



The Association of Geological Surveys of the European Union
(EuroGeoSurveys)
in their position as
custodians to their national natural resources
and
guardians of their terrestrial environment
present their contribution to
**the 5th Framework Programme of Research and Technological
Development Activities of the European Community**

Richard Annells
Secretary general
EuroGeoSurveys
3, Rue du Luxembourg
1000 Brussels
Tel +32 2 282 95 14
info@eurogeosurveys.org
www.eurogeosurveys.org

1997

INTRODUCTION

1. Members of the association EuroGeoSurveys have participated in the Fourth and previous Framework Programmes in the areas of: ESPRIT, Industrial and Materials Technology; Standards, Measurements and Testing; Environment and Climate; MAST; JOULE; and Radiation Protection as well as in DG I and DG VIII International Cooperation programmes. EuroGeoSurveys regards the forthcoming 5th Framework Programme as important for its activities and welcomes this opportunity to contribute its opinion to the European Parliament and the European Commission.
2. The sixteen Members of EuroGeoSurveys are the national Geological Surveys of all fifteen European Community countries and of Norway. They are governmental organisations currently containing 7000 professionals active in mostly applied geoscience programmes in geology, geochemistry, geophysics and related disciplines. Each Survey has gathered information continuously through such work over an average period of 120 years.
3. The Geological Surveys report continuously to their national governments on the state of the country's landmass and earth resources, and are prime national authorities or topic centres on detailed resource and environmental information and policy-related questions. The Surveys maintain large geoscience information banks and have strong links with government and industry. The results of Geological Survey work provide the baseline information for decision-making and implementation by governments and industry of national resource and environment programmes. The geosciences are of central relevance to European Community problems in earth resources and the environment and are critical to their resolution.

GENERAL REMARKS

4. Given the importance of geoscience work to global natural resource and environmental issues EuroGeoSurveys would like to see the 5th Framework Programme provide increased support for RTD work in several specific areas, each of which has direct relevance to the competitiveness of industry and quality of life in the European Community:
5. The work of EuroGeoSurveys member Surveys already has transnational extent across the European Community and extends globally through cooperation programmes with governments and the private sector in the countries of Central and Eastern Europe and the Mediterranean, the New Independent States and the Developing World.
6. EuroGeoSurveys suggestions are outlined below with reference to the three Thematic Programmes and the three Horizontal Programmes proposed for the Fifth Framework Programme.

1. FIRST THEMATIC PROGRAMME

1. UNLOCKING THE RESOURCES OF THE LIVING WORLD AND THE ECOSYSTEM

1.1.4 Management and quality of water

Inland surface waters and groundwaters are connected parts of large continuously moving systems which extend across continents and to depths of many kilometres. Their distribution at any instant in time is the result of the complex natural dynamic balance between basic geological and climatic processes. Water resources are drawn off at local and regional scales often without regard for the larger systems which are in danger of deterioration through overconsumption, waste and pollution by settlements, industry and agriculture.

No two EU countries share the same water resource characteristics but all possess much statistical data on their own water resources. Although water resources are an important part of Europe's natural capital (endowment) no up to date baseline assessment of them exists at a pan-European level. Before any realistic monitoring of the critical changes in the quality and quantity of pan-European groundwater and surface water resources can take place this baseline information needs to be critically evaluated, assembled and levelled across national borders and different climatic zones.

1.1.5 Environment and health

The geosciences provide much evidence that naturally occurring abnormally high (or low) concentrations of metallic and non-metallic minerals and radiation can be harmful to human, animal or plant health. Some European environmental authorities however continue to define action levels in terms of levels that are lower than naturally occurring concentrations.

This key action should not therefore be based on the assumption that only human activity causes adverse changes in health but should focus on mapping natural baseline levels of chemical elements in order to identify abnormal levels as an aid to protecting the population, livestock and crops. Some geochemical and radiochemical information required to establish baselines is already available in each EU country but it needs to be assembled and critically levelled across borders through concerted action between member countries.

Key research priorities should involve multidisciplinary work in 1) tracing the actual pathways along which harmful chemical substances move in turn through air, rain/snow, biological materials, soils (including humus), rocks and groundwater and 2) identifying the actual physical or chemical form in which these substances move. Such work would help to identify technologies for reducing the effect of harmful substances. At present most research in this field is compartmentalised within individual scientific disciplines but EuroGeoSurveys advocates an integrated multidisciplinary approach involving epidemiologists as key partners.

