



CLARINET

An Analysis of National and EU RTD Programmes related to Sustainable Land and Groundwater Management

A report from the Contaminated Land Rehabilitation Network for Environmental Technologies



Netherlands
Centre for
Soil Quality
Management and
Knowledge Transfer



Federal Environment Agency – Austria

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An Analysis of National and EU RTD Programmes Related to sustainable Land and ground-water Management

Report prepared by Working Group "RTD Programmes" of the Concerted Action "Contaminated Land Rehabilitation Network for Environmental Technologies" (CLARINET), funded by the European Commission, DG Research, under the Environment and Climate Programme and co-ordinated by the Austrian Federal Environment Agency.

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- Remediation of Contaminated Land. Technology Implementation in Europe - State-of-the-Art
- Review of Decision Support Tools for Contaminated Land Management, and their use in Europe
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- Proceedings of the CLARINET Workshop on Ecological Risk Assessment, April 17-19, 2001 Nunspeet, The Netherlands. S-TEC 2001
- Environment Agency for England and Wales, June 2001: Epidemiology Workshop on Human Health Tools and Techniques - Report; Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol BS32 4DU ISBN 1-85-705592-6
- Land Contamination & Reclamation, Vol. Nine - Number One, 2001; published by EPP Publications, 52 Kings Road, Richmond, Surrey TW10 6EP, UK, E-mail enquiries@epppublications.com
- Frank Swartjes, 2002: Variation in calculated human exposure: Comparison of calculations with seven European human exposure models - RIVM report 711701030; Amsterdam 2002

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FOREWORD

This report is the result of Working Group “RTD Programmes” of the network CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies), a project funded under the Environment and Climate Programme of the European Commission.

CLARINET provides an interdisciplinary network on the sustainable management of contaminated land in Europe, analysed key-issues in decision-making processes and identified priority research needs on technical, environmental and socio-economic topics. The network brings together the combined knowledge and expertise of academics, national policy makers, government experts, consultants, industrial land owners and technology developers from 16 European countries. The key objective of CLARINET was to identify the means for the effective and sustainable management of contaminated land in order to

- ensure the safe (re-)use of these lands

- abate caused water pollution

- maintain the functionality of soil and (ground-)water ecosystems.

CLARINET focused on the basis of currently applied risk-based procedures for land management in European countries, aiming to evaluate the current state of the art and to stimulate scientific collaboration on identified research needs in Europe.

To yield an integrated approach within the project, several interlinked working groups were identifying problem and solution related aspects for contaminated land management. Following themes have been addressed:

- Brownfields Redevelopment

- Impacts of Contaminated Land on Water Resources

- Remediation Technologies and Techniques

- Human Health Aspects

- Ecological Aspects related to Land Reuse

- Risk Management and Decision Support

Furthermore, one working group aimed to stimulate collaboration between various R&D Programmes on a European level.

Based on the identified state-of-the-art in these areas, integrative concepts and recommendations for tackling contaminated land problems have been investigated, taking the different approaches in the European countries into account. Needs for further research have been identified.

The individual working group results contributed in developing an overall conceptual framework for sustainable management of contaminated land (Risk Based Land Management). This concept is also available within this series of publications.

Martin Schamann

Federal Environment Agency, Austria

On behalf of the CLARINET Steering Committee and members of the network.

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1 SUMMARY

CLARINET established a specific Working Group on Co-ordination of RTD on an European level. Within this Working Group, programme managers from 11 European countries plus DG Research from the EU are aiming to stimulate regular communication and coordination between national RTD programmes on contaminated land issues. The Working Group has made a survey of national and EU research programmes related to sustainable land and groundwater management issues.

Some major findings of the CLARINET Working Group “RTD Programmes” are:

- Budgets of national RTD programmes in Europe add up to a total of about € 20 million /year and about € 10 million from the EU budget. Altogether, there are about € 30 million/year available for contaminated land and groundwater research across Europe. The annual investment in RTD for sustainable land management is less only about 0.03 % of the total cost of the problem.
- Before the Clarinet RTD Working Group there was no co-ordination whatsoever between national RTD programmes in Europe. The consequence is that all countries go through similar learning curves, resulting in a considerable overlap of research projects and targets.
- Eligibility for almost all national RTD programmes is restricted to their own national research community and activities. This means that cross-fertilisation and knowledge exchange among countries from focused partnership projects is not available.
- The dissemination of project findings through national RTD programmes is typically very modest. Opportunities provided by the WWW are not well used.
- There is no co-ordinated approach in focusing the various RTD programmes in Europe towards the major gaps in scientific knowledge.

The Working Group’s overall conclusion is that enhanced co-ordination between countries’ national research approaches will considerably increase the effects and yields of the resources invested in RTD. This will accelerate the provision of focused scientific knowledge, which is urgently needed to meet the demands for sustainable solutions in Europe (Towards a European Research Area, Commission of the European Communities 2000).

The CLARINET Working Group “RTD Programmes” recommends taking steps towards establishing a co-ordinated European research policy on contaminated land and water management, some major recommendations are:

- Providing a platform of research programme managers to exchange information on national research priorities, funding mechanisms and knowledge dissemination.;

- More coherent integration of national and European research activities. These could be achieved through a closer collaboration between various scientific and technological research organisations in Europe;
- A joint approach to the needs and means of financing large research projects in Europe. For example, European researchers and technology developers could test and compare their products at specific demonstration sites in Europe;
- Networking of existing centres of excellence and competence in Europe and the creation of virtual centres through the use of new interactive communication tools;
- Co-ordination of an agenda of joint research priorities and stimulation of trans-national RTD projects and European peer review of programmes;
- Stimulation of trans-disciplinary research involving more stakeholders in the projects;
- More attention should be paid to the dissemination of knowledge in national programmes. The focus should be shifted from pure knowledge supply to “information on demand”.

2 INTRODUCTION

CLARINET (Contaminated Land Rehabilitation Network for Environmental Technologies in Europe) is a Concerted Action within the European Commission's Environment and Climate Programme, which brings together the combined knowledge and expertise from regulators and experts from 16 European Countries. The key objective of CLARINET is to identify the means by which management of contaminated land can be applied effectively in a sustainable manner.

The CLARINET Overview Report over "Sustainable Management of Contaminated Land" presents a general vision on developing contaminated land and groundwater policies in EU countries. According to this paper, contaminated land and groundwater problems can be viewed from two policy perspectives. Polluted sites that pose a risk to human health or ecologies are generally considered as an environmental problem. On the other hand derelict land that does not cause any immediate risk may be considered as a spatial planning problem. The major trend in policy development is to address environmental issues and spatial planning issues simultaneously. Efforts to develop such an integrated approach have resulted in a shift in attention of policy makers from the assessment of problems to the formulation of solutions that will meet the needs of society.

Such an integrated risk-based approach needs to be based on comprehensive scientific knowledge. The development of such knowledge is managed through national RTD programmes in various European countries, and through the EC RTD Framework Programmes at a European Union level.

Since 1997, the European networks CARACAS (Concerted Action on Risk Assessment for Contaminated Sites in Europe) and NICOLE (Network on Industrially Contaminated Land in Europe), have identified priority research needs to extend and enhance the scientific and technical basis for sustainable contaminated land and groundwater management in Europe (CARACAS/NICOLE 1997, FERGUSON *et al*, 1998). These recommendations have been recently updated and further defined with the CLARINET RTD Needs Catalogue (KASAMAS, in prep).

