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Editor Dr. G. Rossi
Assistant Editor Dr. G. Realini with the collaboration of Dr. M. Borlé-Talpaert (presently Ministry of Environment, Rome)

Environment Institute
Joint Research Centre
I-21020 ISPRA (VA), ITALY
Tel.: ++39-332-789981
Fax: ++39-332-785631
Correspondent from DG XII EU Brussels:
Mrs. J. Acevedo

Editorial

"Water is best" *

Water is central to life on earth and to all human activities but although water covers 75% of the planet only 3% of the total volume is "fresh water" with less than a quarter of this free to circulate through the atmosphere and land masses. An adequate supply of wholesome water was a major factor in bringing about the great improvements in public health which have occurred over the last 150 years but growing water demand from increased public and domestic use, agriculture and industry has put enormous pressure on this non-sustainable resource.

Community environmental research deals with questions related to water through many diverse actions which can be summarized under the following themes: climate and the hydrological cycle, climate change impacts and water, ecosystem dynamics and wetlands environmental quality and monitoring, technologies for protecting and rehabilitating the environment, risks from agriculture and socio-economic concerns.

The proposal for the specific "Environment and Climate" programme in the 4th Framework Programme consolidates water research within a broad European context. While it maintains the degree of continuity needed to develop the RTD capacity established in previous programmes in the above areas, it reinforces the contribution of the European Union to global change research. This will allow the expansion of research on water related issues with a view to understanding and modelling processes related to environmental changes at European scale within a global perspective.

Community action focuses on issues where the development of European research networks, joint use of infrastructures, coordination and integration of national research capabilities are likely to be most effective and will highlight Europe's contribution to global research. This is particularly true in research fields such as the hydrological cycle, land use climate interactions and desertification.

The proposal for the specific programme will go a long way to achieving this objective by providing a full assessment of surface and groundwater resources and developing strategies for their management.

In this perspective an important group of research tasks have been identified:

- Assessment of the response of water resources to change, climate variability and more intensive exploitation; probable resource trends;
- Development of methods to estimate, forecast and improve the availability of water resources following environmental change, especially in regions where there is likely to be a gap between availability and demand;
- Development of techniques to re-establish and improve underground water reserves;
- Assessment of the impact of a variation in sea level on water supplies in coastal regions and in relation to other factors;
- Assessment and validation of techniques and methods of integrated management;
- Development of techniques to re-establish the quality of surface and underground water which has been affected by pollution caused by agricultural practices or unsuitable land use.

The sustainability of water resources has become a crucial problem not only in the Mediterranean region, where there is evidence that a secular decline in rainfall is occurring, but also in regions where water was previously regarded as an almost inexhaustible resource. Currently Community legislation on water is being reappraised and substantial progress in research is needed to provide the scientific basis for the Union's environment policy. The overall research objective is to develop a strategic capacity for integrated water resource management, thus providing a sound basis for sustainable development to which the EU is committed in the Treaty on European Union.

Paul Gray
Director, DG XII-Environment

* Inscription on a Victorian monument outside the Roman baths in Bath, UK

4th R&TD Framework Programme

On March 21st, 1994, the conciliation procedure between the European Council and Parliament - according to the codecision principle established by the Maastricht Treaty - was concluded successfully.

The procedure was concerning the Fourth R&TD Framework Programme of the European Union (1994-98).

In respect to the guidelines established by the European Commission on April 21st, 1993 (see Environmental Research Newsletter n° 11, June 1993) allocating 13,100 MECU to the programme, the Council common position foresaw 12,000 MECU - a further 1 MECU being possibly allocated in 1996 - for both the Fourth R&TD Framework Programme and the European Atomic Energy Community (EAEC) Programme.

The new breakdown of the financial resources is as it follows (in brackets are given the previous figures of the European Council common position)*:

Breakdown of Funding for the Fourth R&TD Framework Programme 1994-98

Areas of activity	MECU	
1 Research, Technological Development and Demonstration Programmes	9,432	(10,536)
2 Cooperation with Third Countries and International Organisations	540	(420)
3 Dissemination and Valorisation of Research Results	330	(300)
4 Stimulation of Training and Mobility of Researchers	744	(744)
Total	**11,046**	**12,000**

Taking into account 1,254 MECU agreed for EAEC Programme, the overall budget for the two programmes is now 12,300 MECU with additional 700 MECU to be allocated in 1996 through the above codecision procedure. A proposal for an adjustment of the global budget for the Framework Programme will be put forward by the Commission as the consequence of the adhesion of new countries (Austria, Sweden, Finland, Norway) to the European Union.

As far as it concerns the 1st area of activity the share of funds for the topics included in it is as it follows:

	MECU
– Information and Communication Technologies	3,406
– Industrial Technologies	21,995
– Environment	1,080
– Life Science and Technologies	1,572
– Non-Nuclear Energy	1,002
– Transport	240
– Targeted Socio-economic Research	138
TOTAL	**9,432****

* Council common position of December 22nd,1993.

** of which 600 MECU for the operational budget of the JRC.

By the same conciliation procedure the budget for the operation of the Joint Research Centre (JRC) was agreed at 900 MECU, 600 out of them for activities under the Fourth Framework Programme (as compared to 575 and 619 MECU foreseen by the Council and requested by the Parliament, respectively).

The agreed level of funding has been considered appropriate to guarantee the operation of the JRC.

In putting forward the proposals on specific programs within the approved Framework Programme the Commission has to set apart the activities and pertinent budget for the JRC so as to constitute a further proposal to be presented at the same time as the other proposals on the specific programs.

A new and relevant feature of the decision concerning the JRC consists in the approach whereby the JRC would progressively enter the competitive arena mostly in networks formed with national laboratories - in specific programs of the Framework Programmes as well as for suitable activities providing scientific and technical support to the Community policies. For the purpose, a gradual transition and an adaptation of existing rules and procedures is foreseen during the period 1995-98.

As far as it concerns the first area of activity the outline of the specific programme can be summarized as it follows:

Information and Communication Technologies

This topic includes three main items, i.e.

- ***Telematics.*** Telematics services in the public interest (administrations, health care, transport); Telematics for knowledge (researchers, libraries, education and distance teaching); Telematics for employment and the improvement of living conditions (socially disavantaged people, urban and rural areas, protection of the environment).
- ***Communication Technologies.*** Interactive numeric multimedia services; Optical technologies; Implementation of high speed networks; Personal communications mobility and networks; Intelligent networks and engineering; Quality and Security of telecommunications systems and services.
- ***Information Technologies.*** Software technologies; Technologies for IT components and subsystems; Multimedia technologies.

Industrial Technologies

This area encompasses Industrial and Materials Technologies, and Measurement and Testing.

- ***Industrial and Materials Technologies.*** Production technologies for the industry of the future, with special reference to "clean" technologies; Technologies for product innovation; Technologies for transport (tools for transport industry to improve transport efficiency preserving the environment).
- ***Measurement and testing.*** Measurement for quality European products; Prenormative research and technical support to commerce; Measures for the benefit of society.

Some actions will be developed in collaboration with the Joint Research Centre.

Environmental and Marine Research

Environment and Climate and Marine Science and Technology are the two research areas covered by this comprehensive theme.

- ***Environment and Climate.*** Research on the natural environment, environmental quality and global change; Environment technologies for the observation and the protection of the environment; Space technologies applied to earth observation and research in the environmental field. Social and economic features to be integrated in the Community environmental policy will also be considered.
- ***Marine Science and technologies.*** Marine Sciences (with special emphasis on areas of european concern); Strategic marine research; Marine technologies; Support initiatives.

Life Sciences and Technologies

This broad area encompasses three main topics, i.e.:

- ***Biotechnology.*** The cellular factory (towards bioprocesses); Genome analysis; Plant and animal biotechnology; cellular communication and neurosciences.
- ***Biomedicine and Health.*** Research on major illness (including cancer and AIDS); Pharmacological research; Brain research (diseases of the central nervous system); Research on the human genome. Ethical considerations will have proper focus while in-vitro experiments - whenever possible - will be preferred.
- ***Agriculture and Fisheries (including agro-industry, food technologies, sylviculture, aquaculture and rural development).*** Agriculture; Food technologies, Sylviculture, Rural development.

Energy

This theme covers both nuclear and non-nuclear energy and is subdivided into three topics, i.e.:

- ***Clean and efficient energy technologies.*** Improvement of energy conversion and use; Renewable energy research (biomass conversion, photovoltaic, active and passive solar energy, wind and geothermal energy);
- ***Nuclear Fission Safety.*** Exploitation of new concept; Reactor safety; the nuclear fuel cycle; The effects on radiations on man and the environment; Historical obligations (entailing collaborations with Central and Eastern European Countries in matter of waste management, reclamation of sites and radioprotection).
- ***Controlled Thermonuclear Fusion.*** Next Step (Next Step reactor as basic contribution to ITER); Conceptual development (research in plasma engineering and physics in support of Next Step and DEMO reactors); Longterm Technologies.

Transport

In this area focus will be placed on research related to a high-performance global trans-European network and its constitutive elements; Strategic research for a multimodal trans-European network; Network optization; Socio-economic factors and risk assessment shall be given proper consideration.

Targeted Socio-Economic Research

The activities will be addressed to: Examination of scientific and technological policy options; Research in education and training; Research on social integration and social exclusion in Europe.

Cooperation with third countries and international organisations

The action will be developed following three main lines, i.e.:

- ***Scientific and technological cooperation in Europe*** (in addition to the ongoing cooperation within COST and EUREKA the international cooperation will be reinforced by extending the PHARE and TEMPUS programmes to cover Central and Eastern European Countries as well as Newly Independent States);
- ***Cooperation with non-European industrialized countries;***
- ***Scientific and technical cooperation with developing countries.***

Dissemination and Valorisation of R&TD Results

This following topics will be covered:

- The dissemination and valorisation of research results;
- Technology dissemination in favour of enterprises;
- The financial environment of technology dissemination.

Training and Mobility

This area will essentially concern:

- Research network in view of creating European laboratories without walls. These networks should consist of at least five units working on the same topic.
- Access to large installations;
- Research training (short-to-medium period of training outside the country of origin);
  Accompanying measures (organisation of Euroconferences, courses, etc).

The Joint Research Centre

In the following more detailed information are given on the JRC Environment Programme covering the period 1995-98.

This is subdivided into:

- Institutional research, i.e. research activities undertaken by reason of the specialized competences and special facilities available at the JRC, and,
- Institutional scientific and technical support activities, i.e., actions required for implementing the policies of the European Union.

Institutional Research

It includes the research work proposed and coordinated by the JRC according to the subsidiarity principle.

The work is carried out in collaboration with national laboratories and is complementary with the corresponding indirect action.

The JRC will contribute to the promotion of environmental protection through the following three sectors:

- Natural environment, environmental quality and global change;
- Technologies for the environment;
- Applied space techniques for environmental monitoring and research.

The European Community should make a major contribution to international research into global change, in particular by participating in major initiatives undertaken by the scientific community, such as the International Geosphere/Biosphere Programme (IGBP) - the activities of the European IGAC (International Global Atmosphere Chemistry) Project Office (EIPO) will be continued at Ispra for IGBP - the World Climate Research Programme (WCRP) and the Human Dimension Programme (HDP).

In this context, the Joint Research Centre will concentrate its research on:

- the surveillance and study - particularly using remote sensing technology - of biosphere/atmosphere interactions and interactions between the processes taking place on land and in the ocean and the related parameters affecting climate change;
- physical and chemical analyses of atmospheric processes (in particular the study of sulphur in the atmosphere), including the behaviour of biogenic and anthropogenic emissions. This should include both measurements and modelling;
- the surveillance of global change by remote sensing through the development of advanced earth observation techniques. This should include research into the development of techniques for using space data obtained from satellite observation for the surveillance of the marine environment and of changes in the terrestrial ecosystem. A number of advanced techniques (including those of a statistical nature) for using the new earth observation system should also be developed.

In addition the JRC will make a significant contribution to the implementation of the Centre for Earth Observation (CEO).

The scientific community and decision-makers need accurate and consistent earth observation data spanning a long period. To meet this urgent need, the European Community should set up the Centre for Earth Observation in close cooperation with the Member States and in association with the European Space Agency. This project is designed to guarantee users continuous and log-term availability of consistent data relating to earth observation

It will set up a decentralized network of interested European bodies and thus bring users, the bodies responsible for thematic analysis and data-processing centres together in a single forum. The role of focal point of such a network should be performed by the JRC, while the programmes of shared cost action will provide support for the national components of network.

The JRC will also contribute to the ENRICH network by making its scientific research on global change available.

The JRC will continue to contribute to improving **environmental quality**, mainly through **research on air and water quality and the evaluation of the risks arising from chemical products and waste. Research into air quality inside buildings will also be continued, as will the study of pollution caused by metals in trace quantities.**

Research into innovative technologies for environmental protection will aim to:

- improve **industrial safety** and environmental management by providing industry, research bodies and the public authorities with innovative methodologies (in particular design tools) for evaluation of the safety of chemical installations;
- developing mechanisms for the control of chemical reactions which might become uncontrollable, tools for predicting the dispersion of toxic or flammable products and the consequences of combustion and explosion.

Institutional Support

It matters with the S&T support to the implementation of EC directives. The work is a follow-up of the Commission (Communication to the Council and the European Parliament) following a proposal by the DG responsible for the EC policy in the field and the JRC. The S&T support work is defined and performed in close collaboration with the DG, the JRC and the national Focal Points (or equivalents) in the Member States.

Research in this area, in which the independence and impartiality of the JRC play a very important part, will focus on certain well-structured programmes planned to run for average-to-long periods.

These concern, in particular:

- Research on air quality to be carried out by the **Central Laboratory for Air Pollution (ERLAP)**, which is intended to provide the scientific basis and scientific and technical support for the preparation and implementation of Community directives on air quality. Particular attention will be paid to the urban environment and industrial emissions. The implementation of the Community directives on radioactivity in the environment, in particular those concerning exchanges of information between the Member States under normal conditions and in the event of an accident, requires scientific and technical support which is closely associated with this research;
- The evaluation and control of chemical products which, in view of the importance of the chemical industry and the potential impact of chemical products on the environment, call in particular for an impartial, independent body. The scientific and technical tasks needed for the implementation of the Community legislation in this area will be carried out by the **European Chemicals Bureau (ECB)**, as described in the communication from the Commission to the Council and to the Parliament (O.J. N° C, p. 3 of 5.1.1993);
- The continuation, also within this framework, of the work undertaken by the **European Centre for the Validation of Alternative Methods (ECVAM)** and described in the communication from the Commission to the Council and to the Parliament (SEC(91)1794) in October 1991. The aim of ECVAM is to coordinate the validation and acceptance of "alternative" methods which may reduce or abolish laboratory experiments on animals. To this end, discussions between government, companies scientists, consumers and animal protection associations are being conducted successfully thanks to the impartiality of the JRC;
- Community regulations require the development of methods of analysis to be applied to consumer goods and chemical products and the harmonization of the existing national methods in the context of the internal market in these products. The need of safeguard the transparency of the market in medicinal products and the exchange of data with the national authorities and the European Agency for the Evaluation of Medicinal Products (Council Regulation (EEC) of 23 September 1993) have led the Commission to call on the JRC to provide integrated information and communication services utilizing the impartial, independent role it plays in the European network on Community pharmaceutical products (ECPHIN).
- Council Regulation (EEC) 1210/90 of 7 March 1990 provides for the support of the JRC for the European Environment Agency (EEA) as a priority for the following areas:
  - the harmonization of environmental measurement methods;
  - the intercalibration of instruments;
  - the standardization of data formats;
  - the development of new environmental measurement methods and instruments;

  In addition, other tasks may be assigned to the JRC, in view of its experience, regarding air and water quality, waste management and land-based pollution as well as broad support for information technologies. Major hazards, biotechnological risks, the safety and quality control of consumer products, environmental impact studies as well as safety at work, for wich the JRC provides a support activity for the implementation of the relevant Community Directives.

EC Research Programme and Support Activities to the Commission

Air Quality Research at the Environment Institute of the JRC

Atmospheric Sulphur, Aerosols & Climate

Scope of the project is to contribute to the understanding of global aerosols and their impact on global climate. The present day total radiative forcing by anthropogenic aerosols is estimated to be between -0.5 and -4 W/m^2. The large uncertainty on these estimate prevents to make accurate predictions of future climate change.

Aerosols have an effect on the global radiation balance by direct scattering/absorption of radiation (cooling/warming) and by cloud modification and enhanced reflection of light (cooling).

The project focuses on the emissions and transformation into aerosols of dimethyl sulphide (DMS) from natural biogenic activity in oceans and of sulphur dioxide from industrial activities. Realising that other aerosol species might be equally important, it also started research on carbonaceous aerosols (soot) from industrial activities and biomass burning.

Use is made of the variety of expertises existing at the Ispra site, to foster a programme in which the activities effectively support one another. The programme thus combines numerical modelling, laboratory experiments and field observations. The individual activities are part of European projects funded by the DG-XII, Environment Programme or EUREKA-EUROTRAC, or go in collaboration with national research programmes (GLOMAC, LACTOZ, LABVOC, SINDICATE, POLARSTERN).

Because of its broad range of activities (related to a focused problem) the programme has proven to be useful as a platform for exchanging information between individual European projects. An example has been the symposium 'DMS: oceans, atmosphere & climate' (October 1992), which eventually led to initiating and coordinating the preparation of an international aerosol experiment (ACE-2, see below) within the framework of IGBP's International Global Atmospheric Chemistry project (IGAC). The collaboration with WMO's Global Atmosphere Watch in archiving global aerosol data (World Data Centre on Aerosols, Ispra) can also be regarded as a platform of data/expertise exchange.