Such an approach would assure consistency, cost-efficiency and quality control through the investigation of entire pathways and is far more likely to provide results fit for use by decision makers.

1.2 Activities for the research and development of generic technologies

EuroGeoSurveys feels that improved awareness of major natural and technological hazards should be developed and sustained through essential actions such as the following, all of which should be linked electronically to appropriate European decision chains in industry or civil defence:

actions are:

Support for the further development of permanent earth observation satellite systems and generic techniques to monitor the sustainable management of the level of water resources; terrain susceptible to flooding; volcanic activity; earthquakes and landslips; terrain susceptible to desertification and salinisation; and major technological accidents involving release of dangerous materials into the environment. The data gathered should be used to model predictive scenarios.

Support should be increased for the setting up of permanent ground-based seismological networks to monitor and model for predictive use activity in European earthquake zones.

Few Environment and Climate Programme activities to date in these fields have developed such systems or have produced clear concise recommendations to guide action by decision makers.

The damages caused through inability to understand, predict or adjust to the natural processes and cycles of the environment exact a heavy cost from modern society. Current public knowledge and media treatment of climatic history is not always grounded on balanced, objective scientific information or contexts. For these reasons we believe that a separate Key Action should be set up for the objective monitoring of global climatic and environmental change. Modelling techniques based on the geoscientific evidence locked into sequences of young rocks, ice and snow (particularly in polar regions) and the remains of marine organisms can be used to reconstruct the trends of geologically recent climatic cycles (i.e. over the last 250 000 years) which led into present day climatic variation and could therefore help future prediction by providing a more balanced historic context.

1.3 Support for research infrastructures

The European Communities are rich in public domain data derived from many decades of marine research and climate studies, much of which should be used as suggested in 1.2 above as a basis for objective predictive modelling.

SECOND THEMATIC PROGRAMME

2. CREATING A USER-FRIENDLY INFORMATION SOCIETY

2.1 Key Actions

2.1.1 Systems and services for citizens

EuroGeoSurveys supports the idea of providing readily accessible, intelligent systems for analysis, monitoring, management and early warning of environmental conditions, provided that such systems are objectively controlled by professionals in order to avoid public alarm.

2.1.2 New methods of work and electronic trading

EuroGeoSurveys supports the development of flexible, mobile and remote working methods for individuals and for cooperative and group working based on simulation and virtual reality, especially where large datasets are involved. Applications would include the visualisation and modelling of planning, predictive or production scenarios in mines, water resource systems, oil/gas fields, city substructures and environmental hazard or pollution contexts. The work could be carried out cost-effectively by concerting the actions of national institutions.

2.1.3 Multimedia content

EuroGeoSurveys feels that advanced technologies for accessing, filtering and analysing information should be developed to manage large multivariable geoscience datasets such as geographical information systems (GIS) for use in assisting day by day and longterm planning and modelling by decision makers in the mineral, hydrocarbon and water industries as well as by city and land use administrations.

2.1.4 Essential technologies and infrastructures

EuroGeoSurveys supports the promotion of excellence in information technologies so that the activities in 2.1.2 and 2.1.3 above can be linked to international partners within the global

Information Society context.

2.2 Activities for the research and development of generic technologies

EuroGeoSurveys believes that the key actions proposed in the Second Thematic Programme to develop real-time and large-scale simulation, visualisation and virtual presence technologies would provide the mineral, hydrocarbon and water industries and city and land use administrations with cost-effective day by day or longterm planning and modelling tools, particularly in communicating options for action to non-technical decision makers.

2.3 Support for research infrastructure

EuroGeoSurveys supports the proposal to develop advanced high-speed computer systems such as INTERNET-2 to support data exchange and modelling in geoscience and related technology activities such as those outlined above in 2.1.

THIRD THEMATIC PROGRAMME

3. PROMOTING COMPETITIVE AND SUSTAINABLE GROWTH

3.1 Key Actions

3.1.1 Products, processes, organisation

It will be essential to apply the principles of life cycle analysis to the field of mineral raw materials, through the successive phases of search (exploration), extraction, use and recycling.

