yet sufficiently reliable to provide prediction of future changes in climate variability and large uncertainties remain in their representations of climate at finer scales of resolution. Studies on crop responses to average climate change stressed the non-linear relationships between crop growth and environment. Crop-climate models have been validated and used to evaluate a range of management response and their potential usefulness in adapting to adverse effects of climate change. Despite uncertainties in the results there are important implications arising from this study. Warmer temperatures will shorten the duration of the growing period for annual crops. Decreasing the yield, although the direct effect of increased CO_2 will offset this for crops such as weat. Conditions in southern Europe will generally become hotter and probably dier with negative effects on yield. Parts of western Europe, may benefit particularly if there is an average increase in precipitation.

Coordinator: Prof. M. Parry, University of Birmingham - School of Geography

Environment Programme

The information on the research contracts signed between the Commission of the European Communities and research institutions in Europe published in Environment Research Newsletter n° 10 (December 1992) is further completed as follow:

New contracts under area I.1: Natural Climate Change

Biological and Magnetic Records and Dating of Climatic Changes in Western European Loess Series
Dr. D. Rousseau, Institute de Sciences de l'Evolution, Laboratoire de Paléontologie, Montpellier, F.

The Northwest European Continental Shelf over the Past 250,000 Years: Palaeoclimate, Palaeoceanography, Tectonics nad Sea-level Change
Dr. J. Scourse, University College of North Wales, School of Ocean Sciences, Menai Bridge, UK.

Investigation of the Recent Sediments in Lake Rukwa (Tanzania): A Clue for Reconstructing the South Equatorial Climate during the Last 130,000 Years
Dr. M. Tnigh, CNRS, Laboratoire de Géologie du Quaternaire, Marseille, F.

Palaeoenvironmental Analysis of Italia Crater Lake Sediments (PALICLAS)
Prof. F. Oldfield, University of Liverpool, Department of Geography, UK.

Variations in Natural Climate over the Past 130 KA Along a W-E European Transect a basis for upgrading GCM's
Prof. Dr. J. Vandenberghe, Free University, Institute of Earth Sciences, Amsterdam, NL

Ocean circulation and Global Climatic changes over last 3 interglacias. A contribution to the coordinated program: The study of the two glacial cycles with emphasis on entering into glaciation
Dr. L. Labeyrie, Centre des faibles radiactivités, Gif-sur-Yvette, F.

Glacial Ice sheets during 2 climatic cycles, with special emphasis on entering into glaciation
Prof. A. Berger, Université Catholique de Louvain, Institut d'Astronomie et de Géophysique, Louvain-la-Neuve, B.

Climate changes in Europe during the last two climatic cycles with emphasis on temperature post optimum evolution and entering into glaciation
Prof. A. Pons, Université Aix-Marseille III, Laboratoire de Botanique Historique et Palynologie, Marseille, F.

New contracts under area I.2: Anthropogenetic Climate Change

The global carbon cycle and its perturbation by man and climate II Part C: Ocean
Dr J. Etcheto, Univerité Pierre et Marie Curie, Laboratoire d'Océanographie Dinamique et de Climatologie, Paris, F.

From Local Weather Variability to Global Climate Evolution: The Role of Scales on Predictability
Dr. C. Nicolis-Rouvas, Institut Royal Météorologique de Belgique Département de Climatologie, Bruxelles, B.

Aerosol Climate Parameters over the Mediterranean Area from Joint Ground and Satellite Data
Mr. G. Dalu, Consiglio Nazionale delle Ricerche, Area Ricerca Cagliari, I.

Project for Estimation of long-term Variability in Ice Concentration: PELICON
Dr. B. Burns, University of Bremen, Institute for Remote Sensing, D.

Heat, Moisture and Mass Exchange Processes on a Regional Scale in a non Homogeneous Terrain
Prof. Dr. F. Fiedler, Universität Karlsrhue, Institut für Meteorologie und Klimaforschung, D.

North Atlantic Climatological Dataset (NACD)
Mr. P. Frich, Danisch Meteorological Institute, Database Section, Copenhagen, DK.

Short-Term Climate Variability
Dr. S. Tibaldi, Università di Bologna, Diparimento di Fisica, Gruppo Dinamica Atmosferica, I.

Reanalysis of global atmospheric data for the period 1979-1993
Dr. D. Burridge, European Centre for Medium-Range, Weather Forecasts, Reading, UK.

Investigations of the coupling fluxes at the air- ocean interface
Dr. P. Andreussi, Centro per le Tecnologie Energetiche ed Ambientali, Pisa, I.

Investigations of glacier surges: measurements and modelling of ice dynamics in Svalbard, European Arctic
Dr. J. Dowdeswell, University of Cambridge, Scott Polar Research Institute, UK.

Global 3-D climatolgy of atmospheric water vapor from space borne radiometric measurements
Dr. A. Chedin, Laboratoire de Météorologie Dinamique, Palaiseau, F.

Medium term climate variability
Dr. H. Cattle, Hadley Centre for Climate Prediction and Research, Bracknell, UK.

Anthropogenetic climate change
Dr. U. Cubasch, Deutsches Klimarechnenzentrum GmbH, Hamburg, D.

Physical parameterizations and climate response
Dr. R. Sadourny, Laboratoire de Météorologie Dynamique, Paris, F.

Regionalization
Dr. B. Machenhauer, Max-Planck-Institut für Meteorologie, Hamburg, D.

EUCREX-II: Modelling, measurements and observations of physical processes in cirrus clounds
Prof. Dr. E. Raschke, GKSS-Forschungszentrum Geesthacht GmbH, Institut für Physik, Geesthacht, D.

Reduction of solar radiation by manmade aerosol and thus modified clouds in Europe
Dr. H. Ten Brink, Netherlands Energy Research Foundation, Petten, NL.

Atmospheric mesoscale effects on the surface mass and energy balance of polar ice caps
Dr. G. Schayes, Université Catholique de Louvain, Institut d'Astronomie et de Géophysique Georges Lemaître, Louvain-la-Neuve, B.

The global carbon cycle and its perturbations by man and climate II part B: Terrestrial biosphere
Dr. G. Dedieu, Laboratoire d'Etudes et de Recherches en Télédétéction Spatiale, Toulouse, F.

The Global carbon cycle and its perturbation by man and climate II part A: Atmosphere
Dr. M. Heimann, Max-Planck-Institut für Meteorologie, Hamburg, D.

Study of the indirect and direct climate influences of anthropogenetic trace gas emissions
Dr. L. Bengtsson, Max-Planck-Institut für Meteorologie, Hamburg, D.

New contracts under area I.3: Climate Change Impacts

CLIMEX-Climate Change Experiment
A. Jenkins, Natural Environment Research Council, UK.

Sea-Level Fluctuations: Geophysical Interpretation and Environmental Impact
S. Zerbini, Università di Bologna, I.

Climate and Sea Level Change and the Implications for Europe
T. Wigley, University of East Anglia, UK.

The Likely Impact of Rising CO_2 and Temperature on European Forests
P. Jarvis, The University of Endinburgh, UK.

A Spatial Distributed Soil, Agroclimatic and Soil Hydrological Model to Predict the Effects of Climate Change on Land Use within the European Community
P. Loveland, Cranfield Institute of Technology, UK.

Flood Hazard Control by Multisensors Storm Tracking in Mediterranean Areas
E. Roccatagliata, Consorzio Genova Ricerche, I.

Real-Time Prediction Model of Exceptionally Intense Precipitation in the Western Mediterranean Area
J. Lorente Castello, Universidad de Barcelona, E.

Adaptation of Arable Crops and Perennial Vegetations to a Changing Climate
S.C. Van de Geijn, DLO - Center for Agrobiological Research, NL.

Sea-Level Change and the Stability and Activity of Coastal and Island Volcanoes
W. McGuire, Cheltenham and Gloucester College of Higher Education, UK.

Development of Polarisation Diversity and Doppler Radar Data Analysis for Qualitative and Quantitative Precipitation Monitoring in Severe Weather
A. Holt, University of Essex, UK.