Research on this theme requires an intimate collaboration between theoretical modelling, laboratory research and field experiments. The key-results of the most recent research (1992-1993) are briefly outlined below:

Process modelling & global transport modelling

- A chemical reaction mechanism for the oxidation of DMS initiated by OH radicals has been developed and made subject to an uncertainty and sensitivity analysis. This allowed to identify some of the key inadequacies in the present understanding of this chemistry. Current results indicate that the direct pathway DMS to H_2SO_4, sometimes invoked to explain field observations, is not likely to be a major one.
- Aerosol dynamics modelling has pointed at entrainment of free tropospheric aerosol into the marine boundary layer, as a mechanism that might explain the levels and constancy of the marine aerosol. The model results are consistent with the data obtained during the '92 Hudson cruise.
- An efficient aerosol dynamics module for sulphate aerosols has been implemented in the 3-D global transport model MOGUNTIA. So far the sulphate particle number concentrations calculated are generally lower than those observed, indicating a too large removal of particles by precipitation in the free troposphere.
- A global emission inventory has been constructed for black carbon leading to the result that 5.4 Tg C per year comes from biomass burning and 5 Tg C per year from fossil fuel use. These emissions have been transported in MOGUNTIA yielding global fields of black carbon mass.
- Using MOGUNTIA, it was calculated that 20 to 50% of the sulphate aerosol mass in the N-Atlantic sub-tropics and the Arctic can be explained by anthropogenic sulphate emitted in Europe. These areas are climatologically sensitive areas, because of the stratus cloud decks that easily can be modified by aerosol pollution

Laboratory studies on gas-particle interactions

- Significant progress has been achieved in the study of the night-time degradation of DMS by NO_3 and the formation of a relatively stable peroxy-nitrate intermediate. First evidence has been obtained that the latter intermediate has the structure $CH_3S(O_2)OONO_2$. This result is relevant to the characterisation of the overall mechanism of the tropospheric degradation of DMS and to the partitioning of the oxidised sulphur products.
- A new reactor for the study of gas-to-particle conversion and gas-particle interactions has been completed and tested for laminarity. Initial test have shown that aerosols from photochemical oxidation of SO_2 could be generated in a reproducible way.

Field observations on global emissions and aerosols

- Analysis of the data from the '92 Hudson cruise has been finalised. A clear impact of anthropogenic emissions on the number of CCN over the North Atlantic has been observed, and a sublinear correlation between sulphate and CCN has been quantified.
- The **ACE-2** field experiment has been planned. Following approval of the competent EC and IGBP authorities, the lay out of the experiment has been decided. ACE-2 will be the second in a series of Aerosol Characterisation Experiments planned within IGBP's International Global Atmospheric Chemistry project (IGAC). It aims at determining the chemical and physical processes which control those properties of the atmospheric aerosol relevant to radiative forcing and climate. Whereas ACE-1 will study the aerosol in the unpolluted remote marine boundary layer, ACE-2 will focus on the anthropogenic perturbation of the same marine aerosol.

An intensive field study will be carried out in a restricted area in the N-E Atlantic for studying aerosol characteristics and their controlling processes. A one year of observations (ground based and satellites) will also be carried out, in order to put the results of the intensive campaign in the context of the larger North Atlantic region, and allow the observation/assessment of regional climate forcing.

The intensive campaign is planned for summer 1997, in an area between the Azores (P) and the Canaries (E).

Dimethylsulfide (DMS) in Freshwater Lakes: a Field Study

So far, DMS has mainly been studied in marine environments, because the larger surface areas of these ecosystems makes them obviously the most important source of atmospheric DMS. Other sources of DMS to the atmosphere, like land vegetation or freshwater ecosystems have only recently received attention.

DMS flux estimates for these habitats are scarce up to now. Additionally, such minor contributors to the natural sulfur flux in the atmosphere may present a good site for the investigation of some phenomena which are difficult to access in marine ecosystems. A field study of Lake Maggiore, Lake Monate and Lake Varese was initiated to identify and quantify DMS in freshwater samples. The objectives of this study are to obtain water-to-atmosphere flux esti-

mates for DMS during a full seasonal cycle and to identify sources of this compound in the lake waters.

Measurements of DMS in oligotrophic and mesotrophic lakes showed concentrations similar to those of oligotrophic marine water, thus at the lower end of the concentration range in marine environments. The eutrophic Lago di Varese showed increased concentrations of DMS and other volatile sulphur compounds.

Further information can be obtained from:

J. Hjorth, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (VA)
Tel. ++39-332-789076 - Fax ++39-332-785837

F. Raes, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (VA)
Tel. ++ 39-332-789300 - Fax ++ 39-332-789453

Monitoring of Atmospheric Pollutants

Total ozone column and UV-B flux

The Brewer ozone spectrophotometer, on loan from the Italian Ministry of the Environment in the frame of an agreement with the University "La Sapienza" of Rome, has been operated continuously, participating to the 1993-1994 SESAME (Second European Stratospheric Arctic and Mid-latitude Experiment) campaign.

The 1992-93 preparatory exercise that completed its main measurement phase at the end of March 1993 has confirmed the anomalously low ozone column values already measured in the 1991-1992 period. The 1993 ozone values in the winter months and particularly in February and March were lower than those measured in 1992 and remained lower for a quite long period, reaching the 1992 level only in August. In fact, the mean values of the total ozone column measured at Ispra from the 1st of January up to the end of June are respectively 343.3 Dobson Units (D.U.) for 1992 and 328.1 D.U. for 1993 giving a 1993/1992 ratio of 0.96. This means an average decrease of the ozone cover, in the first six months of 1993, of about 4% with respect to the situation of 1992. The data for August 1992 and 1993 are instead identical (300.7 D.U. and 300.1 D.U. respectively) indicating full recovery of the normal ozone levels.

A qualitative confirmation of the anomalous trend of ozone in 1993 could be derived from analysis of the UV-B irradiation data recorded by the Brewer instrument. Unfortunately a simple relation between ozone column abundance and UV-B cannot be established due to the strong dependence of the UV-B field on clouds and atmospheric aerosols. In order to reduce this influence, the UV-B data have been ratioed to the total irradiation values measured by a pyranometer at the meteorological service of Ispra. The pyranometer detects solar radiation in the range 305-2800 nm so that its sensitivity to ozone is negligible while its response, like for the Brewer instrument, is affected by the presence of clouds and aerosols. Due to the different wavelength range encompassed by the two instruments, the influence of atmospheric parameters on the radiation detected is not the same and this normalisation procedure can be considered only as a rough approximation to the undistorted UV-B radiation. Using the normalised data, the ratio between the 1993 and 1992 UV-B values averaged over the first six months of each year, results equal to 1.08. This value even if only indicative, shows an excess of UV-B for the first half of 1993 compared to the same period of 1992, supporting the evidence of the deficit of ozone in the corresponding months of 1993.

Further information can be obtained from:

F. Cappellani, Environment Institute
CEC-JRC Ispra, I-21020, Ispra (VA)
Tel. ++39-332-789228 - Fax ++39-332-785837

Atmosphere-Biosphere Interactions: The BEMA project

Research on atmosphere-biosphere interactions at the Environment Institute mostly focussed on biogenic emissions from Mediterranean ecosystems and their role in atmospheric chemistry and ozone formation. To this aim, a European project, BEMA, has been developed on **B**iogenic **E**missions in the **M**editerranean **A**rea. BEMA has the primary goal of quantifying emission rates and vertical fluxes of reactive trace gases from various vegetation types typical for that region. In-field measurements, laboratory work, and modeling activities are used to relate biogenic emissions to their resulting concentrations in air and their respective role in the tropospheric ozone formation. BEMA's experimental activities, in fact its core efforts, are focussing on a series of measuring campaigns on selected test sites representative for the Mediterranean vegetation cover and fulfilling areal and infrastructural requirements for both ecophysiological, chemical and micrometeorological measurements. The EC shared cost action Environment programme (DG XII/D-1) has agreed to partially fund the project (1994-95) as it deals with a topic of major concern within the programme.

A preliminary BEMA measuring campaign of two weeks was organized by JRC at the Castelporziano/Rome test site in June 1993, with active contribution of 12 European laboratories, in order to tune the future BEMA field measuring campaigns. Moreover, less intensive measurements have been performed at the site to characterize the seasonal variability of climate, physiology, emission rates and concentrations, and to map the distribution of the major vegetation types.

The objectives of the main campaign were identified by the BEMA Operational Plan Group as follows:

- estimation of the rates and patterns of VOC emissions from selected plant species and determination of compounds related to vegetation in ambient air;
- intercomparison of cuvette systems and of sampling and analysis methods for selected organic compounds;
- VOC flux estimates from two specific ecosystems, the pine/oak forest and the pseudosteppe, including the comparison of cuvette-, micrometeorological- and tracer methods, and
- atmospheric chemical measurements (NO_x, O_3, marine aerosols) at and around Castelporziano for the characterization of its air quality, during and after the measuring exercise.

Two major test ecosystems were selected for continuous measurements during the campaign: a 30 years old plantation of domestic pine (*Pinus pinea*) and holm oak (*Quercus ilex*), with representative shrub understorey (*Erica, Rubus, Cytisus, Pistacia, Phyllirea, Myrtus*), and a seminatural Mediterranean greenland, the socalled "pseudosteppe" area for research on low-vegetation species (*Asphodelus, Calamintha, Pteridium, Cistus*).

Results have been discussed at a BEMA workshop at Ispra on Feb. 21-23, 1994 and a summary report will be available by mid 1994. By showing at least qualitative tendencies the results obtained from the preliminary campaign in June 93 give first in-sights, what to expect from and where to focus on in coming major field campaigns:

The micrometeorological measurements indicate that homogenity and fetch conditions at both test areas - the pseudosteppe and the pine/oak forest - generally allow the use of gradient and covariance approaches for flux calculations. The use of different sampling and analysis techniques for VOCs does not appear to be a major problem, although some intercomparison activity is still needed to ensure comparability of the methods used.

Quercus ilex, Pinus pinea, and several shrub species show high emission rates of monoterpenes. Other shrubs and herbs (*Pteridium, Myrtus, Erica*) are strong emitters of isoprene. Generally, it seems that biogenic emissions are two-three times higher than in temperate ecosystems. Up to 5 fold variability of average daytime monoterpene emission rates from oak (5-20 [μg/g(LDW)hour])and pine (1-5 [μg/g(LDW)hour])can be attributed to natural variability between branches, trees, days, and seasons. Some of the deviation may be effected by the different cuvette types used and by different sampling/analysis methods. In case of pine, even the qualitative emission spectrum of an individual tree differs largely in different seasons.

Instead of emitting isoprene as most other oak species do, the evergreen, sclerophyllous Mediterranean oak is emitting large amounts of monoterpenes, despite of having no monoterpenes accumulated in leaves or bark. The typical daily and seasonal drought stress of plants growing in Mediterranean climate gave the chance to demonstrate a physiological control of monoterpene emissions: the diurnal monoterpene emission course showed a midday depression in parallel to transpiration and photosynthesis, and in contrast to the temperature and light exposure of the plants. Experiments performed in the Ispra greenhouse lab as well as during the campaign have confirmed that emissions are controlled by

physiological activity rather than by temperature. This extremely important feature needs further investigation, because inventories of monoterpene emissions at regional to global scales are always calculated by assuming monofactorial temperature control.

Despite of high emission rates, the ambient air concentrations of terpenes and of isoprene are surprisingly low (0.5-1.5 $\mu g/m^3$) during the daytime and very low at night. This phenomenon may be caused by effective dilution of the compounds due to the permanent land/sea breeze circulation showing strong diurnal cycles with winds from S-SW during day and N-NE at night. In addition, the emitted compounds may have disappeared due to effective chemical transformation in the conditions of high temperature and radiation during the campaign. Enhanced photochemistry is indicated by well-expressed daily patterns of ozone with minima close to zero at night, followed by a sudden increase with sunrise, and maximum peaks of 50-100 ppb in the afternoon. Both nitrogen oxides, NO and NO_2 were strongly anticorrelated to O_3.

Due to low in air concentrations of the emitted compunds, clear chemical gradients above the canopy of the test ecosystems have been observed only in a few situations. Thus, flux calculation was successful when covariance methods could be applied as in case of water, CO_2 and ozone, but was not possible for most of the emitted compounds due to the lack of clear gradients.

Castelporziano seems to be well suited to study the mechanisms and amounts of biogenic emissions, their fate in a polluted atmosphere and their potential contribution to ozone formation: biogenic emission from representative and undisturbed vegetation is high and is confronted with episodic pollution as caused by land/sea breeze transport and/or local influences during the traffic rush hours. Episodic pollution is "ideal" to separate parameters and then investigate interaction mechanisms. Therefore, it was decided by the participating laboratories at the first BEMA-workshop held at Ispra to realize the main field campaign in May 1994 again at Castelporziano.

Further information can be obtained from:

B. Versino, Environment Institute
CEC-JRC Ispra, I-21020, Ispra (VA)
Tel. ++39-332-789958 - Fax ++39-332-785704

JRC-Ispra Support Activities

Central Laboratory of Air Pollution at the Environment Institute

Harmonisation Programmes for Current Directives

SO_2 Directive: measurement of suspended particulate matter (SPM)

In the framework of Directive 80/779/EEC and in view of the standardization of SPM measurements in the EC air quality networks, the Commission (DGXI/B/3) has entrusted the European Committee for Standardization (Technical Committee 264, Working Group 2) to develop a reference procedure to test the equivalence of PM10 sampling heads with the reference measurement method of the Commission (WRAC or Wide Range Aerosol Classifier). PM10 is the fraction of SPM with a size lower than 101 μm, corresponding to the fine particles that reach the thorax when inhalated.

This reference procedure has been drafted by the CEN and will be tested in field conditions during four measuring campaigns held at different locations characterised by different aerosol size distributions and wind forces (heavy industrial area and low winds, industrial area and strong winds, urban area, background area). The site of Ispra has been selected as background site. During these campaigns, the PM10 fraction measured with the WRAC will be compared with those obtained with candidate PM10 sampling heads. Six different PM10 sampling heads will be submitted to the test procedure. This campaign is scheduled to take place in April 94.

NO_2 Directive: Quality Assurance Programme

The Central Laboratory has been equipped with a calibration facility specially designed for the organisation of intercomparison and intercalibration exercises. The calibration unit is a computerized dynamic diluter allowing for the generation of complex gas mixtures (up to 8 components + ozone and water vapour) with 12 sampling ports.

In the framework of the harmonisation programme of Directive 85/205/EEC on air pollution by NO_2, two intercomparison exercises were organised with the scope to control the NO_2 calibration procedures implemented in the EC air quality monitoring networks. A first exercise took place in May 1992 at the Landesanstalt für Immissionsschutz (Essen - Germany). The second exercise was organised in April 1993 at the new calibration facility of the Central Laboratory. The exercises were addressed to laboratories responsible for Quality Assurance/Control in the national air quality monitoring networks. A total of 20 laboratories from the 12 European Member States took part in the exercise. Gas mixtures of NO and NO_2 with concentrations ranging from 5 to 500 $\mu g/m^3$ were generated and supplied to the participants for measurement. Different calibration techniques were implemented by the participating laboratories: permeation method (reference calibration method of the EC directive), static volumetric dilution, dynamic volumetric dilution, Griess-Saltzman wet chemical method, gas phase titration and pressurised standard gas cylinders. The effect of interferents, such as the water vapour content of the gas sample, on the response of the analysers was also investigated by supplying standard mixtures with water vapour contents increasing from 0 to 100%.

When compared with the standard values, the measurements obtained by the different laboratories and with different calibration procedures showed a good agreement. About 80% of the participants were within a tolerance limit of ±10% from the standard values. For NO_2 concentrations above 350 $\mu g/m^3$, the Griess-Saltzman method generally showed a lower response (5 to 8%) when compared to the other methods. It was also noticed that all the chemiluminescence analysers involved in the exercise showed a negative interference with the water vapour content of the gas sample. For an increase in relative humidity from 0 to 100%, a typical decrease in sensitivity of 10% was measured.

O_3 Directive: VOC measurement techniques

With the coming directive 93/72/EEC on air pollution by ozone, the Commission has made an important step towards the control of photochemical air pollution. This directive will require the monitoring of the ozone concentration levels, but also recommends to measure ozone precursors such as nitrogen dioxide and VOCs, in selected stations of the air quality monitoring networks. In view of the harmonisation of VOC measurements, the Central Laboratory had organised in 91/92 a first intercomparison of VOC measurements. The intercomparison has shown that the current performances of gas chromatographic techniques are still poor and must be improved to meet the requirements of a reference method for the determination of VOCs..

A second intercomparison has been organised in December 93 - January 94. About 20 laboratories routinely dealing with air quality measurements are participating to the exercise. The participation was also extended to laboratories from the EFTA Countries. The exercise was performed with the support of the National Physical Laboratory in the UK which provided the hydrocarbon mixtures.

The intercomparison consisted in the measurement of both a gravimetric standard mixture and an authentic urban air sample. The gravimetric mixture contained 26 individual hydrocarbons (C_2 to C_9), with concentrations ranging from 5 to 80 ppb by volume. The hydrocarbons in the gravimetric mixture largely comprised the compounds relevant for the formation of photo-oxidants that have

been put forward by the working group "VOC Measurement Techniques" of the CEC. The gas mixtures were contained in passivated aluminium cylinders of 7 litre capacity at a pressure of 7 bar, and were distributed by road and air courier to the participating laboratories. The results will be available for evaluation in early 94.

Application and development of VOC diffusive samplers

The monitoring of VOCs in the air quality networks generally requires expensive and sophisticated measurement techniques. Diffusive samplers offer a cheap and easy to implement alternative to these techniques. The diffusive sampling method for VOCs is comparable to the NO_2 method already implemented by the Central Laboratory for network design studies. The VOC diffusive sampler consists of a stainless steel tube, one end containing a chromatographic absorbent fixing the pollutants. The pollutants are collected by molecular diffusion along the tube to the absorbent. After exposure of the samplers over a period of two weeks, the tubes are returned to the laboratory for analysis. The hydrocarbons are thermally desorbed and determined by gas chromatography.

The diffusive samplers have been tested and validated in laboratory conditions. In a first phase, the study was limited to the compounds benzene, toluene and xylenes (BTX). An exposure chamber allowing to simulate ambient conditions has been constructed. It was possible to determine the uptake rates of the samplers and to test the effects of ambient parameters such as wind velocity and the changing concentrations of pollutants. The first results of the laboratory validation are promising and a first field validation campaign is planned for early 94 (see Brussels campaign).

Case study: Brussels air pollution campaign

In the framework of a convention between the Commission (DGXI/B/3) and the Ministere de la Region Bruxelloise, an air pollution monitoring campaign was organised in the Brussels area with the scope

- to assess the impact of emissions by traffic on the urban air quality;
- to demonstrate the use of new air quality monitoring techniques in urban areas;
- to sensibilize the population to the air quality problems in large cities.

A first summer campaign took place from June to September 93 and was followed by a winter campaign from December 93 to February 94. The participation of the Central Laboratory involved two different aspects.

