



**Concerted Actions of the EC Environment and
Climate Research and Development Programme**

Joint Statement - September 2000

The management of the water cycle according to the principles of sustainable development will preserve water resources for future generations. Can we neglect legacies from the past when heading for a more sustainable future?

MANAGEMENT OF CONTAMINATED LAND FOR THE PROTECTION OF WATER RESOURCES

**A COMMON POSITION OF THE EC CONCERTED ACTIONS
CLARINET – ETCA – SENSPOL
and the network NICOLE**

We are all dependent on water, - ecologically and economically.

A long history of environmental pollution is archived in soils and sediments. Water transfer through many contaminated sites across Europe results in unacceptable levels of contaminants leaching into the groundwater. Former industrial areas, contaminated agricultural soils, contaminated sediments and landfills are already causing a diversity of serious problems for land-use, groundwater (a major source of drinking water) and terrestrial and aquatic ecosystems. Land-use changes and climatic changes may turn more of the sinks of pollution that are present in soils and sediments into new sources.

On a technical level, following issues have to be addressed to solve perceived problems:

- prevention and reduction of pollution originating from contaminated sites, waste disposal sites and sediments,
- prevention and reduction of diffuse pollution originating from land uses, land use changes and climatic changes.

The perceived problems can only be solved by addressing land-uses and functions and promoting sustainable use of land, including contaminated sites. Solutions require interdisciplinary approaches that must fit in a socio-economic context, which requires a specific management framework.

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A management framework for sustainable solutions

Experiences show that remediating all soils and sediments by hard and fast technical means without considering the related side effects is not a solution according to the principle of sustainable development. Most problems cannot be solved by technology alone. CLARINET and NICOLE have promoted since their start Risk Assessment and sustainable problem solutions based on “suitable for use” as the two pillars for sound, long-term environmental management approaches, which can take socio-economic changes into account.

Risk Assessment and Risk Management are sufficiently developed to allow those responsible for contaminated land management to use them with confidence to ensure the safety of man and the environment. However, as in any science-based endeavour, there are areas where additional research would improve and advance the use of risk-based methodologies. Among others, the following areas can be identified:

- The appropriateness of sampling regimes used, reconciling optimisation of information collection with rapid decision making for remedial actions;
- Reliability of contaminants data and assumptions: indeed environmental effects depend on speciation and spatial temporal effect rather than “total” concentration and on reliable identification/characterisation of pathways;
- Improve effectiveness of in-situ technologies and confidence in natural attenuation; in this respect the use of chemical sensors, biosensors and biomimetic systems (devices that are now more a reality for industrial use rather than prototypes for validation) to characterise sites and to evaluate results of remedial actions is recommended;
- Exposure assessment and toxicology;
- Pollutant fate and transport models;
- Demonstration of source control and pathway interruption as risk management tools vs. source removal;
- Communication/education towards people, regulators and all kind of stakeholders and decision makers to tune the perceived risk with the assessed risk.

The aim of environmental risk management is to avoid developments which are not sustainable. Management strategies have to be further developed to deal with:

ECOLOGICAL ASPECTS

The identification and analysis of pollution and its impact on human health, water resources and other environmental receptors.

ECONOMIC ASPECTS

The relationship between soil and water contamination and suitable for use, which specifies the conditions for sustainable land-use in urban and rural areas.

SPATIAL PLANNING ASPECTS

Anticipation of landuse changes that may affect the release of pollution, registering landuse restrictions due to contamination or long term cleanup activities, planning of water use, river management.

Large excavations and offsite treatment or disposal were used to remove the pollution to make sites suitable for use as fast as possible. The price for these solutions is often very high, not only in terms of money but also in terms of environmental impact. Soil has a natural capacity to biodegrade certain

substances. If needed this process can be stimulated. In such cases so called in-situ technologies could be applied which meet lower costs and have a smaller overall environmental impact.