While, many of these RTD priorities are addressed in some national RTD programmes, an European forum for research programme planners to exchange experience and to co-ordinate their work on a European level has been absent.

CLARINET established a specific Working Group on Co-ordination of RTD on an European level, to initiate this missing communication process between RTD programme planners in Europe. Within the Working Group "RTD Programmes", programme managers from 11 European countries plus DG Research from the EU are aiming to stimulate regular communication and coordination between national RTD programmes on contaminated land issues.

The aims of this working group are:

- to survey currently funded research issues related to contaminated land and groundwater in the various RTD programmes in Europe,
- to initiate collaboration and co-ordination between RTD programme managers in the European Member States and EEA countries (e.g. Norway, Switzerland).

This report summarises the findings of this CLARINET Working Group. It evaluates the current state of the art in RTD funding on contaminated land and groundwater related issues in Europe and provides recommendations for a future co-operation of RTD Programmes in the European Union.

It summarises key-information about various RTD programmes identified in European countries (incl. themes, topics, projects, contact details),

- It analyses the collected information to evaluate the state of the art in RTD funding on contaminated land issues in Europe,
- It gives recommendations for a more co-ordinated approach.

3 NATIONAL AND EU RTD PROGRAMMES

3.1 General Information

The Working Group “RTD Programmes” has made an inventory of national and EU RTD programmes related to contaminated land and groundwater issues. The working group invited all of the countries represented in CLARINET to present their national research activities/programmes. Eleven countries have responded to this request. Table 1 provides general information about these programmes.

Table 1: General information on Surveyed Research Programmes

	Title of research programme	Managed by	WWW information
<i>Austria</i>	Support of studies and R&D projects for remediation of contaminated sites	Kommunalkredit Austria AG Environmental support	www.kommunalkredit.at www.kommunalkredit.at/altlasten/F_E-Projekte/fe-projekte.htm (<i>English version</i>)
<i>Belgium</i>	OVAM R&D programme	OVAM Dienst Sanering	www.ovam.be www.ovam.be/english/multilang.asp (<i>English version</i>)
<i>Denmark</i>	The Danish EPA’s technology programme for soil and groundwater contamination Various programmes	Danish EPA. Cross-ministerial programme. Strategic Environmental Research Programme. Danish Ministry for trade and Industry.	www.mst.dk/homepage/ (<i>English version</i>) www.dmu.dk/1_english/default.asp (<i>English version</i>) www.smp.aau.dk (<i>English version</i>) www.biopro.dk (<i>English version</i>) www.dhi.dk www.imt.dtu.dk (<i>English version</i>) www.GEUS.dk
<i>Finland</i>	Various programmes	Various institutions	www.vyh.fi/eng/fei/fei/html (<i>English version</i>) www.vyh.fi/eng/research/r%5Fdprog/r_dprog.htm (<i>English version</i>)
<i>France</i>	Various programmes	Ministry MATE and ADEME	www.environnement.gouv.fr/english/default.htm (<i>English version</i>) www.ademe.fr/anglais/va/default.htm (<i>English version</i>)

Table 1: General information on Surveyed Research Programmes (continued)

	Title of research programme	Managed by	WWW information
<i>Germany</i>	National R&D programme of the federal Administration "Research for the Environment" (Forschung für die Umwelt)	Ministry BMBF	www.bmbf.de/ (in German) www.umweltbundesamt.de/index-e.htm (English version)
<i>Greece</i>	No national R&D programme, but various relevant projects	Ministries of Development and Agriculture and Environment	www.gsrt.gr www.minenv.gr (in Greek)
<i>Italy</i>	Various programmes, not specific for contaminated land issues	Mainly Ministry for Scientific Research, Ministry for Environment, Italian ANPA and National Research Council	www.minambiente.it (in Italian) www.sinanet.anpa.it (in Italian) www.idg.fi.cnr.it/homeeng.htm (English version) http://www.murst.it (in Italian)/
<i>Netherlands</i>	Centre for soil quality management and knowledge transfer	SKB	www.bodembreed.nl (in Dutch)
<i>Norway</i>	Pollutants: Sources, dispersal and effects "ProFo"	The Research Council of Norway	www.forskningsradet.no/english (English version)
<i>United Kingdom</i>	A variety of relevant programmes though none are dedicated solely to contaminated land issues, e.g. LINK Biological Treatment of Soil and water programme. CLAIRE network of contaminated land sites – a public/private partnership	Three research councils, three Environmental agencies and three Ministries (includes 7 regional development agencies)	www.bbsrc.ac.uk www.epsrc.ac.uk/programmes www.nerc.ac.uk www.environment-agency.gov.uk www.sepa.org.uk www.ehnsi.gov.uk www.detr.gov.uk www.dti.gov.uk www.scotland.gov.uk/who/dept_rural.asp www.claire.co.uk

Table 1: General information on Surveyed Research Programmes (continued)

	Title of research programme	Managed by	WWW information
EU	Fifth Framework Programme Theme: Environment and sustainable development	DG Research (D1.2) Key action: Sustainable Management and quality of water	www.cordis.lu/eesd/src/overview.htm#3 europa.eu.int/comm/research/fp5.html www.cordis.lu/fp5/home.html (<i>in all languages</i>)

Table 2 shows the focus of the various programmes inventoried. The programme may be general RTD programmes which include possibilities to address contaminated land and groundwater issues or may be solely be focused on contaminated land and groundwater only. Table 2 also indicates if the type of research that is undertaken is “basic”, “applied” or “demonstration”. Research programmes in this table have been categorised as:

- Programme is driven: managed on the basis of a prescribed series of research needs with boundaries of the content of projects to be financed (programme driven), or
- Demand driven: the programme is open for any initiative from the demand side.

Table 2: Focus of the Programmes Surveyed

	Focused on general or environmental R&D	Focused on contaminated land issues only	Type of research	Projects based on a tender to defined research needs (programme driven) or based on an open call (demand driven)
Austria	√	√	Applied/ Demonstration	Programme/Demand driven
Belgium		√	Applied/ Demonstration	Demand driven
Denmark		√	Basic/Applied/ Demonstration	Programme driven
Finland	√		Basic/Applied	Programme driven
France	√		Basic/Applied	Programme/Demand driven

Table 2: Focus of the Programmes Surveyed (continued)

	Focused on general or environmental R&D	Focused on contaminated land issues only	Type of research	Projects based on a tender to defined research needs (programme driven) or based on an open call (demand driven)
<i>Germany</i>		√	Basic/Applied	Programme driven
<i>Greece</i>	√		Basic	Programme driven
<i>Italy</i>	√		Basic/Applied	Programme driven
<i>Netherlands</i>		√	Basic/Applied/Demonstration	Programme for basic research Demand driven for applied and demonstration
<i>Norway</i>	√		Basic/Applied	Programme driven
<i>United Kingdom</i>	√		Basic/Applied/Demonstration	Programme/Demand driven
<i>EU</i>	√		Basic/Applied/Demonstration	Programme driven

The following general observations were made by the Working Group:

The mapping of the research was rather problematic. Some countries don't have a specific programme for sustainable land issues the research is part of discipline oriented programmes as biological or technical programmes. Other countries don't have any national funded research on sustainable land management. With respect to the programmes surveyed it may be concluded that:

- All programmes are initiated by ministries or agencies
- Half of the programmes are focused on contaminated land and groundwater issues only
- Almost all programmes execute mainly basic and applied research
- Most programmes have a well defined programme of research needs and only a few are also demand driven

3.2 Priority Themes

There are many ways to presents themes within the field of sustainable land and groundwater management. In this analyses information is presented according to the sequence of events in tackling of contamination: (i) establishing the nature of contamination; (ii) risk assessment to judge the fit for use of a site and (iii)

remediation and aftercare. This sequence might be applied for the management of contaminated land and groundwater, but also landfills or contaminated sediments. Table 3 shows the priority themes in the programmes.