Storms, Floods and Radar Hydrology
R. Moore, Natural Environmental Research Council, UK.

Slope Instability; Erosion and Solid Material Transport in Steep Mountain Catchments: Laboratory and Field Experimentations (EROSLOPE)
P. Ergenzinger, Freie Universität Berlin, D.

Meteorological Factors Influencing Slope Stability and Slope Movement Type: Evaluation of Hazard Prone Areas
C. Margottini, Consorzio Civita, Roma, I.

Climate Change, Soil Erosion and Slope Instability in Selected Agricultural Areas of Italy and Southern Britain
H. Rendell, University of Sussex, UK.

The Impacts of Climate Change and Relative Sea-Level Rise on the Environmental Resources of European Coasts
R.J.N. Devoy, University College Cork, IRE.

Relative Sea-Level Changes and Extreme Flooding Events Around European Coasts
D.E. Smith, Coventry University, UK.

European Stress Physiology and Climate Experiment: Project 2-GRASS (ESPACE-GRASS)
M. Jones, University of Dublin, IRE.

Impact of Climate Change on Hydrological Regimes and Water Resources in the European Community
N. Arnell, Natural Environment Research Council, UK.

Climatic Change and Agriculture: Assessment of Impacts and Adaptation
M. Parry, University of Oxford, UK.

Impact of Hydrometeorologic Changes on Slope Instability (HYCOSI)
E. Leroi, B.R.G.M., Orléans, F.

The Management of the Consequences of Climatic Change: Extreme Sea Surge and Run off Events
E. Penning-Rowsell, Middlesex University, UK.

European Stress Physiology and Climate Experiment: Project 1 - Wheat (ESPACE-WHEAT)
H.J. Jaeger, Justus-Liebig-Universität, D.

New contracts under area IV.1.1 Seismic Hazards

Experimental Evaluation of Technical Interventions to Reduce Seismic Vulnerablity of Old Existing Buildings
P. Pezzoli, ISMES S.p.A., I.

Genesis and Impact of Tsunamis on the European Coasts
S. Tinti, Università di Bologna, I.

High Resolution Imaging of 3-D Strain in Seismic and Volcanic Regions Using Differential Sar Interferometry
J. Achache, Institut de Physique du Globe de Paris, F.

Vulnerability of Buried Pipelines Under Seismic Loading
J. Katsikadelis, National Technical University of Athens, GR.

Volvi-Thessaloniki: a European Test Site for Engineering. Seismology, Earthquake Engineering and Seismology
K. Pitilakis, Aristotle University of Thessaloniki, GR.

Seismic Risk Assessment and Mitigation of Hospital Facility Networks
G. Nuti, STIN S.p.A., Roma, I.

Monuments Under Seismic Action: a Contribution to the Understanding of Structural Behaviour and to the Improvement of Restoration Techniques
S. Angelidis, A.M.T.E.S.A., Athens, GR.

Southern Europe Network for Analysis of Seismic Data
E. Boschi, Istituto Nazionale di Geofisica, Roma, I.

Earthquake Protection for Historic Town Centres
R. Spence, University of Cambridge, UK.

New contract under area IV.1.2 Volcanic Risk

European Laboratory Volcanoes: Furnas. Study of Eruption Precursors and the Plumbing System Aimed at Eruction Prediction, Understanding Eruptive Mechanisms and Hazard Assessment
V.H. Forjaz, Universidade dos Açores, P.

Etna Volcano: Geochemistry and Budget of Volatiles. Implications for the Magma Feeding System, the Structure of the Edifice, and the Eruptive Activity
P. Allard, C.N.R.S., Centre des Faibles Radioactivités, F.

The Physics of the Ascent, Degassing and Fragmentation of Magma
S. Tait, Institut de Physique du Globe de Paris, F.

ETNAISES - Etna Tomography. Novel Approach by Seismology Etna Volcano Behavioural Model: Frame of the Three Dimensional Heterogeneous Edifice and Plumbing System from Seismic Tomography
A. Hirn, Institut the Physique du Globe Paris, F.

FOURNASEIS: Fournaise Operation of Under- shooting, Refraction and Normal angle Seismic Sounding. Seismic Tomography of Piton de la Fournaise Volcano (Département de la Réunion, France) A: Structural Frame to the Tectono-Magmatic Behaviour
J. Gallart Muset, Institut de Ciencias de la Terra "Jaume Almera" CSIC, E.

European Laboratory Volcanoes: Piton de la Fournaise. Definition of the Fine Structure and the Plumbing System Aimed at Eruption Prediction, Hazard Assessment and Eruptive Mechanism Understandings
J.L. Cheminée, Institut de Physique du Globe de Paris, F.

European Laboratory Volcanoes: Etna. Magma and Lava Flow Modelling and Fine Structure and Plumbing System Definition Aimed and Volcanic Hazard Assessment at Etna
F. Mulargia, Università di Bologna, I.

The Shallow Magmatic Plumbing System at Etna: Method and Technique Development for Temporal and Spatial Evolution
F. Ferrucci, Università degli Studi della Calabria, I.

European Laboratory Volcanoes: Teide. Definition of the Fine Structure and Plumbing System Aimed at Eruption Prediction, Hazard Assessment and Eruptive Mechanisms Understanding
V. Araña, Museo Nacional de Ciencias Naturales, Madrid, E.

Santorini Volcano Laboratory. Magma Evolution and Physical Volcanology of Historic, Preistoric and Quaternary Eruptions at Santorini - Analysis of the Evolution and Behaviour of a Hazard Relevant Volcanic System
M. Fytikas, Aristotle University of Thessaloniki, GR.

New contracts under area IV.3 Desertification in the Mediterranean area

MEDALUS II: Project 1 - Basic Field Programme
Dr. A. Imeson, Vakgroep Fysische Geografie en Bodemkunde, University af Amsterdam, NL.

MEDALUS II: Project 2 - Modelling and regionalisation
Prof. M. Kirkby, School of Geography, University of Leeds, UK.

MEDALUS II: Project 3 - Managing Desertification
Prof. A. Aru, Dipart. Scienze della Terra, Università di Cagliari, I.

MEDALUS II: Project 4 - Research and Policy interfacing in selected regions
Prof. J. Thornes, Kings College, University of London, UK.

Desertification processes in the Mediterranean Area and their interlinks with the global climate. Sub-group II: Vegetation, soil physics, inventory and impacts
Dr. F. Martin de Santa Olalla, Dept. de Produccion Vegetal, Universidad Castilla - La Mancha

Desertification processes in the Mediterranean Area and Their interlinks with the global climate. Sub-group I: Hydrological response to land use change and over exploitation of water resources in a semi-arid area of Spain
Dr. J. Bromley, Institute of Hydrology, N.E.R.C.

Desertification processes in the Mediterranean Area and their interlinks with the global climate. Sub-group V: Remote sensing and radiometric properties of the surfaces: assessment of desertification from space
Prof. H.J. Bolle, Institut für Meteorologie, Freie Universität Berlin

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Other Activities Relevant to EC Environmental Programmes

Energy and the Environment

82% of Europeans believe that they personally should be saving energy.

Responsibility for reduction in energy consumption by the private user himself is rated as "really important" by 82 per cent of EU citizens, it is revealed in a pan-European Union opinion survey into attitudes concerning energy consumption.

Previous polls in the Eurobarometer series have indicated a rising trend towards the current attitude. In 1989, of those questioned whether it was really important that "the consumption of energy by the private users will decrease", only 60 per cent responded in the affirmative. In 1991, this proportion had risen to 73 per cent.

In the latest Eurobarometer energy poll the question is slightly differently worded than previously. Results from a preliminary report, point to a relatively uniform belief across the European

Union Member States in the need to save energy. The lowest proportion of believers in it is still high, at 75 per cent, in Belgium. The highest is 85 per cent, in the UK.

In response to more detailed questions similar in theme, a good majority say that they themselves had taken some practical steps towards energy economy. For instance, 40 per cent of European Union inhabitants state that they have in recent years reduced heating costs by improving the insulation of their homes.