The exposure of the population to NO_2 was determined by measuring the distribution of the pollutant over the agglomeration. 200 passive samplers were installed over the Brussels area and exposed over successive two-weekly periods. The NO_2 passive sampler consists in a plastic tube, one end containing a specific absorbent fixing the pollutant gas. The pollutant is collected by molecular diffusion to the absorbent, where it is retained for subsequent measurement in the laboratory. In the case of nitrogen dioxide, NO_2 is collected on stainless steel grid coated with triethanolamine and is determined spectrophotometrically by a variation of the Griess-Saltzman method. The summer campaign allowed to localise critical areas where the population is exposed to the highest risks and where air quality should be monitored with priority. During the winter campaign the NO_2 survey has also been extended to BTX measurements by the diffusive sampling method, with 80 samplers distributed over the agglomeration.

Complementary to the passive sampling study, an extensive measuring campaign took place in June 93 and in February 94 in a Brussels street (rue de la Loi) with the scope:

- to gain knowledge of the concentration levels of conventional and nonconventional noxious substances at a representative site of the city;
- to validate and demonstrate new monitoring techniques such as DOAS open path measurements, automatic GC and BTX analysers in field conditions;
- to estimate the pollution dispersion and possible chemical reaction inside a canyon-like street.

Two mobile laboratories equipped with specific air pollution monitors and two DOAS systems took part in the study. The mobile units were located one in front of the Berlaymont building and the other in the rue de la Loi. The mobile units performed measurements of sulphur dioxide, nitrogen oxides, ozone, suspended particulates, carbon monoxyde, benzene, toluene, xylene and organic acids. Two DOAS instruments (SANOA and OPSIS) were utilized to measure various pollutants at two different heights in the street. The measured pollutants involved sulphur dioxide, nitrogen dioxide, ozone, suspended particulates, formaldehyde, nitrous acid, the nitrate radical, benzene, toluene, and p-xylene.

Further information can be obtained from:

M. Payrissat, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789118 - Fax ++39-332-785236

E. De Saeger, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-785841 - Fax ++39-332-785236

S. Sandroni, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789203 - Fax ++39-332-785236

Ozone and photo-oxidants in the alpine and pre-alpine regions

High mean ozone levels, together with intense photochemical episodes affect the mountainous regions. The Alps, a "gleen lung" for Europe, encompassing France, Italy, Switzerland, Germany and Austria, suffer from frequent and intense episodes not only downwind of emission sources, but also in isolated woody valleys. The complexity of ozone distribution is related to some facts, namely (1) its natural level increase with altitude, being in the free troposphere about twice as high as at the surface, (2) the distribution of urban and industrial areas as of traffic ways in the regions surrounding the alpine chain, (3) the prevailing relief winds in the warm season, lifting pollutant-rich air masses from the plains to the mountain tops and (4) the physical processes of air masses exchange among stratosphere, free troposphere and surface layer. Future CEC-directives on ozone and photo-oxidants should take into account the particular situation of these regions in the assessment of threshold and limit values. Re-evaluation, whenever possible validation and interpretation of the existing measurements will be a first step. To this end the EI reference laboratory of air pollution and its facilities will play a central role.

Since 1987 measurements of ozone, some precursors and meteorological parameters gathered at 17 stations (including Ispra) sited at different altitudes have been collected and compared in terms of seasonal and daily fluctuations. A result is the unexpected high-level observed at intermediate altitude: on mountain slopes up to about 1800 m the monthly mean level can be 10-20 ppbv higher than in the free troposphere, a fact related to the particular air circulation regime.

After some informal meetings, held by initiative of the JRC-Ispra, in which common motivations and objectives have been identified, a working group with representatives of the alpine regions of Austria, Germany, Italy, Switzerland and Slovenia has been set-up. In future the participation of french representatives is expected. The regional database of ozone data for 1991 is in preparation, while a first intercomparison of ozone measurements and calibration techniques at Ispra has been planned for May 1994 at Ispra. The EI will take care of the coordination in the preparatory phase of a project.

Further information can be obtained from:

S. Sandroni, Environment Institute
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789203 - Fax ++39-332-785236

EC Legislative Action

Air Quality: The Photochemical Pollution

The EC Directive 92/72 concerning the air pollution by the ozone came into force on March 21st, 1994. For the first time a procedure for warning and informing the population is established at the european level. The first expert meeting has been held in Brussels on February 9th; in addition to the coordination of the activities connected with the abatement of the photochemical pollution, the meeting has allowed to identify first work themes shared among Member States and the European Commission, i.e.,: efficacy of the different information media (newspaper, television, teletext); criteria for the localisation of the measuring stations; metrology; etc..

One has to distinguish tropospheric ozone, of concern here, from the ozone layer, this latter being dealt with by another Unit of the DG XI/B.

Tropospheric ozone is a so called photochemical pollutant produced - under sun irradiation - through chemical reactions involving nitrogen oxides (NO_X) and volatile organic compounds (VOCs).

Both NO_X and VOCs - ozone precursors - are deriving, for the most part, from car exhausts, boilers, gasoline and industrial solvent vapours.

The European Commission having tackled the SO_2 pollution - a favourite topic for the media in the eighties, known as the "acid rain", and sharply decreased due to the implementation of EC directives aimed at reducing the sulphur content in fuels - is today highly concerned with the photochemical pollution, i.e. a steadly increasing pollution (due to the increase of transport) which is harmful to human health (respiratory diseases), to animals and to vegeation.

Further information can be obtained from:

M. Lamblin
EC DG XIB3, rue de la Loi, 200
Tel. ++32-2-2968748 - Fax ++32-2-2969554

Industrial Risk

EC Research Programme and Support Activities to the Commission

Major Industrial Hazards

The EC has now supported the shared cost research in Major Industrial Hazards for 6 years. There is now both a substantial body of results and ongoing work. In order to promote the dissemination of this work a series of meetings has been planned and a bibliography of published papers established. The bibliography entitled "A list of refereed papers within the EC's Major Industrial Hazards Research", by S.T. Cole and P.J. Wicks is available at the address given below.

The meetings consist of seminars on specific topics or contributions to major conferences. The list below indicates how to obtain proceedings of meetings already held and the plans for future meetings. Except for lambda-mu which in a full conference attendance to these meetings is free and open to interested visitors.

Seminar Topics, Contributions to Major Conferences

Seminar on Major Technological Hazards,
Frankfurt, 17/19 December 1991*

Model Evaluation, Brussels, March 1992*

Industrial Fires I, Apeldoorn (NL), 11/12 March, 1993

Problem Clouds II, Amsterdam, 15/16 April 1993**

Operational Safety, Lyon (F), 14/15 October 1993**

Industrial Fires II, Cadarache (F), April 1994

Lambda-mu, La Baule (F), May 30-June 4, 1994

Industrial Fires III, Hamburg (D), April 1995

A list of referred papers published within the EC research programme on Major Industrial Hazard has been prepared by DG XII/D.

It includes papers in referred journals or presented in international conferences and symposia as well as doctoral theses and final reports of projects.

The list concerns projects included in the first two phases of the programme, i.e.:

MTH for projects starting in 86/87;
STEP for projects starting in 89/91;

MTH AA: Two Phase Releases of Toxic and Flammable Substances
MTH BA: Research on Continuous and Instantaneous Heavy Gas Clouds
MTH DB: Investigation of Flame Propagation
MTH FG: Physical Modelling of Torch Fires
MTH HH: European Benchmark Study
MTH LD: Disinformation in Industrial Disasters
STEP 83: System Response Generator
STEP 85: An Overall Knowledge-based Methodology for Hazard Identification (TOMHID)
STEP 91: Flashing Flow Through and Out of a Breach or Pressurized Vessel Containing a Liquified Gas
STEP 92: FIRE and Associated Toxic Gas Release Modelling, Involving in Particular Chlorinated Solvents (mistral)
STEP 96: Major Hazards Arising from Fires in Warehouses and Chemical Stores
STEP 98: Hazard Consequences of Jet Fire Interactions with Vessels Containing Pressurized Liquids (JIVE)
STEP 104: Management at Risk
STEP 109: Combustion of Chemical Substances and the Impact in the Environment of Fire Products
STEP 111: Modelling and Experimental Research into Gas Explosions (MERGE)
STEP 116: Modelling of Two-phase Release Dispersion for Hazard Assessment
STEP 122: The Evaluation of Technical Models Used for Major Accident Hazards Installations
STEP 125: Research on the Dispersion of Two-phase Flashing Releases (FLADIS)

Further information can be obtained from:

S. Cole
EC DG XII/D, rue de la Loi, 200, B-1049 Brussels
Tel. ++32-2-2950347 - Fax ++32-2-2963024

* Proceedings available from S.T. Cole, CEC, DG XII D-1, SDME 3/49, 200 Rue de la Loi, 1049 Brussels, Fax: +32-2-296.30.24

** Proceedings to be published in Journal of Loss Prevention in the Process Industries

Industrial Hazard Research at the Institute for Safety Engineering & Informatics of the JRC Ispra

Environmental Impact Assessment

The Environmental Impact Assessment (EIA) activity has been performed into three main areas: transformation function and uncertainty analysis of environmental indicators, environmental quality of a city and informatic tools for EIA

Transformation function indicator/index and uncertainty analysis

To facilitate the interpretation of its meaning, an environmental indicator is frequently transformed into an environmental (simple) index by an adimensional and normalised function usually ranging from 0 to 1 and defined subjectively. The fact that the transformation function is not defined analytically causes significant problems:

- in the calculation of an aggregate index (combination of two or more simple indices),
- in the uncertainty analysis, both at the level of a simple index and at the level of an aggregate index. In fact, the uncertainty analysis of aggregate indices is never performed.

Analytical functions are suggested to approximate subjectively defined indicator/index transformation functions. In particular, a double exponential function is proposed to approximate the transformation function used for the Biological Oxygen Demand Indicator in the Chemical Index (a major index of water quality assessment). The use of convenient analytical transformation functions allows a strength calculation of an aggregate index and makes uncertainty analysis feasible.

A study on the environmental quality of a city

Some main aspects of the environmental quality of a city have been investigated. First, the notion of environmental indicator as a stochastic process and the choice of the shape and dimension of the cells of a thematic map are argued. Then, the use of collected and estimated environmental data are considered. Environmental features of a city (Bolzano, Northern Italy) are discussed on the basis of the maps of 55 descriptive and synthesis indicators of the city. The territory includes an urban area, an industrial area, cultivated fields in the valley and woods in the mountains. Three zones having very individual characteristics have been identified: the historical centre, a new residential zone in the eastern part of the periphery of the city and an industrial zone, not very far from the city. One squared kilometre has been considered as a reference area of each zone, and each reference area includes 16 squared cells having a side of 250 metres. The analysis made concern "residential population", "urban green" and "atmospheric pollution". As expected, the residential population density is high in the new residential area (about the double that in the historical centre) and very small in the industrial area. The paper also discusses the degree of homogeneity of the population density in the three areas. Urban green is mainly due to private gardens both in the historical and residential areas. Public green is lacking in all the three areas. The industrial area, urban green is mainly formed by trees and hedges. To investigate atmospheric pollution, the following indicators have been suggested: a traffic indicator, the power of the large thermal installations supplied by gas oil, the population served by gas oil heating and the population served by methane gas heating.

INES-EIA

INES-EIA is the informatic tool which is being designed and implemented to support Environmental Impact Assessment of technological plants. Two main decisions have been taken.

- The system will be implemented on a Personal Computer (PC, IBM compatible). Nowadays, PCs have reached a relevant level of performance that enables one to run sophisticated expert system shells, geographic information systems, computer aided design and hypertext systems without difficulties. In fact, the performance of high-end PCs and proper workstations are now close and the choice between the two classes is often made mostly on price and market considerations rather than on technical arguments. The price is favourable to high-end PCs and so is the diffusion in the market in the UE.
- An incinerator for toxic and dangerous wastes has been taken as a reference installation for the implementation of the prototype of the system. This choice is due both to the fact that the construction of incinerators for toxic and dangerous wastes is a problem of great topical interest and the importance of the technical questions connected with this type of installations. The preparation of reference documents on relevant indicators and indices of the main environmental factors has started. The aim is to collect the information to be implemented in the knowledge modules of the system. The report on flora, fauna and vegetation indicators and the report on water quality indicators have been completed.

Finally, a paper on the implementation of the EIA directive, based on the report from the Commission of the implementation of directive 85/337/EEC (COM(93) 28 final), has been produced.

Further information can be obtained from:

A.G. Colombo, ISEI
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789406 - Fax ++39-332-789007

The NAIADE Method: a Multicriteria Model with Fuzzy Information

This method is the result of a research line, developed at the Technology Assessment Sector of the ISEI, mainly concerned with the issue of fuzzy information in multicriteria evaluation methods for environmental management problems. The rise in world population and the rapid growth of the economic activity have caused environmental stress in all economic systems ranging from global to local levels. The awareness of current and potential conflicts between economic progress in production, consumption, and technology and the environment has led to the concept of "sustainable development".

Given the complexity inherent in the concept of sustainable development, any method trying to operationalize this notion in a planning context, can be considered a kind of "second best". This is the main reason why the less ambitious concept of "environmental management" was preferred in this work. Since here the assumption is accepted that efficiency, equity and sustainability are the three conflictual values of the problem, a mathematical procedure able to deal with these issues in an operational framework is developed, with a particular view on imprecise information in a practical environmental planning context.

Cost-Benefit Analysis (CBA) and MultiCriteria Decision Aid (MCDA) can be considered as competitive methods only if all environmental consequences of decisions can be correctly transformed in monetary values. Often multicriteria evaluation is the only possible approach. However, this doesn't imply that conventional monetary evaluation tools are to be discarded. CBA remains useful as one of the possible inputs to decision making, as long as policy makers bear its limitations in mind, given that in any case societyplaces some weight on the goal of efficiency.

It is clear that in policy-relevant economic-environmental evaluation models, socio-economic and nature conservation objectives are to be considered simultaneously. Consequently, multicriteria methods are in evaluation issues. Given the assumption of a second best world, multicriteria evaluation may be considered an appropriate tool to operationalize efficiency and sustainability criteria as it allows to tackle families of conflictual socio-economic and environmental criteria simultaneously. Traditional qualitative multicriteria approaches take into consideration the case where information on an ordinal scale is present. A problem, related to all multicriteria methods that try to take mixed information into account is the problem of equivalence of the procedures used in standardising the various evaluations of the performance of alternatives according to different criteria. Another problem related to the available information concerns the uncertainty (stochastic and/or fuzzy) contained in this information. Fuzzy uncertainty does not concern the occurrence of an event but the event itself, in the sense that it cannot be described unambiguously. This situation is very common in human systems. Spatial environmental systems in particular, are complex systems characterised by subjectivity, incompleteness and imprecision (e.g., ecological processes are quite uncertain and little is known about their sensitivity to stress factors such as various types of pollution).Therefore, the combination of different levels of measurement with different types of uncertainty has to be considered as an important research issue in multicriteria evaluation.

Our overview of multicriteria evaluation methods in a fuzzy environment, shows that traditional fuzzy multicriteria methods are utility based models; most of these methods are limited to the use of only fuzzy information (often only triangular fuzzy numbers) and a key issue is how to compare fuzzy sets. Thus a new approach based on a semantic distance using areas instead of traditional intersections is presented. This new semantic distance overcomes different weak points of traditional comparison methods.

The NAIADE method

In this framework a new multicriteria method, based on some aspects of the partial comparability axiom, called NAIADE (Novel Approach to Imprecise Assessment and Decision Environments) is developed. It is a discrete multicriteria method whose impact (or evaluation) matrix may include either crisp, stochastic or fuzzy measurements of the performance of an altemative with respect to a judgement criterion, thus it is very flexible for real-world applications. From an empirical point of view, this model is particularly suitable for economic-ecological modelling incorporating various degrees of precision of the variables taken into consideration. From a methodological point of view, two main issues are then faced:

- The problem of equivalence of the procedures used in order to standardise the various evaluations (of a mixed type) of the performance of altematives according to different criteria;
- The problem of comparison of fuzzy numbers typical of all fuzzy multicriteria methods.

The NAIADE method presents different theoretical properties which are not shared by traditional multicriteria methods in a fuzzy environment. Since in environmental and resource management and policy aiming at an ecologically sustainable development many conflicting issues and interests emerge, particular attention has to be given to the problem of different values and goals of different groups in society. Equity and conflicting values in multicriteria decision aid are traditionally introduced in two different ways:

- by weighting the different criteria, but often in public decision making a single pointvalue solution (e.g. weights) tends to lead to deadlocks in a decision process because it imposes too rigid conditions to reach a compromise;
- by taking into consideration a set of ethical evaluation criteria. A weak point of this approach is that it could lead to an excessive number of evaluation criteria. Furthermore, to identify ethical criteria may be not an easy task.

A third possibility is proposed i.e. the use of conflict analysis procedures to be integrated with multicriteria evaluation in order to allow policymakers to seek for "defensible" decisions that could reduce the degree of conflict (in order to reach a certain degree of consensus) or that could have a higher degree of equity on different income groups. The planning balance sheet method aims at providing a broader framework for the assessment of gains and losses of a plan by constructing detailed socio-economic accounts of all project effects and by taking into account different groups in society which are affected in their well-being by the plan. A weak point of this method is that it is primarily meant to present in a systematic way a description of all the distributive impacts, but no elaboration with normative purposes is generally made. As a possible way to overcome this drawback of the planning balance sheet method we propose a fuzzy conflict resolution procedure. Starting with a matrix showing the impacts of different courses of action on each different interest/income group, a fuzzy clustering procedure indicating the groups whose interests are closer in comparison with the other ones is used. Therefore, a compromise solution taking into account all the three conflictual values of economics (efficiency, equity and sustainability) can be eventually identified.

The water management case study

The empirical relevance of the developed mathematical procedures is tested by means of a real-world environmental management problem (in the area of the Delta of the Po river in Italy). From an ecological point of view, one of the most important areas in the whole Po river basin is the Delta region; in this region it has been decided to establish a natural park. The Mesola wood is a part of exceptional environmental value of the Po Delta natural park. In this wood, a sharp conflict between environmental and economic aspects seems to exist. Moreover, different interest/income groups are present. From this case study the following main conclusions can be drawn:

- multicriteria evaluation can help in finding a compromise solution between conflictual ecological and economic objectives;
- the use of fuzzy sets can be a very useful tool in modelling environmental management problems characterised by deep uncertainties and approximate evaluations;
- the mathematical procedures developed in this study, can be an efficient tool to deal with efficiency aspects, equity aspects and economy-environment interactions of an environmental problem.

Further information can be obtained from:

M. Paruccini, ISEI
CEC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789302 - Fax ++39-332-789394

Support to the Community Environmental Policy

Major accident hazards connected with the industrial activities involving dangerous chemicals (implementation of Directive: 82/501 and its revisions)

The activities in supporting the implementation of the so-called Seveso Directive have been reinforced to cover not only the documentation centre and the accident reporting system, but also the organisation of working groups created to enhance harmonisation of national practices.