Table 3: Priority themes of the national programmes

	Field of management			Nature of contamination		Fit for use			Remediation and aftercare			
	Contaminated Land and Groundwater Management	Landfill and mine management	Management of contaminated sediments	Characterisation	Natural Attenuation	Human health aspects	Ecological system functionality	Risk perception and communication	In-situ treatment of soil and groundwater	Ex-situ treatment of soil and groundwater	Groundwater protection	Monitoring
<i>Austria</i>		√			√		√		√			√
<i>Belgium</i>	√			√	√	√	√	√	√	√	√	√
<i>Denmark</i>	√	√		√	√				√	√	√	√
<i>Finland</i>	√			√		√			√		√	
<i>France</i>	√			√		√	√				√	
<i>Germany</i>	√	√			√	√	√	√	√		√	
<i>Greece</i>		√					√		√	√	√	
<i>Italy</i>	√		√				√		√	√	√	√
<i>Netherlands</i>	√	√	√	√	√		√	√	√	√		√
<i>Norway</i>	√		√		√		√	√	√			√
<i>United Kingdom</i>	√	√		√	√		√		√	√	√	√
<i>EU</i>	√	√	√	√		√	√		√		√	√

The Working Group found that:

- Most of the programmes are focused on contaminated land and groundwater, some on contaminated sediments. This is not surprising since some countries have large river systems with sediments,
- The most frequent themes are ecological effects and in situ treatment.

In general it may be concluded that the programmes cover the most important problems concerning contaminated land management, identified within the CLARINET project.

3.3 Research Funding and Eligibility

Table 4 summaries the research funding and eligibility for funding for the various programmes along with the programme duration and the levels of support offered.

Table 4: Research Funding and Eligibility

	Duration	Funding rate by programme	Total Budget in € Million	Eligibility
<i>Austria</i>	Not limited	Up to 100 %	About 1,5 a year	Not limited
<i>Belgium</i>	Not limited	Max. 50 % for demonstration 100 % for basic/applied	1 a year	Not limited
<i>Denmark</i>	Not limited for EPA program. Other programs - 2001	100 % of additional costs Net costs + 20%	About 2 a year for EPA program. About 1,7 a year for all other programmes	Not limited
<i>Finland</i>	Limitation is programme specific		Ministry: 0,4 a year Tekes: 1,3 in 5 years Research foundation: 0,2 a year Total: 0,9 a year	Not limited
<i>France</i>	Limited for ministry programme, not for ADEME	Up to 50 %	2 a year	Universities, Research institutes
<i>Germany</i>	Limited, some 1999 – 2000, some 2000 - 2005	Up to 100 %	6 for 1999 and 2000: 12.5 for 2000 to 2005 average 2,5 a year	Public/private sector, universities research institutes

Table 4: Research Funding and Eligibility (continued)

	Duration	Funding rate by programme	Total Budget in € Million	Eligibility
<i>Greece</i>			About 1,7 a year for soil and groundwater protection	Universities/ Research institutes
<i>Italy</i>	Programme durations are typically 3 years	Up to 100 %	Dedicated to contaminated land: not possible to estimate	Public/private sector, universities research institutes
<i>Netherlands</i>	1999 - 2003, possible extend to 2007	Up to 100 % for fundamental research. max. 60 % for applied research and demonstration	26 in 4 years average 6 a year	Fundamental research: universities. Applied and demonstration: not limited
<i>Norway</i>	PROFO 2000 - 2005	Up to 100 %	About 3 a year	Not limited
<i>United Kingdom</i>	Programme durations are typically 3 years but some continue for 5 or 7 years. Date range of programmes is 1993 onwards.	100 % for scientists and research institutes. 50 % for LINK projects which involve industry.	Approximate total for all programmes is 10 million per annum from 1995 onwards. Dedicated to contaminated land: not possible to estimate	UK universities and research institutes. For LINK programmes eligibility is extended to industry
<i>EU</i>	FP 5 1998 – 2002	100 % for concerted actions/thematic networks; up to 50 % (full cost) and 100 % (additional cost) for shared cost research	25 in the first two years, less in second part of the programme	Financial support is limited to member states and associated countries

Some observations of the Working Group are:

- It appears that in most countries the programmes are limited in time and budget.
- The average duration of the programmes is about 4 years.
- The budgets are quite different in the various countries.
- The total budget of all countries is about € 20 million/year the budget for ongoing FP 5 projects is about € 12 million/year. So the total research budget is estimated to be about € 30 million/year.
- Most programmes are limited to research institutes and universities, although some are open for project proposals from all stakeholders (e.g. the EU RTD programme).

4 PROGRAMME MONITORING

In this analyses two aspects have been considered with respect to the monitoring of programmes:

- The progress of programme in projects and budget etc and;
- The monitoring of the exploitation of the results of the programme.

Table 5 summarises how the programmes are monitored.

Table 5: Monitoring of the progress of the programme

	Monitoring of progress	Monitoring of the exploitation of knowledge
<i>Austria</i>	A 3 year assessment by external institute	
<i>Belgium</i>	Assessment by a steering group from members of OVAM and experts	The programme is demand driven, this is a way to guarantee exploitation of results
<i>Denmark</i>	For EPA projects a 5 year assessment by experts. For other programmes progress reports and final report	
<i>Finland</i>	Assessment by experts and programme mangers, updated by financing bodies case by case	
<i>France</i>	A yearly and a 3 year assessment by experts and policy making representatives	
<i>Germany</i>	A yearly and 4 year assessment by working groups	
<i>Greece</i>	Assessment by a steering group from relevant ministries and experts	
<i>Italy</i>	Financial report every 6 months Technical report every year In case of Ministry for Scientific and Technological Research: Committees of experts Definition of indicators and standards is pursued	
<i>Netherlands</i>	A annual assessment through a questionnaire among members of SKB	The programme is demand driven, this is a way to guarantee exploitation of results
<i>Norway</i>	A 4 year assessment by experts	

Table 5: Monitoring of the progress of the programme (continued)

	Monitoring of progress	Monitoring of the exploitation of knowledge
<i>United Kingdom</i>	Various: steering groups, formal end reviews, programme coordinators (in some cases), site visits, final reporting	This is a task of industry and other users of research such as regulators and ministries. The programmes do not generally monitor exploitation.
<i>EU</i>	A annual monitoring report and review by concerted actions and a 5 year assessment by external experts	Concerted actions are used to monitor the exploitation.

Some observations of the Working Group

- The progress of the programmes is in general monitored by scientific and financial experts;
- There is hardly any monitoring of the exploitation of the results of the programme.

4.1 Dissemination of Knowledge

The dissemination of the knowledge obtained from funded RTD projects is an essential issue of programme efficiency. Dissemination tools include: reports, websites, and/or more interactive ways such as Workshops and Meetings etc. Table 6 shows the ways in which knowledge from the programmes is disseminated.