Similarly, 39 per cent say that they have cut down on the heating used, 30 per cent have achieved reduced motor fuel consumption, and 45 per cent have economised on home lighting or other home electrical appliances. Attitudes implying a sense of civic concern are generally reflected in replies to many of the 17 varied questions drawn up by the Commission department (DG XVII) responsible for energy policy. These were shown up in relation to acid rain, ozone layer destruction and global warming. Most notably, 95 per cent of EU citizens feel strongly for a need for cleaner air in towns.

A high proportion, 89 per cent on average, of those questioned in the poll - which has been assessing attitudes to energy for ten years (since 1982) - are in favour of adopting common EU laws for the protection of the environment. Not a single country scored under 86 per cent on that aspect.

More detailed interpretation of the figures, derived from interviews with approximately 13000 people (aged 15 and over), will be available in a few weeks.

The bi-annual Eurobarometer energy surveys are held against a background that the European Union has to import as much as 50 per cent of its oil, which remains an assential primary commodity for practically all transport. Even allowing for the prospect of Norwegian accession, Community dependence is set to increase at the turn of the century.

Moreover, much imported oil comes from politically unstable on potentially unstable areas. While vast new oil and gas resources could become available from the ex-Soviet Union, it will take at least ten years before this can come on stream to a substantial extent.

However, while the European Union achieves 20 per cent of the world's estimated GNP (gross national/world product), it succeeds in keeping its consumption of energy resources down to only 14 per cent of the world's total.

One in every two European believe their energy source should be pollution free

Half the Europeans in the EU countries believe that the most important aspect of energy resources over the next ten years or so is low risks of pollution. This is revealed in a final analysis of the results a major European Union opinion survey into attitudes concerning energy consumption.

The analysis follows an announcement, in October, that a preliminary examination of the survey (Eurobarometer no. 39.1, June 1993) revealed that 82 per cent of EC Citizens believe that they personally should be saving energy (see above).

On the subject of pollution, the new, in-depth report, organised by the European Commission in Brussels, concludes that renewable energy and natural gas are perceived as high quality sources of energy. The high quality is seen above all from the point of view of pollution.

Social and demographic aspects also play a role in the attitude to the importance of pollution. Older people feel less strongly, and better educated people feel more strongly about the importance of pollution. Less well educated people tend to be more concerned about the price of their source of energy.

Attitudes to the pollution aspect of energy vary considerably from country to country. In Italy, where there are indications of the highest feelings against pollution, 69.5 per cent of those giving valid responses to questions regard it as "most important". The equivalent proportion for Ireland, where the figure is the lowest, is 28.7 per cent.

Other equivalent proportions are: Belgium 31.8 per cent, Denmark 52.3, Germany 51.2 (West 53.0, East 44.3), Greece 63.5, Spain 56.8, France 54, G-D Luxembourg 38.2, The Netherlands 55.9, Portugal 31.7, and the UK 43.3. The EC average is 53.2 per cent.

The image of solid fuel, oil and nuclear energy have all deteriorated since the last Eurobarometer was organised by the European Commission, in 1991.

Only 21 per cent of those questioned support the prospect of transferring to energy sources taxation currently being raised in other ways. People with varying degrees of disagreement to the transfer total nearly 70 per cent. However, various groups, including people well informed on environmental matters, show more acceptance to the transfer.

As stated in the preceeding press release, the Eurobarometer results are based on interviews with approximately 13000 people (aged 15 and over).

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Information

The European Environment Agency

The environment policy of the European Union is almost 20 years old.

Starting with a few sectorial measures aimed at reducing the pollution of air and water, it has progressively expanded to become one of the major components of the European Community activity.

The Treaty of Maastricht stipulates that one of the objectives of the European Union is to promote an economic development respectful of the environment, thus integrating the concept of sustainable development agreed at the UNCED Conference of Rio, in June 1992.

Over 200 pieces of environmental legislation have been agreed so far. These are usually in the form of directives which the Member States must transcribe in their corpus of laws and regulations. No system existed so far, however, at Community level, to check if the measures were enforced, and whether they actually resulted in improvements in the state of the European environment.

It is to address, at least partly, this gap that a European agency for the environment was proposed by the Commission to the Council and European Parliament. A regulation creating the Agency was adopted in 1990 but a decision on the location of the Agency had to wait until 29 October 1993, when the European Council decided that the Agency would be in Copenhagen. In the meantime, the Commission has set up a task force withing DG XI to undertake preparatory actions and to maintain and update the CORINE programme on environmental information.

The Agency, and the European environment information and observation network which it will coordinate, are intended to provide the Community and Member States with objective, reliable and comparable information at the European level to enable them to take the measures necessary to protect the environment, as well as to be able to assess the results of the measures they have taken. In addition, the aim is to ensure that the public is properly informed about the state of the environment. The EEA will be at the hub of a decentralized, distributed network, marking the maximum use of resources already existing in Member States.

This network will consist of:

- component parts of the various national information networks;

- a national focal point nominated by each Member State;
- institutions which will be charged with cooperating with the Agency on a contractual basis in providing information on specific topics of particular interest; these are referred to as "topic centres".

The Agency in its first years will give priority to the following areas:

- air quality and atmospheric emissions;
- water quality, pollutants and water resouces;
- the state of the soil, of the fauna and flora, and of biotopes;
- land use and natural resources;
- waste management;
- noise emission;
- chemical substances which are hazardous for the environment;
- coastal protection.

In every case special consideration should be given to the socio-economic aspects.

Whiting two years of the Agency coming into operation, proposal will be presented to the Council of Environment Ministers for the possible extension of the Agency's functions. Among the areas to considered are:

- association in the monitoring of the implementation of Community environmental legislation;
- preparing environmental labels and criteria for their award to environmentally friendly products, technologies and sevices etc;
- promoting environmentally friendly technologies;
- establishing criteria for assessing the impact on the environment;

Participation of third countries in the work of the Agency is clearly important, since environmental problems and challenges are not confined by national frontiers. This has been envisaged from the outset and is covered in Article 19 of the Council Regulation. Considerable interest has been shown by EFTA (European Free Trade Association) countries, as well as by those in East and Central Europe. The Agency will also develop working relations with relevant international organisations, both in the United Nations family as well as European organisation such as the Organisation for the European Cooperation and Development (OECD) and the Europen Space Agency (ESA).

In parallel with its cooperation with external organisations the Agency will actively cooperate with other Community bodies and programmes, particularly the Joint Research Centre (JRC) and the Statistical Office of the European Communities (EUROSTAT), and the contract research programmes of DG XIII. The JRC will have an essential role in such areas as the harmonisation of new environmental measurement methods, the standardisation of data formats, the intercalibration of instruments and the development of new environmental measurement methods and instruments.

The Agency will the fairly autonomous since it will be governed by a management board comprising one representative of each Member State, two scientific personalities designated by the European Parliament. It will also have a scientific committee of nine members.

Under the Regulation, the Agency's multi-annual work programmme needs to approved by the Management Board withing 9 months of the Regulation coming into force. With the hope of faciliting this approval process, the EEA Task Force has, in the light of many discussions withing the Commission and with experts from Member States, produced a first informal draft of the Agency's Work Programme, based on the objectives of the 5th EC Action programme on the Environment "Toward Sustainability".

The EEA Task Force is now also engaged with several international organisations in the preparation of a report on the state of the pan-European environment. This is undertaken in the context of the pan-European cooperation in the field of environment (conferences of Dublin, 1990, Dobiis Castle, 1991, and Lucerne, 1993). The report which should be available in early 1994 is a first attempt to assess the European environment as a whole. Lessons learned from this experience will undoubtedly be of much value for the future work of the Agency.

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European Network for Research in Global Change (ENRICH)

Global Change is nowadays one of the issues of major concern and highly demanding in terms of resources and efforts in environmental research.

Postering resources and capabilities of industrialized and developing countries is of primary significance for the rationale of a cooperative action among the countries involved and international research institutions.

This was the phylosophy underlying the proposal made by the Commission of the European Communities (CEC) to the Member Countries to set-up an European Network for Research in Global Change (ENRICH).

The proposal included also the provision of a logistic basis for the management of the above collaboration.