The Community Documentation Centre on Industrial Risk (CDCIR) has been regularly operated by continuing the collection of documents on safety regulations, codes of good practice, accidents investigations etc.; editing the Bulletin N. 8 (Masera & Rasmussen, 1993) which describes the new entries; and diffusing information to authorities, industry and research organisations.

At the same time the CDCIR publication series has been enriched by five new volumes on investigations of causes and management of major accidents:

- Vol. 13. Lessons Learnt from Emergencies after Accidents in France Involving Dangerous Substances (EUR 15059 EN,1993)
- Vol. 14. Major Accident Reporting System. Lessons Learned from Accidents Notified. Updated 2nd Issue (EUR 15060 EN, 1993) published as a book by Elsevier
- Vol. 15. Lessons Learnt from Emergencies after Accidents in Ireland Involving Dangerous Substances (EUR 15565 EN,1994)
- Vol. 16. Lessons Learnt from Emergencies after Accidents in Denmark Involving Dangerous Substances (EUR 15562 EN, 1994)
- Vol. 17 Lessons Learnt from Emergencies after Accidents in The Netherlands Involving Dangerous Substances (EUR 15563 EN, 1994)

(The studies on emergencies have been extended to cover all remaining EU countries. Their results should be published during 1994).

Transfer of information collected on the new data base has started. This will allow distribution of the bulletins on a user friendly electronic support.

The Major Accident Reporting System (MARS) has continued to operate by recording, analysing and diffusing information on accidents notified (a total of 170 accidents have been inserted in MARS by end 1993). The lessons learnt for a preventive policy have been subject of regular reporting to the Committee of Competent Authorities, and subject of open publications. Further information on the activity is given in the following, when reporting on the working group on accidents.

To harmonise different aspects of the implementation of the Directive, DGXI has activated technical working groups (TWGs). Such groups are supported by ISEI as far as both the organisation of the meetings and the finalization of the expected results are concerned. As such groups are constituted both by representatives of authorities and control organisations, and by representatives of industrial parties (CEFIC, CONCAWE, EP FORUM, AEGPL, EPSC), ISEI is becoming a focal point for elaborating guidance notes of interest of both authorities and industry. The objectives and the results of the TWGs can be summarised as follows:

- *TWG1 - Accident Reporting.* After three meetings in Ispra, this working group for which ISEI has strongly cooperated with the Rapporteur from the French Ministry of the Environment, has already finalised its mandate. Indeed the group succeeded to elaborate the MARS new collection forms and reporting procedures. In the future the accident reporting will take place in two phases: in a first phase a short notification form has to be supplied after the occurrence of an accident; in a second phase, when the investigation on the accident has been completed, a very comprehensive collection form has to be filled up. This procedure has been already implemented, and the old notifications are being transferred into the newly developed MARS data base. Furthermore a new gravity scale has been adopted for a trial period of two years, as the experience with the previous scale was not satisfactory. Both the short reporting form and the gravity scale are being used as a basis of further international cooperation (OECD, ECE).
- *TWG2 - Inspection Systems.* Also this working group (to which ISEI has given a marginal contribution only) has practically concluded its mandate, i.e. to produce a guidance note for inspecting the plants with respects to major accident hazards.
- *TWG3- Safety Report.* The safety report is the central item within the control process implemented by the Directive. The mandate for TWG3 is the elaboration of guidance notes for the production and the assessment of the safety report. Two meetings have been organised at Ispra in July and in the December '93, with substancial participation of the industry, very sensitive to the need of harmonisation of practices and "costs". The meetings allowed comparison of the actual national practices and guidelines, and the establishment of an intensive working programme.
- *TWG4 - Safety Management Systems (SMSs).* The need for the adoption of formal safety management systems was demonstrate by the analysis of the accidents notified in MARS. The working group started establishing the state of art by reviewing a study contract being performed by TNO on behalf of DGXI, and by contributing to the programme of the seminar on SMSs which was organised by ISEI on October 6-8,1993, hosted by the European University Centre for the Safeguard of the Cultural Heritage in Ravello (Italy). The seminar had a strong support and participation from industrial representatives. Three main subject were discussed: Key Elements of SMSs with Respects to the Directive; Practical Experience with SMSs, and Performance Measurements. The pre-print of the proceedings (eds. Cacciabue & Gerbaulet) are already available. This state of the art reviews will constitute the bases for the next step, i.e. starting elaboration of guidance note on SMSs.

Further cooperation has been given to the works for the implementation of the Directive in the field of information of the public by finalising "General Guidelines for Content of Information to the Public" and by other support studies, as well as for the fundamental revision of the Directive, in particular in the field of environmental impact of accidents, by sponsoring studies for the identification of industrial installations presenting major hazards for surface and ground waters, and, for modelling the effects of corresponding accidents.

Further information can be obtained from:
A. Amendola, ISEI
EC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789208 - Fax ++39-332-789007

Support Activities in the Field of Biotechnology

Support to the Commission with respect to the regulation on the contained use of genetically modified micro-organisms (Directive 90/219/EEC) and of the deliberate release into the environment of genetically engineered organisms (Directive 90/220/EEC) consists of several permanent mandates such as:

- the operation of a Community Documentation Centre on Biotechnology Safety and Regulations (BIOSAFE) that collects relevant information on the legal developments and on safety issues related to biotechnology. In the course of the year, about 900 bulletins have been distributed to Member States Offices, Commission Services, university and industrial laboratories;
- the operation of an information service which aims at the providing scientific or technical information to the Member States, following their specific requests.The sources of the information are the European Patent Office, other data bases accessible by the JRC, as well as relevant studies commissioned by the Member States or by International Organisations;
- the technical support to DG XI for the preparation of documents for the meetings of Competent Authorities and for International meetings (most particurarly of the OECD and of the EC-US technical working group on the environment).

Whilst carrying out these different tasks, ISEI has further strengthened its expertise in software development to provide this assistance to the Services of the Commission. In particular, the database, BIOMARS, has been thoroughly tested and is ready to record accidents to be reported in accordance with Directive 90/219/EEC. At the moment no accidents have been notified yet.

Furthermore the proceedings of the EUROCOURSE on "Scientific Technical Background for Biotechnology Regulation" have been finalised. (Eds. F. Campagnari, V. Sgaramella and G. Van den Eede, published by KLUWER Ac. Pbl., EUR 15579 EN).

Further information can be obtained from:
G. Van den Eede, ISEI
EC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789239 - Fax ++39-332-789007

Support in the field of the Civil Protection Policy

Natural Disasters

The objective of the activity was the identification of needs for a project on natural disasters in support of the Commission policy, similar to what is already running for the major accidents hazards of chemical sites, as reflections on natural hazards vs technological ones confirmed similarities in the principles for a sound control policy.

To this end, within the UN International Decade for Natural Disaster Reduction (IDNDR), a Conference on Natural Risk and Civil Protection has been organised at Belgirate (Italy) on 26/29th October 1993 in cooperation with DGXI (Civil Protection Unit) and DGXII (Climatology and Natural Hazards Research Programme), with the following objectives:

- to generate conducive 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 effective strategies to minimise them.

This was the first time that a similar event was organised at EC level including the participation of earth, scientists from planning, management and communication disciplines, and, civil protection authorities and operators. Especially the round table discussions on data sources, setting of priorities for R&D and "Towards a better understanding between scientists and civil protection operators" confirmed the need of focal points where experts from different in-field experiences and scientists from different disciplines might met and continue to confront for a better approach to civil protection. The results of the conference are now being exploited together with DGXI for establishing priority actions to be pursued by ISEI.

Further information can be obtained from:
A. Amendola, ISEI
EC-JRC Ispra, I-21020 Ispra (Va)
Tel. ++39-332-789208 - Fax ++39-332-789007

Environmental Protection and Conservation of European Cultural Heritage

Catalogue of Contracts funded under the EC "Protection of the European Cultural Heritage" Research Area

Europe's cultural heritage is unequalled in its richness and variety. Its protection and conservation is now recognised to be of great importance in all members of the European Community. At the same time, the threats to this heritage, and in particular to the materials on which it is manifested, be it stone, canvas, or paper, are growing. Increasing atmospheric pollution, urbanisation, tourism, and inappropriate conservation treatments all play a part.

Faced with this important common problem. Europeans have everything to gain by combining their efforts and resources to protect their cultural items.

To achieve this, it is essential to understand the causes and mechanisms by which they are damaged and to establish conservation practices which have a sound scientific technical basis. To provide such understanding is the general objective of the research area "Conservation of the European Cultural Heritage". This research area is a growing part of the EC Environmental Research Programme", which is managed and financed by the European Commission, Directorate General for Science, Research and Development, in Brussels. Within the last two of these Research Programmes (1986-90 and 1989-92), about 60 of the leading laboratories in EC Member countries (as well as in Sweden, Norway and Austria) are undertaking collaborative, international research on the critical problems surrounding this issue.

All these activities will continue in the frame of the present Community programme "ENVIRONMENT" (1991-1994), part of the third framework structure programme for research and technology development.

In addition to these technically advanced research projects, the European Commission is also encouraging better overall communication between scientists, engineers, conservators, architects and managers involved in this field. For this purpose, it publishes a quarterly entitled "European Cultural Heritage - Newsletter on Research".

Another important initiative organised by the Commission was the European Symposium entitled "Science, Technology and European Cultural Heritage" which was held in Bologna in June 1989, as part of Bologna University's Ninth Centenary Celebrations.

Further information can be obtained from:

J. Acevedo
Commission of the European Communities, DG XII D-1
200, rue de la Loi, B-1049 Brussels
Tel. ++32-2-2952043 - Fax ++32-2-2963024

Effects of Air Pollution on Historic Buildings (1986-1990)

- The Interrelationship of Air Pollution Levels and Stone Decay Rates at Historic Monuments
- Kinetic Studies of SO_2 Reactions with Marble
- Reactions of Nitric Acid and Nitrates with Pentelic Marble
- Case Studies in the Deterioration of Stone Monuments in Italy
- Application of Advanced Methods of Chemical Analysis to Stone Conservation
- Chamber Studies on Air Pollution Damage to Stone
- Ultrasound Applied to the Non Destructive Examination of Stone Structures
- Biodeterioration Studies on Stone Monuments
- Environmental Deterioration and the Monastery of Jeronimos: A Case Study
- Non-Destructive Evaluation of Stone Monuments in Pavia: A Case Study

STEP Programme: Protection and Conservation of the European Cultural Heritage (1989-1992)

- Effects of Air Pollutants on Cellulose Containing Materials
- Conservation of Metal Objects from Archaeological Sites
- Environmental Deterioration of Ancient Leather
- Conservation of Megalithic Monuments
- Deterioration of Granitic Monuments in Various parts of Europe
- Deposition of Atmospheric Pollutants on Ancient Monuments
- Effects of Atmospheric Particles on Historic Buildings
- Environmental Deterioration and Protection of Historic Buildings

Environment Programme (1991-1994): Environmental Protection and Conservation of Europe's Cultural Heritage (1st Phase)

- Marine Spray and Polluted Atmosphere as Factors of Damage to monuments in the Mediterranean Coastal Environment
- Non-destructive Testing and System Identification to Evaluate Diagnostic Methods and Reinforcement Techniques Applied to Historical Buildings
- Assessment and Monitoring the Environment of Cultural Property
- New Conservation Methods for Outdoor Bronze Sculptures
- Expert System for Evaluation of Deterioration of Ancient Brick Masonry Structures
- Interactive Physical Weathering and Bioreceptivity Study on Building Stones, Monitored to Computerized X-Ray Tomography (CT) as a Potential Non-Destructuve Research Tool
- The Role for Atmospheric Pollutants and of Surface Characteristics in the Degradation of Monuments

Information

ENERO (European Network of Environmental Research Organisations)

By the initiative of INERIS (Institut National de l'Environment Industriel et des Risques - Verneuil en Halatte, France) in 1992 has been created an Association - named ENERO - whose members are eleven national research organisations having particular expertise in the field of the industrial environment and aimed at common research targets.

Some 5.000 researchers are covered by the association which thus presents a wide ranging span of competences and facilities and a unique multidisciplinary character in view of providing public, private and industrial decision-makers and administrators with the required information, data and expertise, taking advantage of the synergy from common efforts directed towards the protection of the environment.

To the present date the following organisations are ENERO's members:

CIEMAT, Spain
DEMOKRITOS, Greece
ENEA, Italy
ENVIB, Belgium
FORBAIRT, Ireland
INERIS, France
INETI, Portugal
KfK, Germany
NETC, United Kingdom
RISØ Denmark
TNO, The Nederlands

covering almost entirely the countries of the European Union. The Environment Institute of the EC Joint Research Centre (Ispra, Italy) supports the scientific activities of the association.

A number of working groups have been set up within ENERO to deal with themes of wide interest, the result of the joint research being planned to be presented and discussed in the course of dedicated ENERO's Forum.

So far the following working groups have been set up:

Urban environment; life cycle analysis of products; strategies for modelling the environmental fate of pesticides discharged into riverine systems after a chemicals storehouse fire; environmental training and education; measurement of air pollution in developing countries.

Further information can be obtained from:
C. Heuraux, Secretary General ENERO
9, rue de Rocroy, F-75010 Paris
Tel. ++33-1-45960956 - Fax ++33-1-45960957

CEDEFOP: Moving from Berlin to Tessaloniki

By the decision of the European Commission on February 2nd, 1994, the seat of the European Centre for the Development of the Professional Training (CEDEFOP) will be moved from Berlin - where it was established since 1975 - to Tessaloniki. CEDEFOP is a decentralized communitary body aimed at helping the European Commission in view of promoting the development of the professional and continuous training. Through its scientific and technical activity, CEDFOP contributes to the establishment of a common policy in the field promoting the exchange of information and experiences. The 1994 work program foreseen the support to the European Commission for launching in 1995 the community action programme "LEONARDO". The CEDEFOP's cooperation will allow for the studies on the evaluation of professions and professional qualifications to be started. One of the tasks will consist in the diagnostics of the needs of a warning system concerning the on-going transformations of the employment contents and their impact on the training. In close collaboration with the network EURIDYCE, which deals with matters related to the training - CEDEFOP is going to set up a database of monographs related to the professional training in the European Union member Countries.

European Foundation for the Training

Following the proposals of the Commissioner Mr. RUBERTI, the European Commission has approuved on February 2nd, 1994 the text of the EEC Regulation 1360/90 of the European Foundation for the training to be seated in Turin (Italy). The Foundation is aimed at contributing to the development of professional training systems of central and eastern european countries as well as of new independent states.

The Commission has proposed two major amendments, i.e.:

extension of the applicability area of the Foundation to cover new independent States as the present regulation would limit it to the countries considered by the PHARE programme (central and eastern Europe); as the consequence also the countries covered by the TACIS programme will enter the above applicability area; modification of the rules applicable to the staff of the Foundation to be coherent with those adopted for the other communitary agencies.

The Foundation will take over, on behalf of the European Commission, the task for implementing the actions of the TEMPUS programme.

The European Commission ensures the required preparatory work for the establishment of the Foundation and the moving to Turin of the activities of TEMPUS office in Brussels.

MINE - a new database at DIMDI

MINE - The Microbial Information Network Europe - is a new database accessible through DIMDI. It is an English language factual database with information about strain cultures of bacteria, fungi and yeasts from national culture collections of 12 European countries. A document contains:

the taxonomy of the described microorganism; its origin; culture conditions; applications; genetic information; data on pathogenicity; data on preservation, handling, etc.

For MINE a menu driven service is available in English and German like for most databases at DIMDI. Thus, searching is possible without knowing the retrieval language GRIPS-R or the complex database structure of MINE. Clear and easy-to-use menus provide online access to:

information on certain species and strains (when the species name or the strain number is known); strains with special features (i.e. special origin, chemical and biological properties, culture conditions); addresses of the MINE member collections; recipes of the culture media on which the strains are growing.

Altogether 33 institutions are cooperating in the project.

The MINE project had been launched and is still supported by the European Commission (EC). The Royal Dutch Academy of Arts and Sciences is the coordinator of the project.

Further information can be obtained from:
Sylvia Herrmann - DIMDI, Weisshausstr. 27, D-50939 Köln
Tel. ++49-221-4724-1

EEMAA

EEMAA, the European Environmental Management Alumni Association, is a non-profit organisation established by graduates of the EAEME European Master Degree in Environmental Management. The Master programme, which is run by the European Environmental Association for Environmental Management Education (EAEME), receives the financial support of the European Commission.

The purpose of EEMAA is to:

maintain and enhance professional contacts and collaboration through an international network; maximize awareness and knowledge by providing access to environmental management information, including key events, major publications, organisations and istitutions active in the environmental management field; stimulate exchanges between EEMAA members and increase their professional potential by establishing contacts with other associations and organisations; promote EEMAA members and their profiles to interested outside parties; raise awareness and develop concern for environmental management issues.

The activities and services of EEMAA include:

tri-annual journal, EEMAA REVIEW, which examines in each issue a particular topic of current interest in environmental management, and aims to bring together significant personalities in the European environmental field with a view to encouraging dialogue and stimulating partnerships; annual publication of the EEMAA Directory (first edition 1994), including member profiles and an appendix of companies and institutions participating in EAEME research projects; direct access to a Database of member profiles and an ever-expanding mailing list of key players and contacts in European environmental management.

To subscribe to EEMAA REVIEW, to purchase the 1994 EEMAA Directory, or for any further information please contact the Secretariat:

EEMAA - 39 Boulevard de Grancy, c/o General Waters
CH-1006 Lausanne
Tel. ++41-21-6177382 - Fax ++41-21-6179015

Courses

Environmental Bioprocesses

Modelling and PC Simulation

26 June - 1 July 1994 - Braunwald Switzerland

Course Topics

Balancing and Kinetics

Dynamic Mass and Energy Balances; Gas - Liquid Transfer Rates;

Microbial Kinetics; Batch, Fed Batch and Continuous Bioreactors; Dynamic Interactions of Mixed Cultures

Waste Water and Air Treatment

Kinetics of Aerobic Waste Treatment; Activited Sludge Reactor Modelling; Nitrification and Denitrification; Biofilter Air Treatment; Air Treatment with Fluidized Beds; Kinetics of Anaerobic Waste Treatment; Treatment of Recalcitrant Substances; Genetically Engineered Organisms for Treatment; Combined Chemical-Biological Treatment; Simulation Software for Treatment System Design; Sequencing Batch Biofilm Treatment

Measurement and Control

On-Line Instrumentation; Strategies for Measuring Kinetics; Software for Kinetic Parameters; Control of Inhibitory Treatment Processes

Biofilms and Flocs

Diffusional Effects in Biofilms and Flocs; Biofilm Systems for Water and Air Treatment; Modelling the UASB Reactor; Modelling of Compositing Processes

Environmental Ecology and Pollution

Microbial Ecological Interactions; Landfill Pollutant Transport and Soil Leaching; Eutrophication; River Profiles and Lake Cycles; Lake and Reservoir Modelling

The objective is to teach the application of chemical engineering methods to environmental biological systems. The course is designed to benefit engineers and scientists from a wide variety of backgrounds.