Scientifically valid criteria for sustainable use of soil and groundwater in extensive remediation projects are needed to support the decisionmakers to find the right balance between contaminated land remediation and environmental protection. For example, if a risk assessment shows that there remains sufficient time and the self-remediating properties are present in the soil, one could also decide to adopt an extensive approach; in such case a dedicated program for monitoring and control is necessary. Some of the requirements are already apparent:

- Biodegradation has to coexist with surrounding land uses
- The underground geohydrological 'climate' needed for optimal results may lead to restrictions in land use over a larger area
- Spatial planning, which mainly addresses the surface of the land, may have to extend into deeper layers.

With this Joint Statement, the Concerted Actions CLARINET, ETCA, SENSPOL and the NICOLE network aim to provide an input to identify urgently needed research priorities, to further progress towards the targeted **Sustainable Management of Contaminated Land**, which is a prerequisite for water resources protection.

RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION NEEDS

- low cost assessment and monitoring of bioavailability of pollution and its effects on both biodegradation and environmental risk;
- biogeochemical controls on biodegradation pathways;
- the impact of co-contaminants and natural organic matter on contaminant behaviour, adverse effects and biodegradation;
- contaminant behaviour in the vadose zone, including contaminant transport processes, sorption/bioavailability, and attenuation mechanisms (particularly degradation processes);
- controlled biodegradation in contaminant source areas including validation and refinement of existing computer models;
- improved monitoring and data interpretation techniques;
- improved understanding of contaminant transport and fate in consolidated and fractured aquifers;
- better knowledge about human exposure pathways;
- monitoring and stimulating the recovery of ecosystems;
- identification and characterisation of ecological requirements related to human land use;
- improved environmental risk management frameworks which consider ecotoxicological risk measures;
- risk management and communication procedures which take into account real and perceived risks;
- efficiency of remedial technologies in relation to risk reduction, costs, and environmental side effects.

Although not considered directly as research, field-scale demonstration sites are considered to offer opportunities for assessing, even from just economic aspects, new and existing, but not yet fully proven, technologies, as well as to increase confidence on biological methods and monitored natural attenuation and opportunities to compare Risk Assessment models.

WHAT IS URGENTLY NEEDED

In recent years, the EC RTD Framework Programmes have increasingly addressed real-world problems and the achieved results contribute to integrated solution approaches. Based on the recommendations and guidance provided by various stakeholders engaged in the Concerted Actions, on-going research activities in these Framework Programmes are moving into the right direction. Nevertheless, we still have to continue our efforts towards sustainable problem-solving approaches. We still have to increase our knowledge and techniques in environmental management to improve our possibilities to solve actual problems or bring them under control. Science, technology and environmental management have to work in concert. Hence the four Concerted Actions recommend that interdisciplinary research projects should be funded which can contribute to an improved risk management related to priority environmental problems. Only the combination of research and practical application will provide Europe with the right knowledge necessary for the sustainable management of environmental risks.

The Concerted Actions

The Concerted Actions CLARINET, NICOLE, ETCA, and SENSPOL were established as part of Environment and Climate RTD Programmes of the European Commission. They bring together the combined knowledge of various stakeholders, such as academics, government experts, consultants, industrial land owners and technology developers. An important role of these Concerted Actions is to support the co-ordination of RTD activities already financed and to guide future RTD initiatives to ensure a coherent and focused approach towards effective problem-solving approaches.

CLARINET – Contaminated Land Rehabilitation Network

CLARINET was initiated in 1998 and includes various stakeholders from 16 European countries. Primary objective are technical recommendations for sound decision making on the rehabilitation of contaminated sites in Europe and the co-ordination of related RTD activities.

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NICOLE – Network for Industrially Contaminated Land

NICOLE started in 1996 as a concerted action and has been self supporting since 1999. NICOLE is a network for the stimulation, dissemination and exchange of knowledge about all aspects of industrially contaminated land.

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ETCA – Concerted Action on Environmental Technologies

ETCA was launched in 1998. The tasks of ETCA include achieving the aim of the EU with regard to sustainability of industrial growth, preservation of the environment and improving the competitiveness of European enterprises.

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SENSPOL – Sensors for Monitoring Water Pollution

SENSPOL commenced in August 2000. This new European Thematic Network aims to enhance the development of sensors for monitoring environmental pollutants in water, contaminated soil and sediments.

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