A multiple role is assigned to ENRICH: besides the obvious support to public policies, the collection, analysis and circulation of information of relevance, the strengthening of the cooperation and the training are all considered top priority tasks. In particular the collaboration between industrialized and developing countries should stimulate in the latters the endogenous capabilities - in terms of research - emphasis being put on countries in Africa in the Mediterranean Basin and in Central and Eastern Europe.

For a practical implementation of the conceptual design, ENRICH is expected to develop from the available capabilities competences and facilities of already active institutions, relying - through START (Global Change System for Analysis, Research and Training) - on specific research programmes, such as: IGBP (International Geosphere Biosphere Programme), WCRP (World Climate Research Programme), HDP (Human Dimension Programme).

An ENRICH Task Force was set-up as the outcome of meetings in 1992 of a Group of Senior Experts designated by EU member Countries. The Task Force - which was entrusted with the assessment of the structure, the rationale and the scientific agenda of the Network - met for the first time in Brussels on March 17th, 1993.

The need of a more closer coordination of the european research in Global Change and of a support to appropriate initiatives in developing countries was emphasized.

Two sub-groups - namely Scientific Aspects and Institutional Aspects respectively - were set-up, the report of the Task Force to the group of Senior Experts having been completed in June 1993 with the proposal to set-up the Network.

The proposal was endorsed by the Senior Expert Group of nominees of the EC Research Ministere in the course of its meeting in July.

Meanwhile the ENRICH concept has been also accepted by the representatives of the former EFTA countries, of the Central and Eastern European Countries, of Russia and of the START Committee of several African countries in the course of the ENRICH workshop held in Sevilla, spain, in November 1993. An ENRICH office is being set up in Brussels to initiate the implementation.

Further information can be obtained from:
Dr. Anver Ghazi
CEC-Joint Research Centre, Brussels
Tel. ++32-2-2958445 - Fax ++32-2-2950146

The European Master in Environmental Management

The first class of European Masters in environmental management was graduated in Varese on 29 October 1993.

This 3rd cycle programme is organized by the Association for Environmental Management Education (EAEME), an association of, at present, 14 universities: the Université Libre de Bruxelles, the Fondation Universitaire Luxembourgeoise (Arlon), the Ecole Polytechnique Fédérale de Lausanne, the Université de Genève, the Universität Kaiserslautern, the Universität Trier, the Universitat Politecnica de Catalunya (Barcelona), the Université de Savoie (Chaméry), the Université de Nancy II, the Imperial College of Science, Technology and Medicine (London), the National and Capodistrian University of Athens, the Politecnico di Torino, the

Università di Bologna and the Katholieke Universiteit Brabant (Tilburg) (on Environmental Research Newsletter n° 8 December 1991 and n° 10 December 1992).

Supported by the European Union, on the basis of an initiative from the European Parliament, the Programme is aimed at training university graduates (engineering, natural sciences, medicine, law, economic or social sciences) to manage environmental issues, in the private or public sector, in a European context. The 12 month programme includes common preparatory and basic modules, covering the whole range of environmental problems, followed by a specialised application module (eg. environmental management in business and in administrations, decision making support systems, waste management, etc.). A research project is then implemented in an enterprise, or a public institution.

Fifty-six participants, most with several years of professional experience, received their diplomas from Dr Umberto Colombo, Italian Minister for the university and research in the presence, inter alia, of Mr J-P. Contzen, Director General of the EC Joint Research Centre, which is backing the programme with the resources through its Environment Institute located at Ispra.

A new class has started with 83 participants at work in Arlon, Athens, Trier, and Torino. The application modules will be offered in Brussels, Lausanne, Parma and Verbania.

The announcement for the 1994-1995 academic year is out, with a registration deadline of 15 May 1994.

Those interested to know more about the programme are invited to contact the EAEME secretariat (Dr S. Galli de Paratesi, viale Ippodromo, 9 - 21100 Varese - Italy, Tel. ++39-332-282874 - Fax ++39-332-235622).

The international Saint Francis prize for the environment

Canticle of all creatures

October 23, 1993 - Basilica of Saint Francis, Assisi

The International Saint Francis Prize for the Environment - Canticle of All Creatures - is promoted by the Franciscan Centre of Environmental Studies and the General Custody of the Sacred Convent of Saint Francis in Assisi and realized with the cooperation of ENEL.

Under the High Patronage of the President of Italy
and under the patronage of:

- the Prime Minister
- the Minister of the Environment
- the Minister of Culture and Environment
- the Minister for Foreign Affairs
- the Minister of Public Education
- the Minister for University and for Scientific and Technological Research
- UNESCO
- the National Italian Commission for UNESCO
- the European Commissionner for the Environment
- the Italian Commissionner of the European Communities

The International Saint Francis Prize for the Environment - Canticle of All Creatures - is awarded to persons or institutions that have distinguished themselves at the highest international level for their contribution to the improvement, protection or conservation of the harmonious relations of human beings withing their environment.

The three sections of the Prize respect a multidisciplinary effort to overcome the conflictual character of humankind's relationship with its natural environment.

The first section of the Prize - Education and Communications - recognizes the merit of those persons of institutions that have dedicated themselves to the formation of attitudes and patterns of behaviour which respect the dynamic processes of our Planet and have offered correct and full information about human responsibility toward nature.

The price for Section I was awarded to Prof. Elisabeth Mann Borgese, born in Munich in 1918 - a pionier theorist and advocate of sustainable development of the oceans. She is one of the first to integrate economics and ecology in this vital area of the Earth's commons.

The second section - Scientific Research - rewards persons, centers of institutes of study that have contributed to a more exact and complete understanding of the misterious workings of the Planet, thus demanding our total commitment to their protection.

Prof. Ramon Margalef Lopez - born in 1919. Professor at the University of Barcelona was awarded the price for Section II in recognition of his academic career dedicated to research and teaching. His extensive field work formed the basis of a comprehensive theory of ecology, widely recognized as fundamental to the knowledge of terrestrial and aquatic ecosystems.

The third section - Realized Projects and Effective Action - singles out either personal or institutional achievement has improved the quality of human relations with nature or has impeded the destruction of life-sustaining resources.

The price for Section III was awarded to Maurice F. Strong, who for over twenty years has been providing effective, energetic, enthusiastic and, above all, inspiring leadership for the steadily growing world environmental movement. His truly remarkable achievement in designing, promoting, and eventually conducting the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in June 1992.

European School of Climatology and Natural Hazards

The European School of Climatology and Natural Hazards held its sixth course on "Desertification in a European context: physical and socio-ecnonomic aspects" in Pueblo Acantilado, Alicante, Spain from 6th to 13th October 1993.

The course, which was devoted for the first time on desertification, was organised in cooperation with the Consejo Superior de Investigaciones Científicas, C.S.I.C. and some other Spanish Institutions (Comisión Interministrial de Ciencia y Tecnología, CICYT, Diputación Provincial de Alicante, Universidad Politécnica de Valencia, UPV, Ayuntamiento de Alicante, Generalitat Valenciana).

It was addressed to graduating, graduate or post-graduate students already involved in research in the field of desertification. Thirty students from ten E.C. member states and txo students from non-E.C. member states sttended the course.

The main objective of the course was to provide an overview of the principal issues - ecological, physical, social, economic and cultural - which are collectively contributing to the increasing risk of desertification in Europe and therefore to help to focus the attention of young scientists to the multidisciplinary research effort needed to address this complex problem.

The first session of the course was devoted to a general introduction on the concept of the desertification and its evolution. The second session analyzed the physical and biological processes. The third session addressed the socio-economic processes and impacts from a complex system perspective. The fourth session gave an overview of the methods in desertification research with emphasis on field experiments, remote sensing and modelling. The fifth session was focused on the measures for preventing and mitigating desertification and the last session discussed implications of management practices in terms of policy formulation and implementation.

In addition to the above, open sessions were organised in which case studies and research project funded by DG XII and JRC were presented. These session gave also the opportunity to students to present their research work in this field and to discuss important aspects of their work with leading scientists.