Further information can be obtained from:
I.J. Dunn, E. Heinzle, J.E. Prenosil
Chemical Engineering Department, ETH - CH-8092 Zurich
Tel. ++41-1-6323041 - Fax ++41-1-2521827

Modular Training Programme in Environmental Management and Health

A flexible training programme for Environmental Management and Environmental Health Professionals leading to MSc/Advanced Diploma/Advanced Certificate.

The programme is designed for environmental management and environmental health professionals working within industry, commerce or the public sector or for those who wish to enter these areas.

Core Modules

Concepts and Issues in Environmental Management; European Environment Policy and Law; Environment Management and Auditing; Human Health and the Environment

Elective Modules

Pollution Monitoring and Analysis; Environmental Information Retrieval Systems; Waste Management and Recycling; Clean Technology Processes and Practice; Land Use Planning; Water Quality Management; Air Quality Management; Food Quality Management Product Safety and Consumer Protection; Conservation/Restoration Ecology; Geographical Information Retrieval Systems; The Physical Environment and its Health Effects; Assessment and Control of Chemical Hazards in the Workplace; Their effects on Health; Biological Hazards in the Workplace; esearch in Environmental Management and Health (support module for the Masters)

Environmental Auditors Training Course (EARA approved)

5 day residential course; leading to recognised status (EARA Registration); includes on-site practical audit

Courses commencing on the following dates:

27th June 1994; 25th July 1994; 22nd August 1994
19th September 1994; 17th October 1994
14th November 1994; 12th December 1994

Further information can be obtained from:
Rita Chalmers
Aspects International, Bickershaw Lane
Abram, Wigan, Lancs WN2 5TB
Tel. ++44-942-867134 - Fax ++942-867137

Education and training programme 1994-1995

Robens Institute of Industrial and Environmental Health and Safety - University of Surrey

Occupational Health, Hygiene and Safety

Modular training programme in occupational health and safety validated by BEBOH, ENB and IOSH. A part-time modular course for occupational health nurses, doctors, hygienists, safety officers and other health and safety practitioners leading to Masters Degrees of the University of Surrey, and to professional qualifications for hygienists, nurses and safety practitioners. The modules can also be attended as stand alone short courses.

Environmental Health

Modular training programme in environmental management and health. A part-time modular course organised jointly by the Robens Institute and Farnborough College of Technology. This course will offer flexible postgraduate training for environmental management and environmental health professionals, leading to an Advanced Certificate, Advanced Diploma or Masters Degree of the University of Surrey. The modules can also be attended as stand alone short courses.

Analytical Chemistry

Toxicology

MSc in Applied Toxicology. A modular training programme in applied toxicology designed for management scientists, those who establish and monitor regulations, occupational and environmental health scientists and physicians, research scientists, and anyone interested in state-of-the-art toxicology. This course leads to a Postgraduate Diploma or Masters Degree in Applied Toxicology, although the modules can be attended as individual stand alone training courses.

Further information can be obtained from:
Robens Institute - University of Surrey
Guildford, Surrey, GUZ 5XH
Tel. ++44-483-259203 - Fax ++44-483-503517

Centre for Environmental Management and Planning (CEMP)

Auris Business Centre, Old Aberdeen (Scotland)

Conference and Training Calendar

26 June-9 July 1994
15th International Seminar on Environmental Assessment and Management, University of Aberdeen, Scotland, UK.

17 July-7 September 1994
9th Intensive Training Course on Environmental Assessment and Management, University of Aberdeen, Scotland, UK.

4-5 October 1994
1st International Course on New Approaches to Environmental Protection and Management in the Oil and Gas Industry, King's Conference Centre, University of Aberdeen to be repeated in Portugal in November.

10 October-30 November
10th Intensive Training Course on Environmental Assessment and Management, University of Aberdeen, Scotland, UK.

31 October-2 November 1994
2nd International Course on New Approaches to Environmental Protection and Management in the Oil and Gas Industry, the Algarve, Portugal.

20-26 November 1994
International Think-Tank on Sustainable Tourism for the 21st Century - Practical Strategies and Future Directions, the Algarve, Portugal.

25 June-8 July 1995
16th International Seminar on Environmental Assessment and Management, University of Aberdeen, Scotland, UK.

16 July-6 September 1995
11th Intensive Training Course on Environmental Assessment and Management, University of Aberdeen, Scotland, UK.

Further information can be obtained from:
Centre for Environmental Management and Planning
AURIS Environmental Division
23 St. Machar Drive - Old Aberdeen - AB2 1RY, Scotland, UK
Tel. ++224-272483/272479 - Fax ++224-487658
Telex 73458 UNIABN G

CEMP is part of AURIS Environmental, a division of Aberdeen University Research and Industrial Services (AURIS) Ltd. Since 1972 it

has undertaken research, training, consultancy and the provision of environmental information services on many aspects of environmental management and impact assessment. Consultancy and training has been undertaken for a wide range of clients including the World Bank, UNIDO, WHO, UNEP, ILO, the British Council, the Department of Environment (UK), planning authorities, public and private companies and bi- and multi-lateral international aid agencies.

Institute of Sound & Vibration Research (ISVR)

Short Courses

5-9 September 1994	Technical Audiology
12-14 September 1994	13th Engine Noise & Vibration Control Course
14-16 September 1994	3rd Vehicle Noise & Vibration Course
19-23 September 1994	22nd Advanced Course in Noise and Vibration

Further information can be obtained from:
ISVR Conference Secretary
Institute of Sound and Vibration Research
The University, Southampton, SO9 5NH
Tel. ++44-703-592310 - Fax ++44-703-593033

Conferences

Conference Announcement

The first European Conference on: Conservation of the European Cultural Heritage: Research and Policy issues related to the Conservation of Paper and Leather

Delft (The Netherlands), 27-28 June

The European Conference is a joint initiative by Directorate General XII of the European Commission (STEP and Environment Programmes, within the framework of its policy of dissemination of information from research activities) and Directorate General X (Culture Unit within the framework of the "Reading for Pleasure" campaign aimed at raising European public awareness of books and reading).

Conference Objectives

to present to Member States of the European Union the "state-of-the-art" situation in Europe and the U.S.A. concerning research and policy related to the conservation of paper and leather; to present conclusions of two STEP EC research projects: analyses of the effects of air pollutants on paper (STEP CT-90-0100) and on leather (STEP CT-90-0105); to follow up the recommendations of the expert meeting on conservation of acid paper and use of permanent paper, co-organised by the Dutch Presidency and the Commission in December 1991; to assist in the development of a European cultural heritage community; to identify priorities for multinational activities for the conservation of paper and leather.

Further information can be obtained from:
J.B.G.A. Havermans - TNO Centre for Paper and Board Research
P.O. Box 6034 - NL-2600 JA Delft, The Netherlands
Fax ++31-15-696511

EC Workshop "Research on the conservation of brick masonry monuments"

Leuven (Belgium), 24-26 October 1994

The workshop is to review the state-of-the-art on research funded both by the ENVIRONMENT Programme of the European Commission (Research Area "Protection and Conservation of the European Cultural Heritage), and other agencies on diagnosis and pathology of brick masonry monuments including the improvement of new diagnostic tools such as the "brick masonry damage atlas for monuments" and the "brick masonry diagnostic expert system for monuments".

Further information can be obtained from:
Prof. Koenraad Van Balen
Centre for the Conservation of Historic Town and Buildings R. Lemaire - Faculty of Engineering
Arenberkasteel - K. Mercierlaan 94
B-3001 Leuven (Heverlee) - Fax ++32-16-290-017

3rd International Symposium on the Conservation of Monuments in the Mediterranean Basin

Venice (Italy), 22-25 June 1994

The following topics will be covered:

Properties and durability of natural and artificial stones; Historical and architectonic aspects of stone in monuments; Structural and technological aspects of monuments; Forms and mechanisms of weathering: physical, chemical and biological aspects; Environmental studies and climatology: typical problem of indoor and outdoor microclimate; Analytical methods for investigation of damage in monuments; In field assessment of damage to monuments; Cleaning and biocide treatments; Consolidation and preservative treatments; The conservation of the Mediterranean Cultural Heritage: case studies

Further information can be obtained from:
Dr. Vasco Fassina - Laboratorio Scientifico della Misericordia
Cannaregio 3553 - I-30131 Venezia
Tel. ++39-41-720661 - Fax ++39-41-5210547

Sols Contaminés - Contaminated Soils

Third International Conference on the Biogeochemistry of Trace Elements

Paris (France), 15-19 May 1995

This Conference will be held under the auspices of the French Ministry of the Environment and the European Commission DG XII, Environment Programme

The main objectives of the Conference are therefore to discuss new advances in the field of trace element speciation, mobility, bioavailability, etc., in order to improve the validity of data needed for establishment of soil quality guidelines.

Symposia will consider:

contamination indicators (water, plants, ...); risk assessment; treatment,

of contaminated soils

Further information can be obtained from:
Rene Prost, Ministère de l'Environnement
Conference Internationale sur la Biogeochimie des Elements Traces - DGAD/SRAE - 20, Avenue de Segur
F-75302 Paris 07 SP (France)
Tel. ++33-1-42191757-30833250
Fax ++33-1-42191771-30833259

Workshop on Fingerprinting Techniques for Classification and Identification of Bacteria

Organized by European Union: Concerted Action (BIOTECH) on Exploitation of Microbial Diversity

Universiteit Gent, Laboratorium voor Microbiologie
K.L. Ledeganckstraat 35, B-9000 Gent, Belgium
12-16 September 1994

Hands-on workshop on

Fatty acid methyl ester analysis (FAME); Sodium dodecyl sulphate

polyacrylamide Gel Electrophoresis of proteins (SDS-PAGE); HPLC analysis of polyamines (PA); Phenotypic identification systems: Biolog and API Systems

applied on

Xanthomonas spp.; Lactic Acid Bacteria; Pseudomonas spp.

Further information can be obtained from:
Dr. D. Janssens (secretariat)
Laboratorium voor Microbiologie - K.L. Ladepanekstraat 35
B-9000 Gent - Tel. ++32-9-2645108 - Fax ++32-9-2645346

10th World Clean Air Congress

Growing Challenges - from Local to Global

Espoo-Finland, 28 May-2 June 1995

The Congress is to be convened by the International Union of Air Pollution Prevention and Environmental Protection Associations (-IUAPPA), and hosted by the Finnish Air Pollution Prevention Society (FAPPS).

The Congress will be held at the Dipoli Congress Center in ESPOO, located in the Helsinki metropolitan area, from May 28 to June 2, 1995. The Congress will involve daily plenary sessions and several parallel sessions for oral and poster presentations on all facets of pollution control.

Emissions and Control

Specific emissions from stationary sources; Specific emissions from mobile sources; Control technologies; Measurement and monitoring; Integrated approach to pollution prevention

Pollutant Impacts

Ecological effects of pollutants; Climate change impacts; Plant response to increased UV-radiation; Human responses; Material effects

Atmospheric Chemistry and Physics

Instrumentation; Local air quality; Regional air pollution; Stratospheric ozone depletion; Climate change

Pollution Management

Air quality management on the local level; Regional pollution control strategies; Tools for pollution prevention; Combined management of air,waste and water pollution; Mitigation of, and adaptation to, air pollution and climate change

Further information can be obtained from:
Ms. Merja Tolvanen, Secretary General of the Congress
P.O. Box 57, FIN-02151 Espoo (Finland)
Fax ++358-0-4567022

Regional Conference of the International Geographical Union

Environment and Quality of Life in Central Europe: Problems of Transition

Prague, 22-26 August 1994

Cooperating Organizations

Central European University, Prague; Charles University, Prague; Czech Academy of Sciences; Cezch Geographic Society; Czech National Geographic Committee; Ministry of Environment of the Czech Republic; Slovak National Geographic Committee; Society for Sustainable Living (Czech Republic)

The conference will cover the following themes:

Our changing world; Central Europe: a search for a new identity; Reconstruction of central Europe: problems and prospects; Migration and refugee problems; Environment and Society in a geographic perspective; Society and landscape, landscape ecology; Geography and nature conservation; Environmental policies, planning and management; Geographic information systems in action; Mapping the environment; Remote Sensing for the Environment; General problems and prospects of geography; Dynamic and engineering geomorphology; Climatic and hydrological changes; Natural disasters, hazards and risks; Mainstreams of geographic thought; Environment and society; Economic restructuring; Urban, regional and local restructuring; Environment and system of geographic education and training; Becoming aware; Becoming professional; Public awareness upgrading; Current research projects in geographical and environmental education

Further information can be obtained from:
IGU RC
Albertov 6, 12843 Praha 2, Czech Republic
Tel. ++42-2-24912060 - Fax ++42-2-24915817-296025

International Symposium on Human Health and Environment: Mechanisms of Toxicity and Biomarkers to Assess Adverse Effects of Chemicals

Salsomaggiore T. (Parma), Italy - September 25-30, 1994

The symposium is organized by the Scientific Committee on Occupational Toxicology (SCOT) of the International Commission on Occupational Health (ICOH), by the Commission of the European Communities, and by the University of Parma, in collaboration with the World Health Organization: International Agency for Research on Cancer, International Programme on Chemical Safety (ILO-UNEP-WHO), Office of Occupational Health (Headquarters), and Regional Office for Europe.

Main topics chosen by the scientific committee are:

Mechanistic basis for health risk assessment; Biomarkers for exposure assessment; Biomarkers of individual susceptibility; Biomarkers for health surveillance and effect monitoring; Biomarkers in health risk assessment and regulation.

Further information can be obtained from:
A. Mutti - Secretary of ICOH-SCOT
Laboratorio di Tossicologia Industriale
Università degli Studi - Via Gramsci, 14
I-43100 Parma, Italy - Fax ++39-521-291343

International Workshop on Biological UV-dosimetry

29 November - 3 December 1994 - Budapest, Hungary

Cosponsoring Organizations:

Commission of the European Communities; Directorate-General XII, Science, Research and Development; National Science Foundation, USA; Semmelweis University of Medicine; Hungarian Academy of Sciences; National Committee for Technological Development (OMFB); MOL Rt..

Further information can be obtained from:
Andrea Fekete Ph.D.
Institute of Biophysics - Semmelweis University of Medicine
Budapest, P.O. Box 263 - H-1444, Hungary
Tel. ++36-1-2676261 - Fax ++36-1-2666656

European Environmental Mutagen Society

24th EEMS Meeting, Poznán, Poland
August 31st-September 3rd, 1994

The meeting will focus on:

Priorities among environmental genotoxicants; Use of biomarkers in assessing exposures and risks; Genetic hoot factors in humans; Animal models of human host factors; Interactions of occupational exposures and host factors.

Further information can be obtained from:
K. Szyfter
Organization Committee of XXIV Meeting of European Environmental Mutagen Society (EEMS)
60-479 Poznan, ul. Strzeszynska 32, Poland
Tel. ++48-61-221312 - Fax ++48-61-233235

The Annual Conference of the International Society for Environmental Epidemiology and the International Society for Exposure Analysis

August 30 - September 1, 1995
Leeuwenhorst Conference Center
Noordwijkerhout, The Netherlands

Further information can be obtained from:
Bert Brunekreef, PhD - Professor of Environmental Health
Department of Epidemiology and Public Health
University of Wageningen
P.O. Box 238, 6700 AE Wageningen, The Netherlands
Tel. ++31-8370-82080 - Fax ++31-8370-82782

2nd International Conference on Environmental Mutagens in Human Populations

Prague, 20-25 August 1995

Further information can be obtained from:
R.J. Srám M.D. D.Sc.
Laboratory of Genetic Ecotoxicology, Prague
Institute of Advanced Studies.
U. Michelského lesa 366 - 14000 Prague 4
Tel. ++422-472-4756 - Fax ++422-472-4757
Prof. W.W. An, Ph.D.
The University of Texas Medical Branch at Galveston
Dept. of Preventive Medicine and Community Health
Division of Environmental Toxicology
21020 Ewing Hall 110, Galveston TX 77555 USA
Tel. ++1-409-772-1803 - Fax ++1-409-772-5272

European Conference on the Citizen and the Heritage

Brussels, 3-5 October 1994

This European Conference is a joint initiative of Directorate General X of the European Commission and the European Parliament. It will be held in the European Parliament building in Brussels on 3-5 October 1994.

The objectives of the conference, which will concentrate on policy rather than technical issues, are:

to bring together a wide range of experts in order to further inform the Commission and the Parliament's thinking on cultural heritage; to help the Commission to further refine the content envisaged for its communication on the cultural heritage, to be drawn up later this year for submission to the Council of Ministers, the Parliament and the Committee of the Regions; in this regard, to supplement the results of a series of four consultation meetings on the theme of the cultural heritage, organised by the Commission in association with the Belgian and Greek Presidencies and held between October 1993 and February 1994. These meetings were attended by experts nominated by Member States' governments; to take account of views from representatives from potential future Member States of the European Union; to seek the views of international, national and regional organisations not involved in the above consultation meetings.

A significant part of the content of the conference will be of interest to those working in the field of environmental research. One of the four consultation meetings referred to above, on "Heritage and Management" (Mons, Belgium 27-29 October 1993), had a subtheme of "Heritage, Tourism and the Environment". Another looked specifically at the theme of "Heritage, Research and the New Technologies" (Brussels, 17-19 November 1993). In addition, one of two further meetings organised in the field of cultural heritage, at the investigation of the Greek Presidency, was entitled "Heritage and the Environment" (Athens, 26-29 March 1994). The results of all these meetings were followed up at a meeting of Member States' Directors of Heritage (Lisbon, 27-29 April 1994). That process will be continued at the October conference at the European Parliament.