Table 6: Dissemination of knowledge

	Reports	Knowledge exchange Meetings	Reports available on web-site	Others
<i>Austria</i>	√	In some cases	Only summaries	
<i>Belgium</i>	√	√	(English) summaries In the future complete (Dutch) reports	
<i>Denmark</i>	√	√	√	
<i>Finland</i>	√	√	√	

Table 6: Dissemination of knowledge (continued)

	Reports	Knowledge exchange Meetings	Reports available on web-site	Others
<i>France</i>	√	In some cases		
<i>Germany</i>	√	√	√	National recommendations/Guidelines for the implementation of R&D results
<i>Greece</i>	√	In some cases		
<i>Italy</i>	√			Promotion of training courses
<i>Netherlands</i>	√	√	√	Product Guide with a search possibility on keywords but also on remediation concepts and examples such as petrol station. Education programme to maintain expert knowledge.
<i>Norway</i>	√	√	√	Project guide updated each year
<i>United Kingdom</i>	√	√	In some cases	Poster and theme days, workshops Networks like NNAGS and PRM
<i>EU</i>	√	√	√	CORDIS, Workshops, proceedings, exchange of researchers and scientist, concerted actions

The working group found that:

- All programmes use the written report and only a few have additional instruments to disseminate the knowledge,
- The EU programmes use amongst others Concerted Actions to disseminate results and to update the state-of-the-art.
- The working group members all agree that more effort should be spent on the dissemination of knowledge
- The internet is not currently being used to its full potential.

4.2 International Collaboration

International collaboration provides a significant opportunity to accelerate development of scientific knowledge and dissemination. Table 7 indicates if and how opportunities for international co-operation is provided in national RTD programmes

Table 7: International co-operation

	Programme open for funding of international participation	The programme has ongoing or terminated international projects	Bilateral agreements
<i>Austria</i>	No		
<i>Belgium</i>	Yes	No	Netherlands (informal)
<i>Denmark</i>	No		
<i>Finland</i>	No	No	No
<i>France</i>	No		
<i>Germany</i>	Yes		USA
<i>Greece</i>	No		
<i>Italy</i>	No		
<i>Netherlands</i>	Yes	Yes	
<i>Norway</i>	No	Yes: expert exchange only	
<i>United Kingdom</i>	No	Yes: expert exchange only	
<i>EU</i>	Yes	Yes	USA, Australia, New Zealand, etc

Some observations of the Working Group

- It is clear from Table 7 that, except within the EU framework programme, there is hardly any scope for international co-funding at the programme level.
- Some programmes have schemes for the exchange of experts but otherwise co-operation in projects is in most cases not feasible.
- Only Germany and the EU have special bilateral agreements on research with non-European countries like the USA.

5 EVALUATION AND CONCLUSIONS

Research plays a central role in the implementation of public policy. In areas such as health and sustainable development policy options and decisions must be based on solid scientific knowledge and a comprehensive understanding of the environmental, economical and social aspects of the specific problems under discussion. Complex matters like sustainable land and water management requires involvement of societal, economic and scientific stakeholders for integrative problem-solving approaches. In this regard, RTD programmes are an excellent instrument to facilitate the effective implementation of sustainable policies. (CARACAS/NICOLE, 1997).

International co-operation in research would accelerate the development of a portfolio of appropriate knowledge needed to implement sustainable land and water management policies efficiently, international co-operation is also a way to spend the limited budget more efficient. The European Union provides a legal basis to initiate suitable measures for international co-operation in research and technological development, but the principal reference framework for research activities in Europe is national. Co-operation among the national RTD programs is therefore an important condition for this acceleration of knowledge development. However, the analyses of national and EU programmes performed in the CLARINET Working Group “RTD Programmes” have revealed that in real-life current management practice for sustainable land management RTD falls short of what might ideal practice for international collaboration.

Some major findings of the CLARINET Working Group “RTD Programmes” are:

- Budgets of national RTD programmes in Europe add up to a total of about € 20 million /year and about € 10 million from the EU budget. Altogether, there are about € 30 million/year available for contaminated land and groundwater research across Europe. The costs for contaminated land remediation in Europe are estimated to be at least about € 90 billion (EEA 2000). This means that the annual investment in RTD for sustainable land management is less only about 0.03 % of the total cost of the problem.
- Before the CLARINET Working Group “RTD Programmes” there was no co-ordination whatsoever between national RTD programmes in Europe. The consequence is that all countries go through similar learning curves, resulting in a considerable overlap of research projects and targets. Up to now, there has also been a lack of co-ordination between national and EU research programmes. Overall, the missing co-ordination of RTD activities in Europe is likely to result in parallel expenditures and less efficient management of the very limited resources for European research.
- Eligibility for almost all national RTD programmes is restricted to their own national research community and activities. Only a few countries provide limited funding possibilities for the exchange of experts with other countries, but real co-operation on a project level is rarely feasible. This means that cross-fertilisation

and knowledge exchange among countries from focused partnership projects is not available.

- The dissemination of project findings through national RTD programmes is typically very modest. Opportunities provided by the WWW are not well used. The advantages of broad dissemination of project results at a European level do not seem to have been given particular consideration by most national RTD programmes so far. This situation has been one of the main reasons for the creation of various contaminated land and groundwater stakeholder networks in Europe over the past few years. A major aim of all these networks has been “to disseminate knowledge”. A co-ordinated approach by various European RTD programmes would be of substantial benefit in this regard.
- There is no co-ordinated approach in focusing the various RTD programmes in Europe towards the major gaps in scientific knowledge. The stakeholder networks CLARINET (regulators) and NICOLE (industry) have identified priority research issues needed to implement sustainable solutions for contaminated land and groundwater related problems in Europe (CARACAS/NICOLE, 1997, FERGUSON *et al.*, 1998). So far, these research recommendations do not appear to be considered in all national research programmes.

The Working Group’s overall conclusion is that enhanced co-ordination between countries’ national research approaches will considerably increase the effects and yields of the resources invested in RTD. This will accelerate the provision of focused scientific knowledge, which is urgently needed to meet the demands for sustainable solutions in Europe (Towards a European Research Area, Commission of the European Communities 2000).

6 RECOMMENDATIONS TOWARDS EUROPEAN RESEARCH APPROACH FOR SUSTAINABLE LAND AND WATER MANAGEMENT

The CLARINET Working Group “RTD Programmes” recommends taking steps towards establishing a co-ordinated European research policy on contaminated land and water management. Such a co-ordinated approach would be in line with recent EU recommendations for a future European research policy (Towards a European Research Area, Commission of the European Communities; 2000). Some of these measures, in accordance with these EU recommendations should be:

- Providing a platform of research programme managers to exchange information on national research priorities, funding mechanisms and knowledge dissemination. The established CLARINET Working Group “RTD Programmes” could be a suitable starting point for such European platform;
- More coherent integration of national and European research activities. These could be achieved through a closer collaboration between various scientific and technological research organisations in Europe. The stakeholder networks such as NICOLE, CLARINET and ANCORE could provide a suitable platform to interlink and co-ordinate available resources and facilities towards a future “research infrastructure” for contaminated land and groundwater at a European level. The involvement of various stakeholders in such an activity would enable a far-reaching implementation of achieved research results into the formulation of problem solving approaches;
- The EU might consider to promote international collaboration by a 10 % bonus on the overall funding of international RTD projects;
- A joint approach to the needs and means of financing large research projects in Europe. For example, European researchers and technology developers could test and compare their products at specific demonstration sites in Europe;
- Better use of instruments and resources to encourage investment in research and innovation: systems of indirect aid (within the Community rules on State aid), patents, risk capital;
- Networking of existing centres of excellence and competence in Europe and the creation of virtual centres through the use of new interactive communication tools;
- More abundant and more mobile human resources:
 - Increased mobility of researchers and introduction of an European dimension to scientific careers;
 - Stimulating young academics for research careers in land and water management;
 - Bringing together the scientific communities, companies and researchers of Western and Eastern Europe;

- Co-ordination of an agenda of joint research priorities and stimulation of trans-national RTD projects and European peer review of programmes;
- Stimulation of trans-disciplinary research involving all stakeholders in the projects;
- More attention should be paid to the dissemination of knowledge in national programmes. The focus should be shifted from pure knowledge supply to “information on demand”.