The course appears as having been a succesfull one, not only from the organisational point of view but also from the very high level of presentations and discussions.

Proceedings are in press.

Further information can be obtained from:
R. Fantechi
CEC DG XII / D2, 200 Rue de la Loi, B-1049 Brussels
Tel. ++32-2-2955735 - Fax ++32-2-2963024

Medal by the Charles University of Prague

On the occasion of the International Conference "Nuclear Analytical Methods in Life Sciences", September 13-17, 1993 in Prague, Czech Republic, Dr. Enrico Sabbioni, of the JRC-Ispra, Environment Institute, was given the medal by the Charles University of Prague in recognition for his outstanding achievements in the development and applications of nuclear analytical methods in various fields of life sciences and educational activities in this field, particularly in trace metal toxicology.

Conferences

CONFERENCE REPORTS

Joint Japanese-E workshop on emission of the greenhouse gases: methane and nitrous oxide, and techniques for their reduction

Dijon, 24-28 October 1993

The main conclusions reached at the Workshop were as follows:

The research programmes of the EC and Japan, respectively, on biogenic fluxes of CH_4 and N_2O each had a different balance of activities which reflected the particular environments of the two regions. In particular, there was a greater emphasis in Japan on emissions from rice paddies, including the setting up of projects in other Asian countries, while in the EC the focus was more towards upland agricultural systems and natural ecosystems.

Notwithstanding these differences, there were several research areas where both sides had overlapping interests, and where there was much to be gained from closer cooperation. Such cooperation would be particularly valuable in the following areas:

- Intercomparison of chamber and micrometeorological methods for measurement of CH_4 fluxes both from rice paddies and from natural wetlands, and N_2O fluxes, and further development techniques such as TDL analysis in aircraft-based campaigns.
- More comprehensive CH_4 flux measurement campaigns in Siberia, to make a better assessment of the global significance of these fluxes, as part of a 3-way cooperation between Japan, the EC, and the Russian Federation, possibly including the establishment of a major research site in Siberia.
- The modelling of CH_4 fluxes at different scales.
- Studies of the effects of amendments to the diets of ruminants on CH_4 emission, with an emphasis on obtaining data of relevance to developing countries.
- Collaboration as in above to determine the scale of the CH_4 sink in large so-far uninvestigated regions such as the former USSR and China.
- Exchange of information, and possibly the sharing of research facilities, relating to the use of isotopic techniques to determine CH_4 and N_2O sources.
- Studies of the effect of intensive horticultural practices (irrigation, high N inputs), and soil and N fertiliser management practices generally, on N_2O emissions.
- Collaboration as in above to determine N_2O fluxes from agricultural systems in China (which would be a suitable location for a second major research site) and elsewhere, and from natural ecosystems in the Eurasian boreal forests and tundra.
- The management of waste water treatment systems to minimise N_2O emissions.

Regarding non-biogenic emissions of CH_4 and N_2O, the following areas of collaborative were proposed:

- The transfer of technology for CH_4 "Drainage" and utilisation from coal, prior to mining, to China, Russia and Eastern Europe.
- Work on waste separation, to minimise the CH_4 production potential of landfill.
- Work on waste separation, to minimise the CH_4 production potential of landfill.
- The reduction of N_2O emissions from combustion (particularly fluidised bed systems) and from mobile sources.

Applying Multicriteria Aid for Decision to Environmental Management

Ispra - 7/8 October 1993

MultiCriteria Aid for Decision (MCDA) is an important branch of applied mathematics and operational research. Since 1968 there has been a major development of methods, concepts and applications in many directions.

This Conference was the annual meeting of the European Working Group on MultiCriteria Aid for Decision created at EURO I (Brussels, 1975).

The two main objectives of the Group are: to contribute to the development of an original way of thinking at the European level in the field of MCDA by approaching open problems, and to allow each member to present his/her research and submit it to the critical discussion of the Group.

For the first time, specific applications of MCDA to environmental management was the focus of the 38th meeting that was held in Ispra last October organized by M. Paruccini (Institute for System Engineering and Informatics), member of the Group.

The focus of the Conference emerged from the convergence of two main requirements. They are the evolution of environmental management towards the use of multicriteria aid for decision methods, and the increase in the application of MCDA in different fields in which complex decision problems arise. In fact the current society requests from different sciences aids for decision makers in the assessment and management of these kind of problems, and they cannot be solved on the basis of one criterion of choice: that is by the optimization of just one criterion. Therefore the MCDA methods have been developed to fit with a wide domain of applications. Environmental management showed that it could be one of the most relevant of these applications.

The Conference registered a big attendance, with approximately 80 researchers from different European countries and the participation of the most important experts in the field. The 30 papers presented and submitted to the discussion during the two days cover a broad spectrum of environmental topics, such as:

- The choice of waste management system;
- Multicriteria decision for air pollution reduction in urban regions;
- Multicriteria system of reference for environmental impact assessment processes;
- Multiparametric analysis for industrial strategies oriented towards environmental protection;
- Energy planning and trade-offs between environmental and economic criteria;
- Indicators for sustainable agricultural and rural development;
- Environment and multigenerational social choices.

By focusing the 38th meeting of the European Working Group on applying MCDA to environmental management, the convergence of both the evolution of environmental management and the increase in application of MCDA has been reinforced.

The preceedings of the Conference are going to be published by Kluwer Academic Publishers.

Further information can be obtained from:
M. Paruccini, ISEI, CEC-JRC Ispra
Tel. ++39-332-789302 - Fax ++39-332-789394

Methods of Hydrological Basin Comparison

Proceedings of the Fourth Conference of the European Network of Experimental and Representative Basins
University of Oxford 29 September to 2 October 1992

This Publication includes 20 papers from western and central Europe. They cover reports from a broad range of current research on hydrologic comparisons carried out in a number of study sites across Europe and using a wide range of methodological approaches.

Each Chapter is presented in the form of a self-contained paper, with its own abstract and reference list, but may also be viewed as a component of this overall Report.

The papers are grouped under broad methodological headings for convenience only: basin studies may involve some or all of the aspects dealt with below.

General
- A review of experimental and representative basin studies
- Accuracy of hydrological measurements in instrumented catchments: a case study
- Introduction to the ERB inventory (ICARE): Inventory of Catchments for Research in Europe
- Recent technical developments in the measurement of hydrological variables

Basin comparison
- Integrated monitoring of mountainous catchments in the Tatras National Park
- Mountainous basins - the necessity of intercomparison of hydrological processes inside the basin
- Hydrological changes in the Jizera Mountains after deforestation caused by emissions
- Tools for budgeting nutrient transfers in agricultural catchments
- Paired basin studies on the Krofdorf Forest research area, Hesse/Germany
- A scale-dependent approach to the study of nutrient export from basins
- Representative catchment scale from a geochemical point of view

Model application
- Characterisation of quick and slow streamflow components by unit hydrographs for sinlge- and multi-basin studies
- Comparison of basin hydrological characteristics using only one lumped parameter: preliminary note
- Hydrological and hydrochemical comparison of snow accumulation and melting in mountainous basins
- Analysis of the hydrological role of old agricultural hillslope terraces using TOPMODEL concepts
- The influence of vegetal cover on flood hydrology - validation by both upscaling and downscaling simulations

Regional studies
- Comparisons of catchments in Bohemia with the aim to predict floods on ungauged catchments
- Spatial comparison of water quality in rivers
- Methods of catchment characterisation by means of basin parameters (assisted by GIS) - empirical report from Switzerland
- Methods for detection and explanation of trends and temporal variability of nitrogen-concentrations in small forested catchments
- The choice of cell size in digital terrain models: and objective method

Further information can be obtained from:
M. Robinson
Institute of Hydrology, Crowmarsh Gifford, Wallingford
Oxon, OX10 8BB

International Conference "Natural Risk and Civil Protection"

Belgirate, Italy, 26-29 October 1993

This Conference was jointly organised by DG XI/A-5, DG XII/D-2 and JRC/ISEI.

The following subjects were discussed: Earthquakes, Volcanoes, Storm, Floods and Landslides, Wildfires, Risk Communication, Planning, Crisis Management.