Further information can be obtained from:
Madame Marion Eren
European Commission, DG X - Culture Unit
Rue de Trèves 120 (Room 4/42) - B-1049 Brussels
Tel. ++32-2-2999238 - Fax ++32-2-2999283

ASIAN Water Technology 94 Conference

In conjunction with Aquatech Asia 94 Exhibition

22-24 November 1994, Westin Stamford Hotel, Singapore

The Asian Water Technology 94 Conference will be jointly organised by the Environmental Engineering Society of Singapore (EESS) and RAI Exhibitions Singapore Pte Ltd. with the support of a number of major international organisations including the International Association on Water Quality, the Water Environmental Federation, the International Solid Wastes Association and the Water Quality Association.

All aspects of waste water collection, treatment and disposal, and water supply, treatment and distribution will be studied at this conference. There will also be a comprehensive overview of innovation waste water treatment technology especially for developing countries.

Theme: Integrated Water and Waste Water Management

Infrastructure developments for water and waste water management (especially for developing countries); Monitoring, instrumentation and control; Waste minimisation and pollution prevention for industrial waste water; Water quality management; Radical innovative technology (small systems); Ground water contamination and remediation; Environmental auditing; Risk assessment

Further information can be obtained from:
RAI Exhibitions Singapore Pte Ltd
Aquatech Asia, 1 maritime Square, 09-49 World Trade Centre
Singapore 0409 - Fax ++65-2722250 - Fax ++65-2726744

GEOANALYSIS '94

An international Conference on the Analysis of Geological and Environmental Materials

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

An international Symposium covering all aspects of the analysis of geological and environmental materials, designed to attract international participation from scientists in Universities, Research Institutes, Commercial and Industrial Laboratories interested in any aspect of the development and application of analytical techniques in geochemistry and the environmental sciences.

Further information can be obtained from:
GEOANALYSIS '94 Conference Secretariat
Analytical Geochemistry Group - British Geological Survey
Keyworth - Nottingham NG12 5GG, UK
Tel. ++44-602-363349 - Fax ++44-602-363200

Fifth Society of Environmental Toxicology and Chemistry (SETAC) Europe Congress 1995

SAS Falconer Center, Copenhagen, 25-28 June 1995

The main meeting theme will be fate and effect of contaminants in vulnerable ecosystems, including the Arctic and Holarctic regions. The Congress will provide a forum for a discussion of environmental impacts in vulnerable ecosystems and discussions of the scientific basis on how to regulate our behaviour in order to cut down emissions and develop our society towards a sustainable management of resources.

Main Theme - Vulnerable Ecosystems

The Arctic, the Holarctic, and the Baltic;
critical pathways of pollutants; bioaccumulation in food chains and effects in wildlife; human exposure to pollutants; impact of arctic living conditions on health risk assessment; the Baltic Sea: Prospects and threats; effects of oil pollution in northern sea area; effects of mining.

Coastal waters, estuaries and tidal zones;
effects monitoring in the Wadden Sea; wetlands as filters for pollutants; mangrove swamps.

High mountain/altitude ecosystems;
deposition and effects of airborne contaminants; distribution and effects of heavy metals from mining and smelters.

Special Topics

Aquatic, terrestrial and wildlife toxicology;
ecoepidemiology; effects of estrogenic compounds on reproduction; reproduction disturbances in aquatic organisms - antropogenic effects; current assessment of the effects of contaminants on birds; contaminant levels and associated risks in predators.

Pesticides in Europe - Fate, behaviour and regulation;
environmental fate and behaviour of pesticides in laboratory systems; fate and behaviour of pesticides in the field and consequences for water contamination; compiling data for use in models and criteria for decision making; data evaluation and regulatory requirements; control of pesticide regulations - policy or politics.

Environmental risk assessment and risk perception;
fundamentals of ecological risk assessment; environmental exposure and effect assessment; role of ecotoxicology in risk assessment; pollution prevention's role in risk assessment; product life cycle assessment.

General Topics

Environmental chemistry;
emerging analytical techniques for environmental pollutants; standardization of sampling procedures; environmental fate; exposure models; chemical speciation; biodegradation including metabolic pathway studies.

Mechanism, method and process studies;
partitioning and dynamics of contaminants between environmental compartments; mechanisms behind bioavailability, adsorption and uptake of contaminants by organisms; dynamics and transfer of contaminants at the cellular level; monitoring of environmental effects; bioindicators and biomarkers in ecotoxicology; methods to assess chemical exposure; standardization of test methods and guidelines; physiological methods in ecotoxicology; evaluation and experience of microcosms and mesocosms approaches in ecotoxicology; new methods for genotoxicity studies in ecotoxicology.

Short courses

In addition to the Congress, short courses will take place on Saturday 24 and Sunday 25 June 1995 before the start of the main Congress. The following courses are planned:

Physiological responses as biomarkers in ecotoxicology;
review of current methods and demonstration of routine techniques.

Life cycle analysis;
demonstration and practical work with computer based models.

Sediment toxicity testing;
demonstration of sampling equipment and test methods.

Biomonitoring techniques;
review of current methods and demonstration of selected routine field methods.

Air pollution monitoring methods;
review of existing techniques and demonstration of selected methods.

Chemical fate modelling;
review of existing knowledge and practical work with approved models.

Physiological ecology;
methods to assess plant response to environmental stress.

Model ecosystems;
methods and design.

Further information can be obtained from:
DIS Congress Service Copenhagen A/S
Herlev Ringvej 2C, DK-2730 Herlev, Denmark
Tel. ++45-4492-4492 - Fax ++45-4492-5050

Alpen Forum '94

Disentis (Switzerland) - 11-16 September 1994

In the context of the present european policy, the interactive and interdisciplinary cooperation is of paramount importance for the organizations involved in research in alpine area.

Various projects (Futuralp; Integrals; etc.) and institutions (Icalpe; European Academy, Bolzano; etc.) as wall as political initiatives (Alpine Convention) do represent significant milestones in this direction.

The first Alpen Forum is intended to promote and to deepen the cooperation among and the exchange of researchers, to encourage the dialogue between research institutions and decision makers beyond frontiers and disciplines, thus strenghtening the ongoing cooperations.

The Alpen Forum is conceived as an open working meeting lasting one week addressed to researchers, to representatives of research and coordination institutions and to authorities involved in problems related to the Alps.

The first Alpen Forum will be dedicated to the development of natural, socio-economic, cultural and political utilisation of the alpine environment, to assess the present level of knowledge and to identify both the fields and the ways for an international collaboration.

Further information can be obtained from:
SANW/ASSN - Alpen Forum '94, Bärenplatz 2 - CH-3011 Bern

Science and Policy

Gothenburg, Sweden, 26-30 June 1995

The conference will focus on the acidification problem, but will cover the regional air pollution problems in a broad sense. It will give opportunities for presentations of scientific results and their implications for national and international policies.

The conference will cover the following scientific themes:

Atmospheric transport, transformation and deposition of acidifying and related substances; Pathways and effects of acidifying and related substances in terrestrial and aquatic systems and on materials; Direct effects of ozone and other regional air pollutants on terrestrial ecosystems; Reversibility and effects of countermeasures.

Special attention will be given to topics, where scientific understanding is limited and to scientific research directly linked to the development of policies. These topics may include:

Topics of scientific interest

Transcontinental transport of pollutants; Acidification and regional air pollution effects ouside Europe and North America; Nutrient imbalances in terrestrial and marine ecosystems; Interactions with heavy metals; Interactions with global processes (climate, stratospheric ozone) Policy-oriented topics; Regional monitoring and assessment of data; Critical loads/levels - Concept and mapping; Integrated models for assessing regional air pollution effects and control measures; Abatement strategies including economic instruments; Mitigation of effects of air pollution in ecosystems

Further information can be obtained from:
Peringe Grennfelt, Swedish Environmental Research Institute (IVL)
P.O. Box 47086, S-40258 Gothenburg
Tel. ++46-31-460080 - Fax ++46-31-482180
Eva Thörnelöf, Swedish Environmental Protection Agency (SNV)
S-17185 Solna
Tel. ++46-8-7991280 - Fax ++46-8-989902
Göran Bengtsson, Länsstyrelsen i Göteborgs och Bohus län
Provincial Government
S-40340 Gothenburg (Sweden)
Tel. ++46-31-605810 - Fax ++46-31-605809

35th IUPAC Congress

Istanbul, Turkey - 14-19 August 1995

The scientific program will be devoted to six areas of chemistry, comprising the sections described in the following.

Section I: Human Needs Through Chemistry

This section will deal with current problems facing mankind i.e.: the protection of the environment against the adverse effects of the increasing world population, continued urbanization, rising standards of living, increasing demand for consumer goods, energy and transportation; food supply requiring cooperative effort among scientists.

Environment

Atmospheric pollution, acid rains, the greenhouse effect; Clean water; Safe disposal of chemical and nuclear wastes; Speciation in aquatic media; Analytical quality and separations; Environmental responsibilities of the chemical industry; Biomarkers for chemical exposure; Risk assessment

Food

New techniques for food analysis; Quality control in food science; Food additives and food contaminants; Microbiology of foods; Biotechnology, kinetics and modeling in food science; Photodegradation in foods

Energy

Alternative energy sources; Combustion; Artificial photosynthetic and electrocatalytic techniques for converting solar energy to chemical energy; Chemical and electrochemical energy storage systems

Health

Clinical chemistry and toxicology; Drug and cancer research, chemotherapy; Enzymes, vitamins, antibiotics and antivirals; Tropical chemistry; Standardization of measurements and communication; Natural products with potential pharmacological activities

Section II: Physical Chemistry Chemical Change, Dynamics and Structure

Section III: Organic Chemistry Syntheses, Mechanisms and Natural Products

Section IV: Polymer Science and High Technology Materials

Section V: Analytical Chemistry and Instrumentation

Section VI: Inorganic Chemistry and Solid State

Further information can be obtained from:
Prof. Dr. Yüksel Inel - Chemistry Department, Bogaziçi University
P.K. 2 Bebek 80815, Istanbul (Turkey)
Tel. ++90-2631500-2631540 - Fax ++90-2659778-2656357

3rd World Conference on Science Parks

Science Technopoles/Parks and the Environment

Bordeaux - 14-16 September 1994

Organized by Bordeaux Technopolis

- A network of 6 technological centers, under the coordination of a single operator, the SEM Bordeaux Technopolis:
  - Bordeaux Montesquieu Science Park (160 hectares) to the south of the city
  - Condorcet Center and the operation of Unitec, at the very center of the university campus
  - Transfer Centers within the existing technological centers: Technowest, Productic, Hauts-de-Garonne, and Atlantique.
- Seven strengths of excellence: aerospace, materials and chemistry, micro-eletronics, life sciences, automated production, high tech building technologies and logistics.
- A scientific potential on a European level: 3 universities, 60,000 students, 10 schools of engineering and 9 university technological institutes, approximately 5,000 researchers in over 200 major laboratories specializing in biotechnology, chemistry, agrobusiness, aerospace, materials, health and the environment.
- A network of firms and laboratories in the High Tech Club and 23 sectorial associations, working together for the development of high-tech activities and technology transfers.

For the very first time this conference will bring together in France the International Association of Science Parks (IASP) and the Association of University Related Research Parks (AURRP).

By choosing the topic "SCIENCE PARKS AND THE ENVIRONMENT", the International Scientific Committee has focused a strategic theme for the 3rd WORLD CONFERENCE.

Science parks and technopoles are increasingly concerned by environmental issues. As top quality activities parks, they have to be extremely environment-friendly.

Moreover, there are numerous firms in such parks working in the field of environmental technologies in collaboration with scientific partners.

Within this general framework, three major issues are addressed in plenary lectures and three outcomes are discussed in Workshop, i.e.:

Three issues

Science Parks and sustainable development; Urban Development in Global Environment; Science and regulations

Three outcomes

Mid-term industrial perspectives based on new environmental technologies; The Environmental Quality Charter; The network of science parks totally or partially involved in environmental technologies

Further information can be obtained from:
Bordeaux 94 - Bordeaux Congrès Service
33300 Bordeaux (France)
Tel. ++33-56118888 - Fax ++33-56431776

Impact of elevated CO_2 levels, Climate change and Air pollutants on Tree physiology ICAT (COST 614))

International Symposium

Dourdan (near Paris), France - 19-22 October 1994

Since 1991, more than 40 research groups from 16 countries in Europe bring together expertise in modelling, field experiments and laboratory studies on the impact of elevated CO_2, climate change and air pollutants on trees and forests. Experimental data are being collected which should allow systems analysis, in which the effects of combinations of elevated CO_2 concentrations, air pollutants and climate change are simulated, and can be applied to the forests of Europe.

The meeting will consist of communications presented by members of the teams in the EPOCH and ENVIRONMENT programmes. Members of ICAT groups will present complementary reports on interactions between elevated CO_2, air pollutants and other environmental stresses (temperature, drought...).

The symposium is open to scientists involved in CO_2 research on trees for fruitful discussion on processes and modelling. Voluntary contributions are welcome (posters + a few oral presentations).

Further information can be obtained from:
Laboratoire d'Ecologie Végétale
CNRS-URA 1492 - Bâtiment 362 - Université Paris Sud
91405 Orsay cedex - France
Tel. ++33-1-69417961 - Fax ++33-1-69417238

3rd Workshop on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes: Operational Short-Range Atmospheric Dispersion for Environmental Impact Assessment in Europe

Mol (Belgium) - 21-24 November 1994

Air quality model developers and users from Europe and the USA decided in 1991 to organise three workshops to investigate the various aspects of atmospheric modelling for regulatory purposes with emphasis on model requirements (Risø, Denmark, 1992), on model intercomparison and validation (Manno, Switzerland, 1993) and on operational models presently used in Europe (Mol, Belgium, 1994).

The programme of the 1994 workshop in Mol will be of utmost interest to model users and decision makers, while model developers and researchers are offered an opportunity to listen to the users, to present new ideas and to present their findings with respect to model validation (procedures).

The sessions will focus on the following topics:

EIA Modelling in Europe: State-of-the-Art

Featuring review on how the EC-directive 85/337/EEC has been implemented in a given country or region, and what specific atmospheric dispersion models are officially accepted or pragmatically used in this context, or for regulatory purposes in general.

A second set of papers or posters will deal with practical applications of (a) specific model(s) within the context of an environmental impact assessment study.

Modellers in Action: Using the Models

This is to show how modelers actually proceed when performing computations for an environmental impact assessment study, by using their model on a local PC to compute the impact of some source configuration(s) defined especially for the workshop.

Model Validation

This session is the follow-up on the second workshop in Manno, Switzerland, 1993. Results are presented of comparisons between model outcomes and the measured concentrations during some selected dispersion experiments according to a common protocol.

Modellers in Action-Presentation and Evaluation of the Results

Model users participating in Session 2 will be asked to send in some model results for particular source configurations before the actual start of the workshop. This must enable the organizers to work out a systematic way to present the results of the different models when applied to the same source configurations.

Further information can be obtained from:
Guido Cosemans - Division Energy, VITO - Boeretang 200
B-2400 Mol - Fax ++32-14-321185

Metatechnies '94

Inerting and Enhancement of Final Wastes

International Symposium

Bordeaux (France), Palais des Congrès - 12-14 September 1994

Organized under the aegis of the University of Bordeaux I and of the Georgia Tech Institute of Technology of Atlanta with the French Electricity Centre and the International Union for the Applications of Electricity

All the processes and techniques for the treatment of final waste, from inerting to enhancement, starting from the technological innovation of the plasma torch, will be addressed and compared in the course of the symposium, from the scientific, economic and statutory viewpoints.

The workshop will provide specialised firms and economic partners with the opportunity to highlight their skills in the field.

Further information can be obtained from:
Bordeaux Congrès Service - 33300 Bordeaux Lac - France
Tel. ++33-56118888 - Fax ++33-56431776

TTI 1994 Conference

Technology Transfer & Innovation

Queen Elizabeth II, Conference Centre, London - 18-20 July 1994

This international conference aims to provide a forum for discussion on the innovation needs of industry and commerce and on how they may be satisfied. It will concentrate on the successful exploitation of new technologies and methodologies and of new knowledge arising from research and developments in the fields of technology and technology management.

Promoting Organisations

British Council; British Technology Group; Biotechnology & Biological Sciences Research Council; COMETT Programme; Committee of Vice Chancellors & Principals; Department of Economic Development, Northern Ireland; Department of Trade & Industry; EC Information Service, Coventry University; Economic & Social Research Council; Engineering and Physical Sciences Research Council; IMECHE News; ITT Newsletter, Commission of the European Communities; Office of Science & Technology; Technology Innovation Information, Luxembourg; The Royal Society of Chemistry; UK Science Park Association; UK Research & Higher Education European Office; The Institution of Chemical Engineers

The conference will address the following topics:

The innovation process; Implementing technology transfer; Identifying and exploiting innovation opportunities

Further information can be obtained from:
Mrs Kate Smith - TTI '94 Conference Secretary
Hillside House, 79 London Street, Faringdon
Oxon, SN7 8AA, England
Tel. ++367-242822 - Fax ++367-242831

MOSCOW '94

The First International Technology Business Action Conference MOSCOW-94 organized by Environmental Planning Group, Inc. (EPG) will be held September 12-16, 1994.

This forum that unites business leaders with technology producers is championed by the U.S. Department of Energy and is supported by the U.S. Department of Defense, U.S. Environmental Protection Agency and also by the Russian Academy of Sciences, Kurchatove Institute, Minatom, Ministry of Environmental Protection and Natural Resources, International Green Cross and the Russian Energy Technology Congress.

Further information can be obtained from:
Vicki D. Sebela - Conference Manager
Tel. ++708-3820020 - Fax ++708-3820154

POLLUTEC '94

10th International Exhibition for Environmental Technology and Services

Lyon, France - 18-21 October 1994

The exhibition covers the following sectors:

Waste

Physico-chemical measurement, testing and control of soil and of solid and liquid waste; Waste collection and transportation; Waste grading, conditioning and pretreatment; Heat treatment; Physico-chemical treatment; Biological treatment; Landfill; Decontamination of polluted sites; Recovery, recycling, utilisation; Materials and equipment for pollution accidents.

Freshwater and seawater

Measurements, testing and physico-chemical control; Drinking water treatment; Industrial water treatment; Rainwater treatment; Equipment for prevention of accidental water pollution; Physical treatment of effluent; Chemical and biological effluent treatment (products, equipment and processes); Sludge treatment; Water engineering; Improvement of aquatic environments; Coastal protection.

Air

Physico-chemical measurement, testing and control; Radioactivity measurement and control; Research; Physical and electrostatic treatment of gases and smoke (bag filters, electrostatic filters, cyclones...); Chemical treatment and scrubbing of gaseous pollutants; Heat treatment of gaseous pollutants, odour control; Protective and first-aide equipment; Interior air purification, air-conditioning and environmental control; Transporting and extraction of gases and smoke; Measures to combat atmospheric pollution due to vehicle emissions.