7 REFERENCES

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- FERGUSON, C. C. *et al* (1998): Risk Assessment for Contaminated Sites in Europe: Volume 1, Scientific Basis. LQM Press, Nottingham. ISBN 0953309002

ANNEX 1

Contacts

Contacts

Contacts / Working Group Members

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ANNEX 2

National RTD Programmes (as of 2001)

AUSTRIA

Introduction

Research in the field of contaminated land management does not play an important role. Projects are focused on the situation in Austria, so far international co-operation as regards funding of projects is not given. The EU projects CARACAS and CLARINET gave input to stimulate research activities. The Law for Environmental Funding and the Law for the Clean-up of Contaminated Sites create the most important legal basis for funding of research projects in the field of contaminated land.

R & D Topics

Based on results of the Clarinet project and under the co-ordination of the Federal Ministry for Agriculture, Forestry, Environment and Water Management main research topics in the field of contaminated land have been stipulated firstly in February 2001. This compilation of research topics shall support on the one hand donors in evaluating submitted projects and on the other hand applicants for focusing projects towards thematic priorities. The stipulated research topics shall serve as flexible instrument, being regularly updated with respect to identified research needs.

These activities are integrated part of the Framework Programme for Research of the Federal Ministry for Agriculture, Forestry, Environment and Water Management aiming to thematically link research activities in order to implement projects and to apply research results most efficiently.

At present the following main research topics have been identified:

- site characterisation
- fate and transport of contaminants
- risk assessment
- remediation technologies
- contaminated land management

National Research Programmes

Law for Environmental Funding

The Law for Environmental Funding provides - among other topics - funds specifically focusing on research in the field of contaminated land management. Subject for funding is the development and application of advanced technologies, minimising emissions as well as contaminants remaining on site. The final responsibility for funding of projects is by to the Minister for Agriculture, Forestry,

Environment and Water Management. Evaluation of project proposals as well as handling and controlling of projects has been charged to a bank - Österreichische Kommunalkredit AG. A special commission advises the Minister with respect to funding of submitted projects. The funds for research activities are created through charges on the disposal and export of waste and its intermediate storage.

In the past ten years 15 projects have been funded. The total amount of provided money is approx. € 3,5 mio. Four of these projects are already completed. Maximum annual budget allocated for funding is app. € 3 mio. Main research topics are improving of existing and development of new technologies, additionally projects deal with site characterisation, fate and transport of pollutants and decision support tools.

Law for the Clean-up of Contaminated Sites

The Law for the Clean-up of Contaminated Sites entered into force in 1989. Main interest is the financing of remediation projects in Austria. Apart from this the law provides the possibility for funding of projects focusing on the topics 'investigation' and 'risk assessment' of contaminated sites. Granting of funds is in the responsibility of the Federal Minister for Agriculture, Forestry, Environment and Water Management. Similar to funding referring to the Law for Environmental Funding, money is created through charges on waste treatment.

Since 1989 four projects aiming at developing methodologies for preliminary site assessment and investigation have been funded. The total amount of funds already provided by the Ministry is € 1,400.000.-

Both in execution of the Law for Environmental Funding and the Law for the Clean-up of Contaminated Sites there are no calls for proposals - projects can be submitted at any time and are evaluated in the light funding at single case basis. Both programmes are not terminated. Reports about project's results are obligatory - so far only in German language.

BELGIUM

National research programmes on contaminated land issues

Introduction

In Belgium research funding is not vertically organized in different R&D programmes for the different disciplines, but horizontally by organizations supporting research on different levels such as pH grants, postdoctoral fellowships, ... Two such organizations are operative: IWT (Institute for the Promotion of Innovation by Science and Technology) and FWO (Fund for Scientific Research). Although research funding for contaminated land issues is integrated in their general programmes, these will not be discussed here.

The Flemish Waste Agency (OVAM), the administration responsible for the implementation of the Decree on Soil Remediation, runs a R&D programme specifically for contaminated land issues. Research projects responding to a direct necessity in the functioning of the OVAM are supported.

Objective of the R&D programme of the OVAM

The objective of the OVAM R&D programme is to stimulate soil and groundwater protection and the remediation of contaminated land by funding either projects supporting the policy on soil remediation, or projects involving technical and scientific research.

Subjects of research are: risk assessment and soil standards, developing new technologies for more efficient soil remediation (BATNEEC-principle), developing methodologies for monitoring of soil remediation projects, ...

Management

The total budget for this R&D programme is about one million EURO per year. The duration of the project can vary from a few months till several years. The projects are selected according to the direct necessity for the functioning of the OVAM.

For research projects for the development of remediation techniques a financial participation of the private sector for at least 50% is required.

Monitoring

Projects are assessed by a steering group with OVAM members and experts.

Dissemination of knowledge

Depending on the subject different ways of dissemination can be chosen. A meeting can be organized for the different stakeholders (e.g. community officials for communities with a similar problem). The press can whether or not be invited on these meetings.

Reports with results of the research projects (including guidelines for application, etc.) are published by the OVAM. Stakeholders are informed about these publications.

Project leaders are stimulated to present results on international forums and to publish the results in the scientific press.

International collaboration

The program is open to international collaboration. For instance, in 2001 several projects will be started in collaboration with SKB in the Netherlands.

DENMARK

DANISH ENVIRONMENTAL PROTECTION AGENCY

R & D programmes on soil contamination in Denmark

- EPA's Technology Programme for Contaminated Soil and groundwater (App. 20 projects)

Sub-programmes on SVE and bioventing, air sparging, phytoremediation, reactive permeable walls, degradation under natural conditions, etc.

For further details please look at: <http://www.mst.dk/publica/>

- Financing Agency: Danish Environmental Protection Agency
- Contact: Danish EPA
- Duration- not limited
- Funding: 15 mio. DKK / year.
- Centre for Microbial Processes in Contaminated Soil and Sediment (6 projects, 9 partners).
 - Financing agency: Strategic Environmental Research Programme (Cross-ministerial programme)
 - Contact: Centre leader: Geological Survey of Denmark and Greenland (GEUS)
 - Duration 2002
 - Funding: 4 mio DKK / year.
- Centre for Sustainable Land Use and Management of Contaminants, Carbon and Nitrogen (9 projects, 12 partners)
 - Financing Agency: Strategic Environmental Research Programme
 - Contact: Research Centre RISØ
 - Duration 2001
 - Funding: 2 mio. DKK / year
- Centre for *In-situ* Venting of soil and groundwater (CEVENT) (8 partners)
 - Financing Agency: Danish Ministry for trade and Industry
 - Contact: DHI
 - Duration 2001
 - Funding: 2 mio DKK / year
- Project: Population Ecology of Bacteria Introduced into Polluted Soils (2 partners)
 - Funding Agency: Danish Research Council
 - Contact: Geological Survey for Denmark and Greenland (GEUS)

FINLAND

R & D activities on soil contamination in Finland

Problems related to contaminated soil and soil remediation in Finland are controlled by the Environmental Protection Act and Decree (2000). Also other legislation is associated with these problems, the Waste Act (1994) and the Environmental Damage Act (1996) among others. Contaminated soil issues belong to the Ministry of the Environment and to the 13 Regional Environmental Centres. The regional centres are also the permitting bodies for remedial actions within their region.