The general objectives of the Conferences were:
- to generate conductive conditions for an integrated dialogue between researchers and practitioners in different states, which draws on the state-of-the-art knowledge in natural risks and civil protection;
- to provide a multi-disciplinary forum for discussion of the most relevant needs and priorities in hazards research in the light of the needs of planning and responding authorities and to promote the continuation of such discussion;
- to explore commonalties in approaching the management of risks posed by both natural and technological hazards, set in the context of a shared culture of safety among public authorities, regulators, civil protection agencies, industry and citizens;
- to analyse organisational problems associated with emergency response, crisis management, risk communication and citizen participation and to identify affective strategy to minimise these.

Further information can be obtained from:
R. Fantechi
CEC DG XII / D, 200 Rue de la Loi, B-1049 Brussels
Tel. ++32-2-2955735 - Fax ++32-2-2963024

Symposium "Global Change: Climate Change and Climate Change Impacts, Focussing of European research"

Copenhagen 6-10 September 1993

The symposium was arranged by the Danish Centre of Atmospheric research on behalf of the Commission of the European Communities (Directorate-General for Science, Research and Develpment, Climatology and Natural Hazards Unit).

The aim of the symposium was to discuss the present knowledge of climate variability, climate change and associated impacts. The symposium was attended by about 125 leading European climate researchers.

44 scientific papers vere presented, each representing research projects involving several European research groups and supported by the EC climate research programmes, and covering topics in climate modelling, climate change impacts, past climates and physical processes in the climate system.

The main conclusion were:

Major progress has been achieved in many areas, from high resolution reconstruction of past climates, - raising new questions on the functioning of the climate system - to detailed studies of the processes in the atmosphere, the oceans, the cryosphere and the biosphere. These have helped in the formulation of better and more complete models for the prediction of climatic change, and its impacts on agriculture, forests and other sectors of socio-economic importance, in the perspective on natural variability and human induced perturbations, in particular the burning of fossils fuels and its consequences in terms of increased CO_2 levels and the associated increase of the greenhouse effect.

Further information can be obtained from:
Ib Troen, DG XII / D-2
Climatology and Natural Hazards Unit
Tel. ++32-2-2950465 - Fax ++32-2-2963024

Water pollution research report 30

Eros 2000 (European River Ocean System)

Fourth workshop on the north-west Mediterranean Sea
Plymouth (UK), 28 September - 2 October 1992

NERC - Plymouth Marine Laboratory (PML)
Plymouth, United Kingdom

Edited by J.-M. Martin and H. Barth
ISBN 2 87263 093 7 - EUR 15152 EN

The proceedings for the Fourth Workshop on the CEC project EROS 2000 (European River Ocean System) have been published as volume 30 of the Water Pollution Research Reports series. This workshop was held from 28 September to 2nd October 1992 in Plymouth, (UK). The Proceedings, edited by J-M. Martin and H. Barth, contain extended abstracts of the work of the EROS project partners on the biogeochemical processes and cycles in the Western Mediterranean Sea which was excuted in 1992. Water Pollution Research Report 30 (EUR 15152, 1993) can be received (free of charge) from:
H. Barth, CEC DG XII - D/1, 200 rue de la Loi, 1049 Brussels

Air pollution epidemiology report series

Report No. 3
EC (COST)-east Europe workshop on air pollution epidemiology

Edited by:
P. Rudnai, Department of Community Hygiene
National Institute of Hygiene, Gyali Ut. 2-6
1097 Budapest, Hungary

This workshop was intended to bring together leading air pollution epidemiologist from COST countries and the countries of Central and Eastern Europe, in order to review problems of air pollution and health in Europe, to discuss methodological issues, appropriate technologies and to explore possible areas and means of developing mutually beneficial cooperation.

The workshop was held at the Bela Johan National Institute of Hygiene in Budapest, 23-25 May 1991. Participation was by invitation only; a list of participants is included in this Proceedings.

Further information can be obtained from:
A.I. Sors, CEC DG XII, 200 rue de la Loi, 1049 Brussels

Conferences Announcement

International geographical union regional conference

Environment and quality of life in central Europe: problems of transition
Prague, Czech Republic, 22-26 August 1994

The International Geographic Union Conference "Environment and Quality of Life in Central Europe: Problems of Transition" is organized under the auspices of Václav Havel, President of the Czech Republic, and with expected participation of about 2000 scholars from all continents (organizers seek to stimulate participation from Central and Eastern Europe) will rank among Prague's major events in 1994. The Conference is addressed not only to geographers' community; as it seeks to cover a broad spectrum of issues with double focus on environment and problems of transition in the Central European region, its character will be rather interdisciplinary. Apart from the four Plenary Sessions which will introduce main Conference topics as well as Prague and the former Czechoslovakia, the programme is divided into six main streams: (A) The Emerging "New Central Europe", (B) Environment and Landscape, (C) The GIS, Cartographic Systems and Remote Sensing, (D) The Domain of Physical Geography, (E) The Domain of Human and Economic Geography, and (F) Geographic and Environmental Education. The programme will be complemented by workshops, poster sessions or round table discussions, excursions and a variety of social events. In addition, large areas will be available for both commercial and non-commercial exhibitions.

Further information can be obtained from:
IGU RC 1994, Albertov 6, 128 43 PRAHA 2, CZECH REPUBLIC
Tel. ++42-2-24912060 or ++42-2-296025
Fax ++42-2-24915817 or ++42-2-296025

Aquatech 1994

RAI Amsterdam The Netherlands
September 26-29 1994

Organized by:

- International Association on Water Quality (IAWQ)
- European Water Pollution Control Association (EWPCA)
- Netherlands Association for Waste Water Treatment and Water Quality Management (NVA)

The conference aims at promoting the concept of integrated water resources management. Special attention will be given to trans-boundary issues and international cooperation. The conference focuses on freshwater systems: rivers, lakes, reservoirs, wetlands, aquifers, etc.

Since integrated water resources management has great consequences for water management authorities, industry, agriculture, nature conservation and recreation, the participation of representatives from all of these groups is called. Engineers, natural and social scientists, policy and decision makers as well as politicians are welcome.

The conference will be held during the exhibition AQUATECH 1994 from 26-29 September 1994 in the RAI Conference Centre in Amsterdam.

Further information can be obtained from:
Conference Secretariat
Buerweg 51, 1861 CH Bergen (NH), The Netherlands
Tel. ++31-2208-99062 - Fax ++31-2208-99040

International Symposium on the Analysis of Geological and Environmental Materials

Charlotte Mason Conference Centre
Ambleside, England, UK
18th - 22nd September 1994

Geoanalysis 94 will be an International Symposium covering all aspects of the analysis of geological and environmental samples, and follows the first highly successful symposium in this series, held in Huntsville, Canada in June 1990. Geoanalysis 94 is designed to attract international participation from scientists in Universities, Research Institutes, Commercial and Industrial Laboratories interested in any aspect of developments in analytical geochemistry. The scope of the symposium includes advances in bulk and microprobe analytical techniques (whether elemental or isotopic, for solids or fluids), reference materials and data quality. It is planned that sessions will be organised to cover the applications of geoanalysis in both geochemical research and environmental assessment. In addition, contributions will be particularly welcome on the themes of: field sampling and measurement, quality control and laboratory accreditation, reference materials for microanalysis, developments in techniques for isotopic analysis and geoanalytical techniques used in environmental applications.

Further information can be obtained from:
Mr. D.L. Miles, Analytical Geochemistry Group, British Geological Survey, Kingsley Dunham Centre, Nottingham, NG12 5GG, UK

6th International Symposium Scientific Bases for the Preparation of Heterogeneous Catalysts

Louvain-la-Neuve (Belgium), September 5-9, 1994

It has become a tradition that every four years, the Université Catholique de Louvain and the Katholieke Universiteit Leuven jointly organize a symposium devoted to the scientific bases for the preparation of heterogeneous catalysts. These meetings bring together researchers from academia and industry and offer a forum for discussions on the chemistry involved in the preparation of industrial heterogeneous catalysts.