Noise

Acoustic and vibration measurement and control; Research; Noise nuisance abatement; Personal protection from noise.

Environment (General Heading)

Administrative bodies, Public agencies; Regional interest groups; Professional associations and bodies; International bodies; Public and private research centres; Universities and technical colleges; Institutes of further education; Engineering; Commercial delegations and foreign agencies; Specialist press, publishers; Design and engineering offices, environmental engineering consultants; Financing; insurance; Civil protection.

Energy

Biomass; Solar collectors; Energy distribution; Home automation systems; Heat exchangers; Renewable energy sources; Wind power; Ovens and stoves; Habitat - bioclimatic and solar; Methane conversion; Photovoltaics; Heat systems; Geothermal energy; Energy efficient technologies.

Industrial cleaning

Services: Cleaning companies, equipment rental companies, second-hand equipment.

Products: Cleaning products, protective products, hygiene and disinfection products.

Machinery: Vacuum cleaners, high-pressure cleaners, brushing machines, automatic washing machines, vacuum cleansing machines, floor sanding machines, shampooing machines, injection-extraction machines, powder shampooing machines.

Hand-held equipment and accessories: Brushes, brooms, mop-buckets, swabs, pads, disks, mops, trolleys, mopping materials.

Training: Institutes, further education centres, educational establishments, management methods, consultancy, information science, office automation.

Environmental landscaping

Design and engineering offices; Rural, urban and industrial landscape architects; Space planners; Improvement of living environment; Pedestrian areas, parks and gardens, roads and motorways, stabilisation of soil, forests; Urban furniture, paving; Redevelopment of industrial sites, quarries, waste dumps; Horticulturalists; Nurserymen; Seeded lawns; Greenhouse cultivators; Horticultural supplies; Specific maintenance materials, equipment and products; Cleaning of beaches.

The last one is a new section which will also be the entral topic of a symposium organized as part of the show on October 18-20 lby the magazine PHM-Ligne Verte.

The following themes will be developed

Law and the landscape: Stakes of general policy; Role of the State of regional authorities; Examples French and European of "Environmental" management of urban, suburban and rural green spaces, and of reclamation of despoiled sites; Landscape Economics

Further information can be obtained from:
SEPFI TECHNOEXPO
8, rue de la Michodière - F-75002 Paris
Tel. ++33-1-47429256 - Fax ++33-1-42661428

Living with water

International Conference on Integrated Water Resources Management

RAI Amsterdam. The Netherlands - 26-29 September 1994

Organized by

International Association on Water Quality (IAWQ)
European Water Pollution Control Association (AWPCA)
Netherlands Association on Water Management (NVA)

The conference will be held together with the 15th Aquatech Exhibition.

The conference aims at promoting the idea of integrated water resources management. Special attention will be given to river basin studies, large scale development projects, control of non-point pollution, restoration of lake and river ecosystems and new tools for the implementation of integrated management.

The scientific programme encompasses the following topics:

Case studies on large river systems; the Don River; the Rhine River, the Fraser River; impact of large scale water resources development projects on hydrology and ecology; Pollution control, with emphasis on the control of non-point sources; Restoration of aquatic ecosystems: policies, strategies and results; new tools in integrated water resources management

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

Conference Reports

ENERO Forum

Strategies for modelling the environmental fate of pesticides discharged into riverine systems after a chemicals storehouse fire

Brussels May 31st, 1994

ENERO (European Network of Environmental Research Organisations) has presented the first results of research jointly performed by three out of its twelve members.

ENERO has been established as a network since the end of 1992, by the initiative of INERIS with the purpose to promote exchanges and the concentration in the field of environmental research.

The conference was open to industrialist, public authorities and bodies concerned with the specific theme.

Further information can be obtained from:
C. Heuraux - Secretary General ENERO
9, rue de Rocroy, F-75010 Paris
Tel. ++33-1-45960956 - Fax ++33-1-45960957

Sixth European Symposium "Physico-Chemical Behaviour of Atmospheric Pollutants"

Varese, 18-22 October 1993

The Sixth European Symposium "Physico-Chemical Behaviour of Atmospheric Pollutants" was held in Varese, Congress Centre Villa Ponti, from October 18th to 22nd, 1993.

As for the previous editions (the first one in 1979) the symposium was jointly organised by the JRC (Environment Institute) and the Directorate General XII (Unit D-Environmental Technologies).

Main objective of the symposium was to review the current status of the research which is part of the Concerted Action in "Atmospheric Chemistry". A task which appears now rather well accomplished, since 177 contributions have been presented in oral and poster sessions, to an audience of more than 240 scientists from 19 countries (EC, EFTA and overseas).

Following current highlights of the research on tropospheric chemistry, priority was given in the symposium to studies performed in four main areas.

Topic 1, **"Oxidation Efficiency of the Atmosphere"**, was especially addressing the chemistry of tropospheric ozone. Formation and destruction of ozone in the oxidation of biogenic and anthropogenic species and the capacity of the troposphere to degrade anthropogenically emitted trace gases (e.g. CFC's substitutes) imply relevant climatological issues at the regional (contribution to surface ozone episodes) and at the global scale (greenhouse effect, stratospheric ozone destruction).

Topic 2, **"Transport Processes"**, was focussed on field and modeling studies of the circulation of pollutants in the Mediterranean area (some relevant differences with respect to higher latitudes are apparent) and on the European contribution to global change.

Topic 3, **"Instrumental and Analytical Techniques"** was an update of the progress achieved in the area. The introduction of new measuring techniques was discussed in parallel with intercomparison exercises, addressing advanced and widely used methods and instrumentation, with the scope of assuring full comparability of data measured by different laboratories.

Topic 4, **"The Role of Clouds in Tropospheric Chemistry"**, was organised as a joint CEC-Eurotrac workshop, according to a scheme successfully tested in the Fifth Symposium in 1989 for the CEC-Eurotrac subprojects Halipp and Lactoz. The effects of clouds on the chemistry and the budget of sulphur, nitrogen and oxidants and the increasing importance of liquid and solid aerosols are subjects still widely open to research. The poorly understood role of aerosols and their influence on clouds in the Earth's radiative budget are, in fact, continuously gaining interest and importance in the context of global change modeling.

The chemistry of the stratosphere was not directly addressed in the symposium, since this subject is traditionally covered by specific meetings.

The meeting was an opportunity for initiating and strengthening collaborations among laboratories: an objective certainly of importance for the CEC equivalent to that, previously indicated, of reviewing the status of the research.

The proceedings of the Symposium will be published by the European Commission by the first half of 1994 (Report N° 50 of the series "Air Pollution Research Reports", Edited by G. Angeletti and G. Restelli, EUR 15609 EN.

Further information can be obtained from:
G. Angeletti - DG XII D1, Brussels (B)
Tel. ++32-2-958432 - Fax ++32-2-2963024
G. Restelli - EC-JRC Ispra, I-21020 Ispra (Va) Italy
Tel. ++39-332-789225 - Fax ++39-332-785837

6th International Congress on Noise as a Public Health Problem "Noise & Man '93"

Noise & Man '93 - The sixth International Congress on Noise as a Public Health Problem was held at Nice on 1993 July 5-8. The conference was organized by INRETS, France.

The abstracts - (volume 1 - 83 pages), the free communications - (volume 2 - 671 pages), the official speeches, the key notes, the invited papers, the workshops and the summaries of each team (volume 3 - 607 pages) are available.
Actes INRETS 34, 34 bis and 34 ter edited by INRETS
ISSN 0769-0266 - ISBN 2-85782-372-X

Further information can be obtained from:
INRETS - Service des Publications
2, Avenue du Général Malleret Joinville
F-94114 Arcueil Cedex

The summaries of each of the 9 teams, in English and French, are also included in this volume, i.e.:

- Noise induced hearing loss,
- Noise and cómmunication,
- Non-auditory physiological effects,
- Influence of noise on performance and behaviour,
- Noise disturbed sleep,
- Community response to noise,
- Noise and animal life,
- Noise and combined agents,
- Regulations and standards.

Publications

European Cultural Heritage Newsletter on Research

This publication aims to facilitate inter-communication between scientists, art historians, architects, restorers, politicians, jounalists and all individuals interested in this field.

This "Special Issue 1993" presents a compilation of all EC research since 1986 in the field (1986-1990, "Effects of air pollution on historic buildings"), STEP Programme (1989-1992) and ENVIRONMENT Programme (1991-1994).

Further information can be obtained from:
J. Acevedo - EC DG XII/D1
200 rue de la Loi - N-1049 Brussels
Tel. ++32-2-2952043 - Fax ++32-2-2963024

Air Quality. Analysis sources, transport, transformation, and deposition of pollutants

Overview of research and results within the 4th Environmental R&D Programme

Eds. G. Le Bras - CNRS-LCSR, Orléans
G. Angeletti - EC DG XII/D Brussels
EUR Report 15016, 1993 - 115 pages

Physico-chemical Behaviour of Atmospheric Pollutants

Conference proceedings of the Sixth European Symposium Varese (I), 18-22 October 1993.

Eds. G. Angeletti - EC DG XII/D Brussels
G. Restelli - EC DG XII/JRC Ispra
EUR Report 15609/1/2 EN - ISSN 1018-5593, 1994, 1074 pages

General Assessment of biogenic emissions and deposition of nitrogen compounds, sulphur compounds and oxidants in Europe and EUROTRAC Subproject BIATEX

Proceedings of the joint workshop organised by the CEC within the Concerted Action "Atmospheric Chemistry". Aveiro (P), 4-7 May 1993

Further information can be obtained from:
J. Acevedo - EC DG XII/D1
200 rue de la Loi - N-1049 Brussels
Tel. ++32-2-2952043 - Fax ++32-2-2963024

Coastal Research in the Environment Programme

A synopsis of goals, implementation, and perspectives

June 1994 - 135 pages - EC DG XII/D

Further information can be obtained from:
H. Ott, EC DG XII/D-1
200 rue de la Loi - B-1049 Brussels
Tel. ++32-2-2951182 - Fax ++32-2-2963024

Introduced Species in European Coastal Waters

Report on an international Workshop organised jointly by the Environment Programme of DG XII of the European Commission and the Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée (CIESM)

Published by the European Commission, Directorate General XIII, Telecommunications, Information, Market and Exploitation of Research, L-2920 Luxembourg

Edited by C.F. Boudouresque, F. Briand, C. Nolan

EUR 15309 EN, ISBN 92-826-6727-8

Further information can be obtained from:
C. Nolan - EC DG XII/D-1
200 rue de la Loi - B-1049 Brussels
Tel. ++32-2-2961633 - Fax ++32-2-2963024

The Effects of Environmental UV-B Radiation on Health & Ecosystems

A synopsis of goals, implementation, and perspectives
May 1994 - 47 pages - EC DG XII/D

Further information can be obtained from:
H. Ott, EC DG XII/D-1
200 rue de la Loi - B-1049 Brussels
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Human genetic risks from exposure to chemicals, focusing on the feasibility of a parallelogram approach

Proceedings of the EC/US Workshop on Risk Assessment
Durham, North Carlona, USA 11-14 October 1993
EUR 15606 EN - EPA/600/R94/042 - June 1994 - 450 pages

Research on Environmental Health & Chemical Safety
In the STEP (1989-92) & Environment (1991-94) Research Programmes

A synopsis of goals, implementation, and perspectives
EC DG XII/D - July 1994 - 200 pages

Environmental UV Radiation

Causes-Effects-Consequences

Edited by J. Acevedo, C. Nolan, DG XII/D-1 - ISBN 2-87263-105-4

This document is directed to scientists, policy-makers and educators. Its objective is to explain the mechanisms and impacts of ozone depletion, particularly the effects of UV radiation, and to describe how ozone depletion is being countered both by international cooperation in legislating to prevent it and by research aimed at increasing our understanding of the causes and potential impacts of our efforts. It is hoped that this will lead to a wider knowledge of the issues involved in this subject and to a more informed discussion at all levels.

Further information can be obtained from:
H. Ott, EC DG XII/D-1
200 rue de la Loi - B-1049 Brussels
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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

EUR 15351 EN - ISBN 92-826-6839-8, September 1993

Edited by O. Hov, University of Bergen, Norway

Further information can be obtained from:
H. Ott, EC DG XII/D-1
200 rue de la Loi - B-1049 Brussels
Tel. ++32-2-2951182 - Fax ++32-2-2963024

Green Globe Yearbook of International Co-operation on Environment and Development, 1994

Eds Helge Ole Bergesen, Georg Parmann

Oxford University Press

This major reference work demonstrates to a worldwide readership how successful the international community has been in solving specific environment and development issues, what are the main obstacles to effective international solutions, and what is needed to overcome these barriers.

Part I is made up of articles providing an up-to-date description and evaluation of the problem concerned, focusing on the results, impediments, and challenges to international co-operation.

In Part II, key data on international agreements on the environment and development are itemized, together with the inter-governmental organizations and a selective group of non-governmental organizations which are active in these areas.

ISBN 0-19-823324-8 344 pp., maps, tables March 1994

Further information can be obtained from:
Katie Wilson
Oxford University Press - Walton Street, Oxford OX2 6DP
Tel. ++44-865-56767

Environmental Science and Pollution Research

International Editor-in-chief: Otto Huteinger

ECOMED Publishers, Landsberg (D)

ESPR serves the international scientific community in all areas of Environmental Science and related subjects with emphasis on chemical compounds. It reports from a broad interdisciplinary outlook. Apart from the strictly scientific contributions as research articles (short and full papers) and reviews, ESPR publishes: news and views from research and technology, legislation and regulation, hardware and software, education, literature, institutions, organizations, conferences.

Examples of topics are: chemical analysis, environmental fate, toxicology and health issues, ecotoxicology, risk evaluation, life cycle assessment, regulatory questions, technological solutions, global change, waste problems.

These characteristics allow ESPR to serve a large and diverse audience: environmental scientists, engineers, physicians, public and industrial health personnel, consultants, lawyers, regulators, action groups, educated laymen.

Further information can be obtained from:
Otto Hutzinger - University of Bayreuth
D-95440 Bayreuth, Germany
Tel. ++49-921-552254 - Fax ++49-921-552334

International Journal of Sustainable Development and World Ecology

Editor-in Chief: J.N.R. Jeffers

The Parthenon Publishing Group Inc., Pearl River, N.Y. 10965 USA

B linking sustainable development to world ecology the journal publishes original research papers, articles and reviews that deal with all aspects of sustainable development, aiming at a balanced discussion, including the economic viewpoint. Contributions related to major environmental issues such as biodiversity, global climatic warming, resource management and wildlife conservation, especially those which deal with Third World ecosystems and developing countries, will be especially featured.

Published quarterly: March, June, September, December

Dimethylsulphide: oceans, atmosphere and climate

Proceedings of the International Symposium held in Belgirate, Italy

13-15 October 1992

G. Angeletti and G. Restelli Eds. Kluwer Academic Publishers, 1993

Further information can be obtained from:
G. Restelli, EC DG XII/D
Tel. ++39-332-789225 - Fax ++39-332-785837
G. Angeletti, EC DG XII/D
200 rue de la Loi - B-1049 Brussels
Tel. ++32-2-2958432 - Fax ++32-2-2954891

Electronic Bulletin for All Aspects of Sustainable Development and the Environment

"Communication for a better World"

Electronic papers to submit articles, peer reviewed original papers, review papers, database descriptions or data compilations, book reviews, notes, scientific events to this specialized Electronic Bulletin Board for all aspects of Sustainable Development and the Environment are called for.

The articles should be submitted in plain ASCII format through e-mail and generally should not exceed 4 full pages of text.

This initiative is being supported by KFKI Research Institute for Measurement and Computing Techniques.

The aim is to setup a network in Central and Eastern European Countries as a cooperative effort of universities, government, business and non-profit organizations dedicated to the exchange of scientific and practical information on sustainable development systems. It is a network in the broadest sense of the word, supporting the exchange of information with a variety of users.

The distribution of information via the existing systems of inter-connected computer networks commonly called "The Internet" is encouraged.

The topics covered by the Bulletin range from environmental impact to relevant databases and to remedial actions and prevention from further environmental damages.

Further information can be obtained from:
Arpad Nagy, Editor-in-Chief, Bulletin Board
KFKI Research Institute for Measurement and Computing Techniques of the Hungarian Academy of Sciences
P.O. Box 49 - H-1525 Budapest (Hungary)
Tel./Fax ++36-1-1695532

Asbestos Abatement

Volume 5 of the Sourcebook on Asbestos Diseases

Medical, Legal, and Engineering Aspects

Edited by George A. Peteers, Barbara J. Peters

Butterworth, 90 Stiles Road, Salem NH 03079

Contents

Part I Legal Considerations

The Role of the Plaintiff's Attorney in Asbestos Litigation; Asbestos Cost-Recovery Actions; Criminal Liability of Contractors, Engineers, and Building Owners; Regarding Asbestos Projects; A Practical Legal Approach to Asbestos in Buildings

Part II Public Health Policy

Asbestos in Buildings and Cancer Risk: Public Health and Public Policy Considerations; Pulmonary Health Risks from Asbestos and Smoking

Part III Asbestos Management

Asbestos Control Programs (O&M); Reliance on Asbestos Consultants; Multidisciplinary Approach for the Management of Asbestos Materials

Part IV Analytical Methods

Analysis of Airborne Asbestos; Asbestos Monitoring for Airborne Fibers: Preabatement Through Final Clearance; Floor Tiles: Sampling, Analysis, and Removal

Part V Technical Aspects

Safety Considerations in Asbestos Abatement Projects; Inspection for Asbestos in Buildings; Site-Specific Specifications for Asbestos Abatement Projects

Part VI Current Problems

Problems and Solutions in the Asbestos Abatement Industry; Warnings, Notice and Safety Information

Asbestos Risks and Medical Advances

Volume 8 of the Sourcebook on Asebstos Diseases

Medical, Legal, and Engineering Aspects

Edited by Geogre A. Peters, Barbara J. Peters

Butterworth, 90 Stiles Road, Salem, NH 03079

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Valuation of Asebstos-Impaired Property; Asbestos in Drinking Water: Health Issues; Environmental Exposure to Fibrous Zeolite in Turkey: An Appraisal of the Epidemiological and Environmental Evi-

dence; Epidemiological Studies on the Health Effects of Asbestos in Yokosuka, Japan; Asbestos and Lung Diseases: a Mechanistic Approach; Early Diagnosis of Pnemoconiosis Using Ultrathin Bronchofiberscopes; Radiological Signs of Exposure to Asbestos Not Classified in the ILO System; Treatment of Asbestos-Related Diseases; Home Mechanical Ventilation in Patients with Chronic Obstructive Pulmonary Disease; Fibroblast Growth Factors in Asbestosis; The Role of Reactive Oxygen Species in Asbestos-Induced Diseases; Asbestos Standards Around the World; Visualization of Airborne Particles with Real-Time Monitoring Instruments and Video; Asbestos Control by Government Regulation; Publication Date: October 1993

Environmental Management of Nickel Production

Technical Report N° 15

Technical and managerial measures can be taken to reduce the environmental impact of processing nickel ores. This report, published by the UNEP Industry and Environment Programme Activity Centre, presents the options.