Many state research institutes like Finnish Environment Institute (FEI), Technical Research Centre of Finland (VTT) and Geological Research of Finland (GTK), universities and consulting companies carry out R&D concerning remediation of contaminated soil, both from the scientific and the practical aspect.

R&D-programmes related to soil remediation are mainly financed by

- environmental administration
 - R&D-programme of FEI
 - the Finnish Environmental Cluster Research Programme 2000-2002
- National Technology Agency (TEKES)
 - practical applications
- Academy of Finland
 - scientific research
- foundations such as the Maj and Tor Nessling Foundation
 - scientific and practical

The programmes are intended for Finnish applicants but co-operation with foreign researchers is also possible under certain circumstances. Through these programmes nearly €1 million is annually used in Finland for the R&D related to contaminated soil and soil remediation.

The priorities of the R&D on contaminated soil are

- source and risk management
- characterisation
- biological remediation methods and *in situ* techniques in the Finnish environmental conditions and in cold climate

The duration of the programmes varies from 3 to 5 years. The programs of the administration are perpetual but they are updated every three years.

The results of the programmes and individual projects are introduced in conferences, seminars and workshops. Scientifically important results are published in English as a rule. Practical applications are published mainly in the Finnish publication series

and to some extent in relevant foreign newsletters. The use of web-sites is highly recommended or required.

FRANCE

National research programmes on soil pollution

In France the Ministry of Environment (MATE) and the Agency for Energy and environment (ADEME) are the main stakeholders for research programmes.

Recently one specific centre of research was created on the subject (CNRSSP Douai). For the main other research, the different research organizations (CNRS, INRA, BRGM, INERIS, Universities) are partly active in soil pollution. Specialisation exists only for radionuclides with CEA and IPSN or in the field of hydrocarbons.

If we speak more at the national level, the MATE (and ADEME) have set up different types of programmes

1. Programmes on contaminated soils which will be more developed here.

ADEME is involved mainly on soil rehabilitation on remediation.

2. Programmes on the environmental functions of soil considering soil quality but also air, water on food chain quality. (10 millions of Francs).

Projects are now financed :

- to set up methods to characterize mobility on bio-availability of trace elements (isotopic, cinetic ...).
 - to characterize the effect on microbial on biological activities.
 - To map the geo-chemical background at different scales.
 - To have good indicators to follow soil quality soil pollution, soil degradation which can be used on the monitoring sites.
3. A programme of 5 years financed 4,5 millions a year by the MATE and ADEME was accepted in 2000 devoted to a soil monitoring system with 2100 sites (500 correspond to the European sites for forest, 1600 to soils with others occupations). A bank of samples and of data are included in the system.

Contamianted soils

The choice was made to set up with the regions a few « sites ateliers of research » on the more representative types of pollution, corresponding to the main type of industrial pollution (smelters, cockeries).

Research programmes

A better understanding of the fate of contaminants such as elements (Pb, Cd, Zn, ...) or substances (HAP, chlorinated Compounds, ...) is needed to make risk assessment and to manage contaminated sites. The behaviour of contaminants such as mobility (lateral and /or in depth transfer, ...), speciation, and transformation (oxidation, reduction, precipitation, neo-formation, ...) etc. are useful for such purposes.

To increase the efficiency of research programmes, all the scientists were working on the same sites. Criteria used to choose contaminated sites were the following :

4. one site with a monometallic pollution (Pb).
5. one site with a polymetallic pollution (Pb, Cd, Zn, ...). The plant is in activity.
6. one site with a polymetallic pollution (Pb, Cd, Zn, ...). The plant stops its activity 40 years ago.
7. one site contaminated with organic substances (HAP, ...). The plant stops its activity about 30 years ago.
8. one site contaminated with organic substances and elements. The plant stops its activity about 30 years ago.

More than 25 projects were conducted on sites 1,2 and 3 by scientists funded by the French Ministry of Environment and the Nord Pas-de-Calais Region. A synthesis was made for data collected on site 1. Very soon a synthesis will be ready for data collected on sites 3 and 2 (a symposium will be organized in 2000).

About to projects are conducted on sites 4 and 5. This programme will be finished in less than 2 years.

Outcomes

Data collected on these sites at an interdisciplinary level by scientists will be useful :

1. to get a better understanding of mechanisms and processes involved in the behaviour of pollutants. That can be used to predict the fate of contaminants contained in contaminated soils,
2. to improve the risk assessment of polluted sites. Indeed, the total amount of potentially toxic elements cannot be used as the only one criterion of pollution. It is also very important to know the fraction which is mobile or bio-available,
3. to manage contaminated sites. A better knowledge of the behaviour and of the fate of pollutants will allow more appropriate solutions to control the pollution.

Development

Some of these sites (3 and 4) can be used for European programmes. In particular, data harvested on these sites will be very useful to validate risk assessment procedures at national and European level. They can be used also to compare methodologies developed to manage such contaminated soils.

GERMANY

Executive Summary

The federal funding system is based on an RTD programme “Research for the Environment” (Forschung für die Umwelt) initiated in September 1997. Recent initiatives launched in this programme address Reactive Barriers Technologies, prognosis of landfill leachate, Monitored natural attenuation, and brownfield redevelopment. The overall amount for contaminated land related RTD (soil and groundwater) by federal and provincial sources in Germany is estimated within the range of € 10-15 million per year.

Introduction

Organisation and funding of RTD projects which are addressing particular local problems is in the responsibility of the German provinces (Länder). RTD funds are mainly granted to innovative demonstration projects and to the development of guidelines. An Internet site is available at <http://www.mi.sachsen-anhalt.de> which informs about province-specific RTD initiatives.

Federal RTD funding is addressing problems beyond the provincial dimension and which falls within the responsibility of the federal government. The federal funding system is based on an RTD programme “Research for the Environment” (Forschung für die Umwelt) initiated in September 1997. This programme regulates RTD initiatives taken by those federal ministries which are responsible for contaminated site related issues, such as

- Ministry for Education and Research (www.bmbf.de)
- Ministry for the Environment (www.bmu.de)
- Ministry for Transportation, Building and Housing (www.bauministerium.de)
- Ministry of Defence (www.bmvg.de)

The Ministry of Education and Research (BMBF) is responsible to organise and co-ordinate the federal funding programme, and to initiate specific RTD programmes on the federal level.

The Federal Ministries are supported through Federal Agencies, such as

- Environment Agency (www.umweltbundesamt.de)
- Agency for Spatial Planning of Federal Properties (www.bbr.bund.de)
- Directorate for Financial Administration of Federal Properties (www.oberfinanzdirektion.de)

Moreover, there are Federal Foundations (www.dbu.de) which are also funding specific cases for contaminated sites related RTD, if this is in public interest and supporting SMEs.

The overall amount for contaminated land related RTD (soil and groundwater) by federal and provincial sources in Germany is estimated within the range of € 10-15 million per year.