In the time that has elapsed since the last symposium in this series, catalyst types and manufacturing techniques have evolved significantly. The general concern for environmental protection and abatement of pollution that has marked this decade has led to the introduction of new types of catalysts, with new shapes, the manufacturing of which involves more environmentally friendly synthesis operations.

Further information can be obtained from:
Dr. G. Poncelet, Unité de Catalyse et Chimie des Matériaux Divisés, Place Croix du Sud, 2 boîte 17, 1348 Louvain-la-Neuve (Belgium)
Tel. ++32-0-10-473596 - Fax ++32-0-10-472005 or 473649

EROS 2000 (European River Ocean System)

Functioning of the Western Mediterranean Sea
Present and Future: A European Symposium
Palma de Mallorca, 7-9 April 1994

The understanding of the biogeochemical cycles and their alteration by human intervention in the coastal zone becomes more and more crucial for the preservation of an ecosystem of critical value for the sustainability and the global biosphere.

The knowledge of the functioning of the coastal environment and its interaction with the ocean will lead to the evaluation (or prediction) of its reaction to the global and local environmental and climatic changes (due to human activities). The basic rationale of the EROS 2000 project is to carry out interdiciplinary investigations in estuarine/coastal sea systems, representing the contrasting environmental characteristics of European coastal waters so as to address such problems.

The Rhône river delta, the Gulf of Lions and later on the Western Mediterranean Sea were the targets of interest of EROS 2000.

After 6 years of successful interdisciplinary research on the Western Mediterranean Sea the integrated scientific results and major achievements of the "EROS 2000" project-network (composed of 27 institutions from almost all EC member states) will be presented during a European symposium to the interested regional, national and international scientific communities, policy makers and environmental managers. This will also include the opportunity to compare the EROS project results with those of other groups working in the same area.

The symposium will be co-organised by the Environmental Technologies and the MAST programme of DG XII/D, which both supported the "EROS 2000" project.

Further information can be obtained from:
Dr. H. Barth, CEC
DG XII/D1, 200 rue de la Loi, 1049 Brussels

International Scientific Colloquium on the Impact of Emissions from Aircraft and Spacecraft upon the Atmosphere

Köln, Germany, April 18-20, 1994

The Colloquium provides a forum to present assessments and research results on the effects of emissions from global air traffic and space transportation on the atmosphere, including tropospheric and stratospheric ozone, particle and cloud formation, and climatic and environmental aspects.

Scientific contributions will be presented both orally and by poster. Paper selection will be based upon review of abstracts by an international scientific advisory committee.

Further information can be obtained from:
Gescäftsstelle "Schadstoffe in der Luftfahrt", DLR, MD-UP,
D-51147 Köln, Germany
Fax 02203-601-2105.

6th International Workshop on Quantitative Structure-Activity Relationships (QSAR) in Environmental Sciences

Belgirate, I, September 13-17, 1994

The sixth Workshop on QSAR in Environmental Sciences will be organized by the European Chemicals Bureau of the Joint Research Centre of the Commission of the European Communities.

This Workshop will continue in the tradition of previous events held in Burlington, Canada (1983, 1986), Knoxville, USA (1988) Veldhoven, NL (1990) and Duluth, USA (1992).

QSAR represents an interdisciplinary approach, integrating chemistry and biology. The scope of the forthcoming workshop is to provide a forum for the exchange of information and discussion among scientists working on innovative and theoretical developments as well as on applications in risk assessment, especially in relation with EC regulations.

The workshop will provide a platform for oral and poster presentations as well as a discussion forum on selected topics. The abstract booklet will be distributed at the congress site and the proceedings will be published as special issues of the Journal "SAR and QSAR in Environmental Research" (Gordon and Breach Scientific Publications) after a suitable review process.

Further information can be obtained from:
W. Karcher, Environment Institute
JRC Ispra, T.P. 641, I-21020 Ispra (VA)
Tel. ++39-332-789983 - Fax ++39-332-789963

A. Cardani - A. Chiesa, Environment Institute
JRC Ispra, T.P. 641, I-21020 Ispra (VA)
Tel. ++39-332-785570

1st International Congress on Environmental Medicine

Duisburg, Germany, February 23-26, 1993

The Society for Hygiene and Environmental Medicine in collaboration with the Medical Institute of Environmental Hygiene at the University of Düsseldorf has been planning the 1st International Congress on Environmental Medicine which will be held in February 1994 at Duisburg. This congress will give comprehensive information about different topics of environmental medicine. It gives the possibility of interdisciplinary exchange of theoretical as well as practical experience in the field of environmental medicine. The international comparison of data as well as threshold values will play a special role.

Further information can be obtained from:
Dr. Katharina Beyen
Medical Institute of Environmental Hygiene
Auf'm Hennekamp, 50, 40225 Düsseldorf, Germany
Tel. ++49-211-3389231 - Fax ++49-211-3389358

Speciation of elements in toxicology and biological sciences

Loen, Norway, June 15-18, 1994

The Symposium is organized by:

The Institute of Environment and Health University of Toronto and McMaster University, Canada and the National Institute of Occupational Health, Oslo, Norway

The Symposium will focus on recent speciation research related to the chemical, physical and morphological state of elements as they appear in various compartments in environmental and biological systems. The aims of the symposium are: to provide a forum at which recent progress in analytical methodology of element speciation can be discussed and to provide an opportunity for an interchange of ideas between analytical chemists and scientists investigating fundamental aspects of environmental and human toxicology, nutrition, or metal-containing drugs.

It is hoped that the participants will also attend the 5th Nordic Symposium on Trace Elements in Health and Disease which takes place at the same venue immediately after the symposium (June 19-21, 1994). The two symposia are intended to complement each other.

Further information can be obtained from:
Yngvar Thomassen, National Institute of Occupational Health
P.O. Box 8149 DEP, 0033 Oslo 1, Norway

The 5th Nordic Symposium on Trace Elements in Human Health and disease

Loen, Norway, June 19-21, 1994

The Symposium is organized by the Nordic Trace Element Society

The Symposium will focus on recent research related to trace elements and their relevance in human physiology and toxicology. The programme will emphasize cross-disciplinary issues and promote participant interactions. The conference is intended both for scientists in academia with expertise in toxicology, clinical and analytical chemistry, pathology, metabolic disorders, occupational and environmental health and nutrition, as well as environmental and health professionals.

It is hoped that the participants will also attend the 2nd international symposium on Speciation of Elements in Toxicology and in Environmental and Biological Sciences which takes place at the same venue, June 15-18, 1994. The two symposia are intended to complement each other.

Further information can be obtained from:
Yngvar Thomassen, National Institute of Occupational Health,
P.O. Box 8149 DEP, 0033 Oslo 1, Norway

Publications

New Books

Dimethylsulphide

Oceans, Atmosphere and Climate
G. Restelli and G. Angeletti, Editors

Kluwer Academic Publishers P.O. Box 17
3300AA Dordrecht, The Nederlands

Proceedings of the International Symposium held in Belgirate, Italy, on October 13-15 1992, organized by the Commission of the European Communities, Directorate General for Science, Research and Development - Environment Programme Brussels and the Environment Institute of the Joint Research Centre, Ispra (Italy); Cosponsored by the Danish Centre for Atmospheric Research.