- An overview describes commonly used processes to extract and refine nickel from a range of ore types, and their potential impacts on the environment.
- Possible sources of contaminants are identified as well as risks to workers from exposure to chemical dust and heat; control technologies and protection of the working environment are reviewed.
- The final sections of the report deal with aspects of environmental planning, and the establishment of management and control systems.
- Technical annexes give further details on environmental impact assessment and environmental audits.

This technical report complements earlier UNEP IE/PAC publications on nickel production from sulphide ores, and on environmental aspects of non-ferrous metals ore mining.

Further information can be obtained from:
UNEP IE/PAC - Tour Mirabeau, 39-43, quai André Citroën
F-75739 Paris Cedex 15 - Tel. ++33-1-44371474
or UN Publications - CH-1211 Geneva 10, Switzerland
or New York, NY 10017, USA

International Cleaner Production Information Clearinghouse ICPIC User Guide Version 1.0

Technical Report N° 9

This guide provides the information needed to access and use the computerized International Cleaner Production Information Clearinghouse (ICPIC). ICPIC, which is run in cooperation with the U.S. Environmental Protection Agency, is designed to transfer technical, policy, programmatic, and financial expertise on cleaner production. The system provides easy access to the UNEP/PAC international network and is available to anyone with a computer, a modem, communication software and a telephone line.

ICPIC can assist you in:

- identifying technical process options to make products and their production cleaner;
- establishing cleaner production programmes;
- providing money saving illustrations of cleaner production applications;
- keeping up-to-date on forthcoming events, conferences, training sessions, seminars and workshops; and
- locating cleaner production experts and documents.

ICPIC features include a message centre; bulletins of the latest news and developments in the cleaner production community; a calendar of upcoming international events; technical case studies highlighting industry and the wastes they generate, economic incentives and cost recovery times; cleaner production publications including more than 1100 abstracts; a directory of expert contacts in cleaner production techniques for specific industries and policies for government.

Further information can be obtained from:
UNEP IE/PAC - Tour Mirabeau, 39-43, quai André Citroën
F-75739 Paris Cedex 15 - Tel. ++33-1-44371474
or UN Publications - CH-1211 Geneva 10, Switzerland
or New York, NY 10017, USA

Calculation and Mapping of Critical Loads in Europe: Status Report, 1993

R.J. Downing, J.P. Hettelingh, P.A.M. de Smet Eds.

Coordination Center for Effects
RIVM, National Institute of Public Health and Environmental Protection Bilthoven, The Netherlands

The report has been produced as part of the work plan for the implementation of the United Nations (UN) Economic Commission for Europe (EC) Convention on Long-Range Transboundary Air Pollution. The report includes European maps of critical loads of acidity and sulphur, which have been submitted to UN ECE bodies to be used as part of the basis for negotiation of the second sulphur protocol.

The report assesses ecosystem sensitivity to current levels of sulphur deposition in Europe.

The largest areas of high sensitivity (those with the lowest critical loads) are mainly in northern and central Europe (including Scandinavia, Germany, and part of the United Kingdom). In general, southern Europe (parts of Spain, Greece, and the Russian Federation) appears less sensitive.

This information on ecosystem sensitivity can be compared with pollutant deposition data, to identify which areas currently receive pollution levels that exceed the area's critical load. These areas of "exceedance" show where present levels of pollutant deposition increase the risk of damage to ecosystems, thus endangering their sustainability. Present sulphur depositions are higher than critical loads in roughly 50 percent of the area surveyed.

The report was produced by RIVM's Coordination Center for Effects, with the participation of many scientists from 20 European countries, as contributions to the work plan for the Convention. The Coordination Center was established at RIVM in 1990 to support the environmental effects-related work conducted under that Convention.

The report also includes a detailed description of the methods and data used to calculate critical loads, and reports from countries participating in the work under the Convention.

Copies of the report are available from the Coordination Center for Effects, RIVM, P.O. Box 1, 3720 BA Bilthoven, the Netherlands.

Further information can be obtained from:
Ms. S.E. Tuk - National Institute of Public Health and Environmental Protection (RIVM)
P.O. Box 1 - 3720 BA Bilthoven (The Netherlands)
Tel. ++31-30-742560

Informal Meeting of the G7 Environment Ministers

Florence, March 12-13, 1994

Florence hosted on March 12 and 13 a meeting of Environment Ministers of the seven most industrialized Countries (G7) and the Commission of the European Union, to exchange views in an informal setting on some crucial environmental questions.

During the meeting delegations addressed in detail a number of relevant issues, a general agreement having been reached on the following:

Global Environment

General concern was expressed on the increasing deterioration of the global environment, as regards global warming, ozone layer depletion, desertification, fresh water depletion, biodiversity loss and deforestation. On the other hand, a growing confidence on the benefits of the newly established international instruments was recorded.

The entry into force of the *Conventions on Climate Change and Biodiversity* will provide new impetus to the programmes of mitigation of the greenhouse gas emissions and spur the international community to counter the alarming loss of the Earth's genetic patrimony. With respect to the Climate Convention, a converging view emerged on the potential of "joint implementation" schemes for trasferring energy-saving technologies to non-OECD countries; however, joint implementation should be used as a mechanism for further reductions of greenhouse gas emissions, not as a resort to help stabilize emissions by the year 2000 at their 1990 levels.

The negotiating process for a Convention to fight the scourge of *desertification* in the most threatened areas of the Earth (such as Africa, including the Mediterranean Southern rim) must be accelerated. Financing the implementation of the future Convention is a matter of concern: also GEF's funds might be used, so long as projects show a clear link with the protection of one of the "global commons" already covered by the GEF.

The lack of a binding instrument for the conservation and good management of the word forests was deplored. The establishment of an intergovernmental Task Force on Forests, to include both boreal and tropical forests, is a first and urgent step for further negotiations aimed at a *global Forestry Convention*: a broad support emerged on this Malaysian-Canadian initiative which has the merit, among others, to take into full account the sovereignity rights of the holding countries.

The increasing *depletion of freshwater resources*, especially in areas of the world where water problems can lead to regional tensions, must be tackled through greater international and subregional cooperation.

Putting *science and technology at the service of global environment* is a common priority, to be pursued through the strengthening of the technological cooperation. Developed as well as developing countries should encourage the launching of well-defined programmes of technology partnership. In this context, more permanent and stable support for existing multilateral research initiatives is necessary.

The role of the *Global Environment Facility* (GEF) is essential to the sustainable management of the "global commons". The success of the ongoing negotiation on the GEF restructuring and replenishment is crucial to this aim.

Demographic Pressure on the Environment

The need to face the demographic challenge to the carrying capacity of the Earth by integrating demographic considerations and environmental policies is a priority.

Successful efforts to reduce rapid population growth and wasteful consumption patterns are essential to achieve sustainable development. The *"critical loads"* of the planet should be assessed, particularly for sensitive areas like the Mediterranean ecosystem.

Industrial countries were asked to earmark more resources for financing programs of family planning, infants and women protection in the developing countries. Multilateral development banks and institutions were asked for more commitment and transparency to this aim.

The forthcoming World Conference on Population and Development, to be held in Cairo next September, should also address all relevant environmental implications.

Environment, Economic Growth and Job Creation

International cooperation on the environment, far from hindering the economic development, can enhance employment and welfare.

Employment and growth opportunities are associated with investments in environmental infrastructure, energy efficiency improvements, innovative communication and transportation networks, clean-up of polluted areas.

Finally, there is an advantage for environment and employment from embodying into prices of goods and services the value of environmental resources. This double advantage (or "double dividend") can be achieved by tax reforms, which shift fractions of the tax burden from labour to natural resources. Anyhow, the aim to incorporate environmental costs into prices of goods and services should not be associated with punitive effects: hence, the importance to mix taxes with incentives and to take into preminent account the differences in national situations.

Financing Sustainable Development

Views are converging on the need to partially substitute merely financial commitments with a mix of *policies that integrate environmental objectives.*

The implementation of Agenda 21 could be therefore pursued more effectively:

- by reducing the currently high volume of environmentally damaging subsidies both in the industrialized and in the developing countries
- by resorting to market-based instruments, as ecotaxes, incentives, tradeable emission permits, debt-nature swaps, etc.

As regards the management of existing aid policies, an environmental orientation and a strenghtening of multilateral agencies were advocated. Indeed, the programmes of the multilateral development banks are critical to achieving the sustainable development objectives of the developing countries.

Trade and the Environment

Sound environmental and trade policies can be mutually supportive.

Environment regulation is not harmful to trade. In fact, environmental regulation that internalizes environmental costs into the price structure is essential if gains from trade liberalization are to be assured.

On the other hand, expanded trade is not instrinsically harmful to the environment insofar as using environmental resources more efficiently is the key to pollution prevention.

A broad support emerged to the establishment of a permanent Committee *on Trade and Environment* in the new structure of the World Trade Organization, which will be born from GATT next April at the ministerial Conference of Marrakesh. This Committee should be mandated with a well-defined work programme.

Environmental Risks from Nuclear Reactors in Central and Eastern Europe

Nuclear reactor safety in Central and Eastern Europe and in the former Soviet Union is a wide-spread concern: both health and environment are at risk pending this situation.

The G7 Countries have a primary responsibility in increasing technological and financial assistance to recipient countries: the activity of the working group on nuclear safety operating within the G7 context is to be further encouraged.

Confidence was expressed that the G7 Summit give the utmost attention to this alarming matter.

Hazardous Wastes Export

Transboundary movement of wastes, particularly of hazardous wastes, must be generally discouraged.

Export of hazardous wastes from industrial countries to non-OECD countries must be virtually banned. Well-defined exceptions to this principle should be allowed only for wastes to be recycled under strict safety conditions.

The oncoming session of the Conference of the Parties to the Basel Convention is a juncture not to be missed for strengthening the international discipline to this aim.

Overview of the Environmental Issues included in the last five Summit Declaration

Global Climate Change	
Paris (1989)	– support for the efforts to **limit emissions of carbon dioxide and other greenhouse gases**, especially those of the Intergovernmental Panel on Climate Change – need to strengthen the worldwide **Network of Observatories for Greenhouse Gases** and to support WMO to establish a Global Climatological Reference Network – need to improve **energy conservation and efficiency** through the development of relevant **techniques and technologies** as well as **economic measures** – need for new instruments such as a **Framework Convention on Climate Change** to set out general principles or guidelines to mobilize and rationalize the efforts of the international community
Houston (1990)	– support for the **negotiation of a framework convention on climate change** (UNEP/WMO) – development of cooperative scientific research including the **collection of satellite data on Earth** and its atmosphere as well as the establishment of an **International Network** – development of **new technologies and methods for energy conservation** as well as measures to reduce CO_2 and other greenhouse gas emissions – effort to improve **energy efficiency** and to develop **alternative energies**
London (1991)	– achievement of the **framework convention on climate change**, design and implementation of concrete strategies to limit net emissions of greenhouse gases – setting up of significant **actions to encourage the participation of developing and Eastern European countries** – need for **cooperation in scientific research** including satellite monitoring and ocean observation; welcome to the development of information services for users of Earth observation data – development and diffusion of **energy and environment technologies**, including proposals for innovative technology programmes
Munich (1992)	– commitment to **ratify the Climate Change Convention** by the end of 1993
Tokyo (1993)	– progress towards implementation and ratification of the **Framework Convention on Climate Change** by the end of 1993

Marine Pollution - Conservation of Living Marine Resources	
Paris (1989)	– condamnation of the indiscriminate use of oceans as **dumping grounds for pollution waste** – need to launch actions to contain and alleviate the consequences of **maritime oil spills** (monitoring, clean-up technologies), to ensure the largest adhesion to and implementation of the international conventions for the prevention of oil pollution of the oceans and to submit proposals for further preventive action – need to ensure the **sustainable management of the marine environment** and to conserve the living resources of the sea through international cooperation
Houston (1990)	– commitment in the comprehensive strategy concerning **land-base** sources of **pollution** – actions to avoid **oil spills** through the enforcement of International Maritime Organization Convention and the elaboration of an international oil spills convention – support for cooperation in the **conservation of living marine resources** to limit the impact of environmental degradation and unregulated fishing practices
London (1991)	– **comprehensive approach** to the oceans, including regional seas, for the sake of protection and sustainable management – urgent need for **effective monitoring and enforcement measures** to control marine pollution and compliance with the regimes established by regional fisheries organizations
Munich (1992)	– commitment to ensure the organization of the **international conference on straddling and highly migratory fish stocks**
Tokyo (1993)	– look forward to a successful outcome of the **UN Conference on straddling and highly migratory fish stocks**

Deforestation	
Paris (1989)	– call for the adoption of **sustainable forest management practices** – strong support for rapid implementation of the **Tropical Forest Action Plan** to promote a **sustainable use of tropical forests**
Houston (1990)	– support for the efforts of developing countries towards a **sustainable forest management**, proposal for a **pilot programme on tropical rain forests** in collaboration with the World Bank and the European Commission; reform of the **Tropical Forestry Action Plan** – start of negotiations on a **Global Forest Convention/Agreement** to curb deforestation, protect biodiversity,...
London (1991)	– agreement on principles for the management, conservation and sustainable development of all types of forests leading to a **framework convention** in a form acceptable to the developing countries and consistent with the objective of a future **global forest convention/ agreement** as set at Houston – welcome to the progress made in developing the **pilot programme for the conservation of the Brazilian tropical forest** in collaboration with the World Bank and the European Commission, financial support (private sector, NGOs, multilateral development banks, GEF, bilateral assistance) to the preliminary stage of the pilot programme
Munich (1992)	– commitment to establish an **international review process for the forest principles**, to seek possible appropriate **internationally agreed arrangements** and to encourage an **increased international assistance** for the implementation of those principles
Tokyo (1993)	– continue to seek appropriate **internationally agreed arrangements on the management, conservation and sustainable development of forests**

Stratospheric Ozone Depletion	
Paris (1989)	– need to fight against the depletion of the stratospheric ozone layer through the complete abandonment of the production and consumption of chlorofluorocarbons (**Montreal Protocol**) as soon as possible and not later than the end of the century – need to **amend the Montreal Protocol** and to promote the development and use of suitable substitute substances and technologies
Houston (1990)	– welcome to the **amendment of the Montreal Protocol**, encouragement to adhesion and ratification – establishment of a financial mechanism to assist developing countries to tackle ozone depletion
London (1991)	
Munich (1992)	
Tokyo (1993)	

Integration of Environmental Considerations in Other Policies	
Paris (1989)	– need to take into account environmental considerations in economic decision-making, as well as in trade, development, energy, transport and agriculture policies and to clearly assess the costs, benefits and resources implications of environmental protection to help governments take decisions – call for studies on techniques of analysis to assess appropriate economic measures to promote the quality of environment and for the development of **environmental indicators** (OECD)
Houston (1990)	– need for cooperative scientific and economic research and analysis on the environment to define **suitable tools for decision makers** – encouragement to OECD to achieve its very useful work on environment and economy, particularly the early development of **environmental indicators** and the design of market-oriented approaches to achieve environmental objectives
London (1991)	– support for the OECD work including the **environmental performance reviews** and the development of **environment indicators** for use in decision making
Munich (1992)	
Tokyo (1993)	

Cooperation with Developing Countries	
Paris (1989)	– need to provide **financial aid** (OAD debt forgiveness, debt for nature swaps) and **specific transfer of technology** to encourage developing countries take environmentally desirable actions
Houston (1990)	– **financial and technological assistance programmes** in favour of developing countries: multilateral development bank programmes including environmental impact assessments and action plans to protect environment and promote energy efficiency; debt-for-nature swaps; creation of a Global Environmental Facility
London (1991)	– mobilization of **financial resources** to help developing countries tackle environmental problems (see global climate change): possible role of GEF as a comprehensive funding mechanism to allow the adhesion of developing countries to new environmental conventions – encouragement of an improved flow of beneficial **technology** to developing countries, making use of commercial mechanisms
Munich (1992)	– commitment to provide developing countries with **additional financial and technical support** for sustainable development through official development assistance (ODA), in particular by replenishment of IDA, and, for actions of global benefit, through the GEF as a possible perma nent funding mechanism - welcome to the enhanced use of voluntary **debt conversions for environmental protection**
Tokyo (1993)	– ensure that the GEF functions as the financial mechanism to provide **funding for the incremental costs of implementing the global environment conventions** signed at Rio – welcome to the analysis by OECD/IEA on the **contribution of environment and energy technology** in meeting global environmental concerns

Biological Diversity	
Paris (1989)	
Houston (1990)	– actions to combat **desertification**, to expand projects to conserve **biological diversity**, to protect the **Antarctic**, to assist developing countries in their environmental efforts in collaboration with UNEP
London (1991)	– support for the negotiation of an acceptable **Framework Convention on Biodiversity** (protection of ecosystems, particularly in species-rich areas, without impeding positive developments in biotechnology)
Munich (1992)	
Tokyo (1993)	– progress towards implementation and ratification of the **Convention on Biological Diversity** by the end of 1993

Nuclear Safety	
Paris (1989)	– commitment to maintain the **highest safety standards** for nuclear power plants and to strengthen international cooperation in safe operation of power plants and waste management
Houston (1990)	– need for special efforts to ensure the **highest worldwide performance standards** for nuclear (and other) energy to ensure health and environmental protection
London (1991)	– urgent need to achieve and maintain the **highest available standards of safety**, including **waste management**, and to encourage cooperation especially with Central and Eastern Europe and ex-Soviet Union
Munich (1992)	– offer of help to the new independent States of the former Soviet Union and to Central and Eastern Europe to improve the safety of their nuclear power plants through a **multilateral programme of action**
Tokyo (1993)	– welcome the progress made in the **nuclear safety programme for the new independant States of the former Soviet Union and for Central and Eastern Europe** agreed at the Munich Summit, including the establishment of the **multilateral fund**, in which a broader participation is encouraged

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.