Content of programme

Mission

The Federal RTD Programme “Research for the Environment” aims to stimulate innovative developments in economy and society for

- shaping regional and global environments
- facilitating sustainable development
- stimulating environmental education

Themes

The RTD Programme “Research for the Environment” covers contaminated sites related topics in

- conurbations (cities, industrial areas)
- risk assessment
- remediation technologies
- water- & waste treatment
- surface water protection and rehabilitation

Available Budget and Duration

The BMBF has started following RTD initiatives recently:

1999 - Application of Reactive Barriers for Site Remediation (€ 5-8 million for 2 years duration)

1999 – Prognosis of leachate in landfills (€ 5 million for 2 years duration)

2000 – Monitored natural attenuation (€ 25 million for 5 years duration)

2000 – Brownfield Redevelopment (€ 25 million for 5 years duration)

The RTD project funding is up to 50% of the total costs for business, trade and industry; for others up to 100% of the total costs.

Eligibility

To be eligible for funding, RTD projects need to

- address applied science for demand driven RTD priorities
- include new or improved concepts
- be interdisciplinary

- take cost/benefit evaluations into account

There is no legal claim to obtain funding. Funds will be preferably granted to organisations and enterprises located in Germany

Monitoring & Control

Control of RTD progress through expert panels. Publication, presentation of results is obligatory. A technological implementation plan is a requirement in the application phase for funding.

Information transfer

Reports of RTD results have to be published and distributed to the potential target groups. Presentation of RTD results at seminars and conferences required. Related costs for publications is eligible for funding.

International Co-operation

Funding of international RTD projects is possible through sub-contracting foreign companies or funding the German partner in an international collaboration project. However, funding of parties outside Germany is not possible, because German law needs to be applied.

GREECE

Summary (27-11-2000)

Contaminated land has not been classified as a first priority environmental problem in Greece, mainly due to the availability and good quality of water resources until now. For this reason, the Greek environmental policy today does not include specific instruments for contaminated land management and there are no specific National R&D Programmes in the field of contaminated land.

Nevertheless, in the last years, there has been considerable interest in rehabilitation activities, mainly concerning municipal waste disposal sites, but also contaminated land in mining areas. In this regard, several relevant projects are performed currently, funded and supervised mainly by the Ministry of Environment (YPEHODE). For their realization, national resources are used, or resources from the Community Support Framework (C.S.F.) of Greece. Of the above projects, a small part concerns R&D projects.

The majority of R&D projects is included in National R&D Programmes, planned and supervised by the General Secretariat for Research and Technology (GSRT), which is one of the Secretariats of the Ministry of Development. They are mostly in the field of groundwater and soil protection in waste disposal and mine sites and of the In-situ / Ex-situ treatment of soil and groundwater.

All national R&D projects, mentioned above, are included in the C.S.F. of Greece and their total budget amounts to € 1,7 Million a year. Their progress is monitored by steering groups from relevant Ministries and experts.

It is worth mentioning that a number of research projects, many of which are funded by the Ministry of Agriculture, address land contamination problems due to agricultural activities.

Generally, research on contaminated land is carried out by Greek Universities and Research Institutes, such as (mainly): the *National Technical University of Athens (NTUA) / Laboratory of Metallurgy*, the *National Agricultural Research foundation (NAGREF) / Soil Science Institute*, the *Aristotle University of Thessaloniki / Environmental Pollution Control Laboratory, Chem. Technology & Industrial Chemistry Sector*, the *Agricultural University of Athens*, the *University of Patras / Laboratory of Hydrogeology*, the *University of Aegean*, the *Technical University of Crete / Dept. of Environmental Engineering*, the *Institute for Geology & Mineral Exploration (IGME)*.

Information:

Fotini Boura / Ministry of Environment - Solid Waste Management Section

Nimfodora Papassiopi / N.T.U.A. - Lab of Metallurgy

Panagiotis Panousis / General Secretary of Research & Technology - Planning & Programming Div.

ITALY

Only recently, Laws No.22/97 and No.426/98 (Polluted sites of National interest) and the following technical regulation D.M 471/99 recognised the importance of a national policy on contaminated land problems, which were previously regulated on a regional level. At present, in Italy there exists no specific national R&D programme relevant to contaminated land.

The Italian governmental institution in charge of promoting national-wide research programmes is the Ministry for the Scientific and Technological Research (MURST), but a relevant role in research funding can be played by the Ministry for the Environment, the National Environmental Protection Agency (ANPA) and the National Council for Research (CNR).

The Ministry for the Scientific and Technological Research (MURST) (<http://www.mur.st.it>) defines the National Research Plan and is responsible for the definition, monitoring and evaluation of scientific and technologic research national programmes. MURST funding system is based on two different ways: the top-down and the bottom-up approaches. The top-down approach consists of calls for project proposals under strategic RTD programmes, whereas the bottom-up approach provides funds to individual research projects on a demand-driven basis.

With concern to contaminated sites related issues, a R&D programme on soil remediation technologies has been launched under the National Research Program 15. It supported by over € 6,5 million a 4 years project (1997-2001) concerning in-situ and on-site bioremediation techniques, in situ vitrification techniques and training courses.

Another funding possibility for contaminated land related research is within the special fund for supporting the industrial research, since an extra fund has been established to enforce RTD in “depressed regions in the country”, including large dismissed industrial areas. In 1996, € 425 million were allocated on this fund and addressed to 29 specific issues (clusters). Although the contaminated soil and groundwater issues were not directly indicated, some funded projects concerned remediation technologies and land rehabilitation.

A relevant part of basic research on contaminated land is carried out by University Departments, which are partly funded by MURST and partly by external contractors.

Monitoring and evaluation of research programmes and strategies are performed by Committees of experts, (e.g. for research policy, for research evaluation), on the basis of projects reports as well as definition of quality indicators and standards.

The Ministry for the Environment (<http://www.minambiente.it>) and the National Environmental Protection Agency (<http://www.sinanet.anpa.it>) promote research projects addressed to environmental protection and restoration. Although there is not a strategic RTD programme related to land and groundwater contamination, ANPA is supporting some research projects on land remediation, with a special focus

on phytoremediation and bioremediation techniques. Beside ANPA, Regional Agencies for the Environmental Protection (ARPAs), as well as regional and municipal public authorities play a minor role as research founders. The funded research projects are usually not under strategic programmes and would be difficult to sort a complete list.

The National Research Council (CNR) is defined (legislative decree 19/1999) as a "national research organization, with general scientific competence and with scientific research institutes distributed over Italy, which carries out activity of primary interest for the promotion of science and the progress of the Country". It plans the research activities on a triennial basis. "Soil contamination" is one among 27 selected main research streams for funding.

At present, all research initiatives of the institutions above are not coordinated and listed into a national inventory. As result, it is difficult to estimate the total budget addressed to land contamination issues. The perception is that most of the budget is addressed to the development and demonstration of remediation techniques.

As far the international research cooperation is concerned, it is mainly encouraged by European Commission Research Programmes.

THE NETHERLANDS

Introduction

The R&D on sustainable land management is managed by the Centre for soil quality management and knowledge transfer, SKB. The SKB is dedicated to the quality of the soil from the point of view of controlled risks for man and the environment, without losing track of the financial aspect. In other words, the SKB wants to contribute to more efficient methods for soil remediation and to the development of soil protection and soil management as instruments for preventing (further) soil contamination. The SKB is a co-operative body involving all parties interested in soil management, i.e. trade and industry as well as the authorities. Initially, the activities will be set up for a period of four years (1999-2002), with a possible continuation until 2009.