Clean Production Strategies - Developing Preventive Environmental Management in the Industrial Economy

Tim Jackson Editor Stockholm Environment Institute

Lewis Publishers 121 South Main Street P.O. Box Drawer 519

Chelsea Michigan 48118

The content is subdivided into three parts and an epilogue, i.e.:

Part I

The Scientific and the Economic Context, including the following chapters:

- The "Biophysical" Economy (T. Jackson, R. Costanza, M. Overcash and W. Raes)
- Environmental Quality Objectives (M. chadwick and J. Nilsson)
- The Precautionary Principle (V. Dethlefsen, T. Jackson and P. Taylor)
- Uncertainty and Environmental Learning (B. Wynne)
- Costs of the Toxic Legacy (K. Davis and G. Hyfantis)
- Hazardous Futures (T. Jackson)

Part II

The Preventive Strategy with the following 8 chapters:

- Towards Prevention (J. Hischorn, T. Jackson and L. Baas)
- Principles of Clean Production (T. Jackson)
- Industrial Metabolism (R.U. Ayres)
- Profiting from Pollution Prevention (M. Dorfman, A. White, M. Becker and T. Jackson)
- Product Lifecycle Assessment (N. de Oude)
- Material Concerns (K. Geiser)
- Risk Reduction and Chemicals Control (B. Wahlström and B. Lundqvist)
- Optimal Utilization and Durability (W.R. Stahel and T. Jackson)

Part III

Developing a Policy Framework, composed of 3 chapters:

- Policy Options for Clean Production (H. Yakowitz and R. Hanmer)
- Economic Policy and Environmental Assurance (C. Perring, R. Costanza, T. Jackson and W. Rees)
- Liability for the Environment (P. Simmons and J. Cowell)

Epiloque

- Values Quality and Sustainable Development (E. Manzini)

Ecological Effects of Afforestation

Studies in the history and ecology of afforestation in Western Europe

Edited by Charles Watkins, Department of Geography, University of Notthingam, UK

March 1993 - ISBN 0 85198 818 0

Forestry and the environment: economic perspectives

Edited by W.L. Adamowicz, Department of Rural Economy, University of Alberta, W. White, Forestry Canada and W. Philips, University of Alberta, Canada

May 1993 - ISBN 085198 827 827 X

Environmental Management

Environmental Management is a three volume series with the aim of presenting the reader with a comprehensive overview of environmental management

Volume I:
The Compartmental Approach
Editors: B. Nath, L. Hens, P. Compton, D. Devuyst

Volume II:
The Ecosystems Approach
Editors: B. Nath, L. Hens, P. Compton, D. Devuyst

Volume III:
Instruments for Implementation
Editors: B. Nath, L. Hens, D. Devuyst

The "Guide on European Safety and Environmental Regulations" keeps a close eye on international regulations on safety at work and the environment. It contains all the relevant information from the different General Directorates of the European Commission, the OECD, the ILO, the Council of Europe and the UN even before it's published: the draft texts, comprehensively; opinions, comment and amendments from all international official advisory bodies; the final approved guidelines, programmes and recommendations.

Further information can be obtained from:
Kluwer Editorial Excelsiorlaan 18
1930 Zaventem (Brussels) Belgium
Tel. ++32-2-7191511 - Fax ++32-2-7191519

The environment and the planning system: business implications

The report provides an overview of the whole field of planning in relation to the environment and the environmental constraints in land development. It is a concise and clearly written guide which enables the manager, unfamiliar with the issues, to chart a programme for business expansion.

Peter Bulleid, Barton Willmore partnership reading limited

May 1993 - ISBN 0 946655 79 0

Business and environmental accountability: and overview and guide to the literature

This report will be of interest to chief executives, managing directors, financial directors, accountants and managers who need to be aware of current developments in environmental accountability.

Lesley Grayson, B.Sc. (Econ), A.L.A., and Helen Woolston B.Sc., P.E.Dip.Lib., A.L.A., with Joseph Tanega, B.A., M.Phil, J.D.

July 1993 - ISBN 0 946655 82 0

The eco-management and audit scheme: a practical implementation guide

This report addresses both of these questions. It provides a detailed account of the Eco-Management and Audit Scheme and its implications for business. The contents of the Scheme are clearly and concisely outlined, using diagrams, tables and question and answer setions. This approach ensures that busy managers find the report easy to read.

Ruth Hillary, M.Sc. (Imperial College)

July 1993 - ISBN 0 946655 81 2

Correction

Annual energy review 1992

Special issue of energy in Europe - April 1993

Subscribers will have recently received the Annual Review which for the second year covers the entire world. Unfortunately an error crept into the table on page 25, the World Summary Energy Balance.

The figures concerned are the main indicators namely World Population Consumption/GDP, Primary Consuption/Capita, Electricity Generated/Capita, which comprise the final section of the table.

Further information can be obtained from:
Energy in Europe, DG XVII
Commission of the European Communities
200 rue de la Loi, B-1049 Brussels, Belgium,
ISBN 92 826 5325 0

The environment in Europe: a global perspective

Report no. 481505001, May 1992

This report is written on request of the GLOBE-Europe organization by, and responsibility of RIVM, the Netherlands National Institute of Public Health and Environmental Protection
ISBN 90 6960 031 5

Commission of the European Communities

DG XII, Environment Research Programme

Ecosystem research report no. 2

The NITRIX project (Nitrogen saturation experiments)

Dise, N.B., Wright, R.F. (editors)
Norwegian Institute for Water Research
Box 69 Korsvoll
0808 Oslo, Norway
ISBN 2 87263 077 5 - EUR 14319 EN

Ecosystem research report no. 3

Regulation of Organic Matter and Nutrient Turnover in the Soil Compartment of European Forests

Edited by M. Raubuch GSF
Institut für Bodenökologie
8042 Neuherberg - Germany
ISBN 2 87263 086 4 - EUR 14680 EN

Further information can be obtained from:
P. Mathy, CEC-DG XII/D-1
200, Rue de la Loi, B-1049 Brussels

Environmental UV Radiation
Environment Programme

Cause - Effects - Consequences

Edited by J. Acevedo, C. Nolan, DG XII/D-1

Further information can be obtained from:
H. Ott, DG XII/D-1, 200, rue de la Loi, B-1049 Brussels Belgium
Fax ++32-2-2963024 - ISBN 2 87263 105 4

Chemistry in the atmosphere

A strategy for european research into global environmental issues

Prepared by the CEC Science Panel on Atmospheric Chemistry and the Task Force on Stratospheric Ozone, in consultation with the wider European scientific communities. Brussels, September 1993

The Global environment problems currently causing most concern are climate change and depletion of the ozone layer. Atmospheric chemistry is central to these problems, as well as to regional problems such as acid deposition and urban pollution. This document discusses the uncertainties in our understanding of:

- stratopheric ozone depletion over Europe;
- the current oxidising capacity of the atmosphere and how this capacity might change;
- natural and man-made aerosols and their effects on global climate;
- the importance of natural emissions.

Further information can be obtained from:
G. Angeletti
CEC DG XII/D-1, SDME 3/55, 200, rue de la Loi, B-1049 Brussels

European cultural heritage newsletter

A new version of the European Cultural Heritage Newsletter is being prepared for December 1993.

The volume 7 - Number 1 will be a 1993 Special Issue which will cover particulary the research activities falling under the period 1986-1990, 1989-1992 (STEP Programme) and 1991-1994 (ENVIRONMENT Programme).

The mailing list for the Newsletter contains, at present, more than 2,000 addresses of research centres, universities, international organisation (i.e. museums, libraries, training centres for restorers) as well as public and private enterprises. These are mainly European but North and South American addresses are also included.

Further information can be obtained from:
M. Acevedo
CEC DG XII-DI, 200, rue de la Loi, 1049 Brussels
Tel. ++32-2-2952043

Comparative studies on salt marsh processes

Laboratoire d'evolution des systemes naturels et modifies Université de Rennes I Museum National d'histoire naturelle - France (J.C. Lefeuvre)

In this volume are presented the main results of the contract EV4V-0172-F (EDB). This contract was the opportunity to establish a good cooperation among the teams of the four countries (the Netherlands, England, France, Portugal) involved in this research. For the first time a same methodology has been developed simultaneously in four salt marshes of the European coast from North to South, to understand the role of Salt marshes and their influence on marine coastal water systems. The main research results are presented by each team.

New method, (stable isotopes, molecular marker) are used to confirm the reality of the exchanges between salt marshes and coastal marine water and particularly to understand the transformation and the integration of the organic matter produced by salt marshes in teh floodweb of the marine ecosystems.

The result of this research were presented at the INTECOL VI International Wetlands Conference Columbus, Ohio, USA, September 1992 in a Symposium organized by J.C. Lefeuvre and R. Dame to compare results obtain on the salt marshes role along the West European coast and the East USA Coast.

Note from the Editor

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

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