Content of programmes

Mission

To develop and to disseminate knowledge about the functional and cost-effective realisation of a soil quality appropriate to the desired use. The mission perfectly matches the new Dutch government policy on soil remediation, i.e. functional remediation and cost-effective contaminant removal. This policy is known by its acronym, BEVER.

Themes

The SKB anticipates initiatives in the following areas of attention:

Urban development and restructuring

Integration of the new development and the restructuring of urban centres in combination with the remediation of contaminated locations, such as former (gas) works sites.

Restructuring natural areas

Nature development and re-designation of agricultural areas in combination with the remediation of former dump sites and contaminated dredging sludge.

Water systems management

Integrating the management of surface water and deep groundwater with the quality of the soil, which consists of earth and groundwater.

Remediation of existing contaminated locations

Developing cost effective remediation strategies and methods for contaminated locations, in which risk assessment, environmental merit, weighing alternatives and in situ methods are important issues.

Maintenance and soil management

Risk assessment, management and monitoring of residual (mobile) contaminants will receive increasing attention because it will often be impossible to fully remove the contamination. Moreover, measures will have to be taken to prevent new contamination.

Duration

Initially, the activities will be set up for a period of four years (1999-2002), with a possible continuation until 2009.

Budget

A demand-driven programme also implies the joint financing of the activities by all interested parties. The annual costs of the SKB, estimated at € 6.6 million are therefore borne by the government via an ICES contribution (€ 4.5 million) and by public/private market parties (€ 2 million)]

ICES is an instrument of the government to strengthen the knowledge infrastructure

NORWAY

Country-specific report for Norway; Prepared by Tor Loeken

Executive Summary

In the period 1995 – 1998 The Research Council of Norway had one minor research program specially aimed at contaminated soil, ground and ground water; “GRUF”.

From 1999 this program, together with 3 other small environmental programmes, were incorporated in to one larger program: POLLUTANTS; Sources, dispersal and effects “ProFo”.

Introduction

“ProFo” is at the moment the only relevant research program in Norway for CLARINET WORKING GROUP „R & D“. In addition there is ongoing research relevant to WORKING GROUP „R & D“ at some of the Universities and research institutes, but these programmes/projects are not open for external applications.

Following contacts may be of interest:

- Institute of Geology at University of Oslo, Prof. Per Aagaard (per.aagaarg@geologi.uio.no).
- Institute of Geology at University of Bergen, Prof. Noralf Rye (noralf.rye@geol.uib.no).
- Geological Survey of Norway (NGU), Bernt Olav Hilmo (bernt.olav.hilmo@ngu.no).
- SINTEF kjemi – Trondheim, Svein Ramstad (svein.ramstad@chem.sintef.no).
- JORDFORSK, Ola Nordal (ola.nordal@jordforsk.nlh.no).
- NIVA, Jens Skei, (jens.skei@niva.no).
- NGI, Gijs Breedveld, (gbr@ngi.no).

Content of program

The main goal of the “ProFo” research programme is to improve the general understanding of the fate of pollutants, their sources, pathways, exposure and effects on biota and environment. The research activities intend to support environmental actions and management. The research shall also support national goals regarding environment and international work on reduction of long range transported pollutants.

The research areas of the programme are:

- Contaminants of national priority, new hazardous substances and radioactive components.
- Regional and local pollution issues, both contaminants and nutrients.
- Long range transported components, with focus on contaminants and nitrogen.
- Contaminants in arctic and polar regions.
- Methods and models for monitoring of the environment. Risk evaluations and abatement strategies.

Management

The duration of this program is 2000 – 2005, with a budget for year 2000 of 20.2 MNOK.

Applications for new projects have to be sent in before the 15th of June each year. All applications are evaluated firstly by two external referees, and finally by the scientific committee of the programme.

Accepted projects can get funding (100% or less) by the programme for up to 4 years, especially for Dr. degree projects.

Monitoring

All project responsible have to send in technical and economical progress reports every halfyear, which are evaluated by the programme committee.

At the end of each project there has to be made a final scientific report, including a list of references where the results of the project has been published.

At the start of “ProFo” in 1998 there was a seminar with presentation of both running and ended projects belonging to the 4 smaller programmes to be terminated. A new seminar is planned in 2001 for the running projects in “ProFo”. The plan is to make a final (written) summary at the end of the programme in 2006.

Dissemination

A list and summary (mostly in Norwegian) of all running projects can be collected from the NFR web page;

<http://www.sol.no/forskningsradet/program/profil/forurensning/>

go for; “nedlastbare filer” collect “prosjektkatalogen-2000.doc”

Of possible WORKING GROUP „R & D“ interest are number; 4, 7, 9, 10, 21, 30, 39, 41, 45, 46, 47,, and 49.

International collaboration

Some of the projects have contribution from other nations incorporated within the project.

So far no direct international collaboration has been established on the programme level.

UNITED KINGDOM

Programme Title & Acronym	Summary	Sponsor(s)	Duration (Years)	Budget/ Funding to Date	No. of Projects	Estimated % Contaminated Land R&D	Eligibility	Keywords	Contact
LINK Biological Treatment of Soil and Water (BTSW)	Multidisciplinary programme launched in April 1993, focused on land reclamation and effluent treatment	DTI, BBSRC, EPSRC, NERC, Industry	5	£8.3M	15	60	U, RI, PSRE, C, AIRTOS	Contaminated land, effluents, slurries, bioremediation, biotreatment, monitoring, sensors	DTI - Sue Ellison BBSRC - Ben Sykes
Urban Regeneration and the Environment (URGENT)	In partnership with urban authorities, industry and regulatory bodies; multidisciplinary research programme.	NERC (with links to WPM - EPSRC)	7	£9.7M	41	60	U, RI	Sub-surface, atmospheric science, chemistry, hydrology, hydrogeology, ecology, environmental monitoring and info systems	NERC - Graham Leeks [CEH Wallingford]
Waste and Pollution Management (WPM)	Industry-led programme to support engineering and physical sciences research	EPSRC, NERC, Environment Agency	5	£8.1M	49	70	U, RI	Contaminated land, landfill practice	EPSRC - Steve Milsom
Environmental Biotechnology	Limited programme launched in 1995, focused on bioavailability of pollutants in soils and liquid effluent treatment	BBSRC	5	£3.1M	14	70	U, RI	Bioavailability of pollutants in soils, liquid effluent treatment, biosensors	BBSRC - Ben Sykes
Environmental Diagnostics (ED)	Programme to address a number of fundamental contaminated land issues	NERC	8	£7.8M	35	80	U, RI, PSRE, C, AIRTOS	Chemical transport processes and pathways, biotransformations, effects, detection of contamination, critical loads	NERC - Daniel Osborn
Contaminated Land: Applications in Real Environments (CLAIRE)	A public/private partnership to establish a UK network of contaminated sites to demonstrate remediation research	SAGTA, English Partnerships, EA, SEPA, DETR, WDA, DoE (NI)	4+	£100k	9+	100	Open to all	Contaminated sites, demonstration projects, site characterisation, monitoring, risk assessment	CLAIRE - Paul Beck



An Analysis of National and EU RTD Programmes related to Sustainable Land and Groundwater Management

Further CLARINET publications in this series:

Sustainable Management of Contaminated Land:
An Overview

Brownfields and Redevelopment of Urban Areas

Contaminated Land and its Impact on Water Resources

Remediation of Contaminated Land Technology
Implementation in Europe

Review of Decision Support Tools for Contaminated Land
Management and their Use in Europe

Clarinet Final Conference, Proceedings; 21/22 June 2001,
Vienna, Austria

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