Support should be given to:

the development and use of new remote sensing and geophysical techniques to gather generic Earth information which can be used to locate new sources of minerals or to monitor environmental hazards;

the building and use of spatial electronic databases to help locate new sources of minerals, for example in deep concealed zones where exploitation will have minimal environmental impact at the surface;

the development of clean environmentally friendly mining techniques;

the development of innovative drilling technologies, particularly if these can be applied to benefit other industries, e.g. oil and gas;

the development of new environmentally and energy-efficient technologies for separating metals, for example the use of bacteria to leach sulphide ores by removing sulphur as soluble compounds;

for research into the comparative economics and real environmental benefit of developing alternative uses or substitutes for minerals used in engineering and construction, e.g. the substitution of refractory clay mouldings for metal castings;

for the design of artefacts which do not consist of intimate mixtures of materials or elements and can therefore be readily separated and re-used;

In all of the above activities support should be given to the design and development of processes that are energy-efficient with waste products that can be re-used or disposed of safely.

3.1.2 Sustainable mobility and intermodality

Support should be provided for the definition of best practice and use of detailed geological and geophysical techniques and natural hazard analysis in surveying and appraising natural infrastructure along stable new European transport corridors.

3.1.4 Marine technologies

As in many other fields funding is needed to support assembly and standardisation of the many existing sets of disparate sea floor data on sediments and other features so that they can be used for decision support in management of the marine environment.

Given the high costs and unpredictable outcomes of mineral exploration and extraction onshore in Europe it is unlikely that industry will be able to exploit mineral resources located at depth in the floor of the open sea. This activity is obviously practicable for very large hydrocarbon reservoirs (at kilometre scales) or other structures that are extensions of mineral occurrences already proven onshore (e.g. coal mines). It is unlikely however that objective cost analysis would justify exploration for the much smaller and compositionally very variable targets characteristic of metallic minerals (tens to hundreds of metres) in moving water: their evaluation and exploitation on the sea floor would be too difficult to make them priority targets.

Exploitation of sea floor sands and gravels is however a practical option and can be carried out at larger scales than on land if care is taken not to unbalance the ecology of fish breeding grounds or the erosion profiles of coasts and navigation channels.

3.1.5 Advanced energy systems and services

New research is needed on the chemical and physical characterisation of coals in order to keep pace with clean combustion technology being developed for modern power stations, especially with the current reduction in funding for European Coal and Steel Community activities. Such work is particularly important as coal use is likely to exceed that of renewable sources over the next two to three decades and to remain as the most widely available fuel material in the world. The development of new technology in this area could therefore give Europe an important international competitive advantage.

The European Community is likely to depend on hydrocarbons to supply about 65% of its total energy needs for the next 50 years. During this time production in important oil and gas fields in the North Sea and Canada will decline and a third oil crisis is likely. New targeted objective investigations are therefore needed to elaborate scenarios on economy/environment/energy interactions in order to support planners and decision makers. Such scenarios should be defined at regional, national, European and global levels, as many of the renewable energy supplies will be cost-effective only for small areas close to source.

The EU and associated countries such as Norway have already achieved important advances in the technology of underground CO₂ disposal, notably within the JOULE programme, and funding of research into this activity should continue, particularly in the context of predicted global hydrocarbon consumption increases of 35-45% over the next 15 years.

3.1.6 The city of tomorrow

New models need to be drawn up for the sustainable development of European cities. European Union policy to date however has not addressed the hidden but structurally critical geological space beneath European cities. For example, underground problems caused by subsidence or overloading by poorly planned high-rise buildings can bring about very large material losses to cities. Out of 55 environmental indicators selected for the urban environment section of the Dobris Report none deal with the quality or stability of the soil or underground space and only one is related to drinking water quality. EuroGeoSurveys recommends that work within the city of tomorrow includes consideration of these issues as an integral part of every European city management's forward planning and decision support system.

3.2 Activities for the research and development of generic technologies

The annual production of EU non-energy minerals-related industries in 1993 was worth 212 billion ECU and is increasing annually. New and diverse non-fuel mineral raw material supplies (metals and non-metals) are needed in large quantities to support European manufacturing industry and technology of an increasing sophistication driven by market demands. Because of economic constraints (including heavy operating, transport, processing, energy and licensing costs) the non-fuel mineral industry has to work to much tighter profit margins than the oil and gas industry. Many mineral enterprises are SMEs and although the industry has many innovators it needs more support in funding important RTD.

Few mineral raw materials are available "ready-made" and most need extensive processing to meet the rigorous quality specifications and enormous daily tonnages demanded by EU industry. This means that the mineral exploration, extraction and processing sectors need to be in perpetual scientific and technological evolution because individual mineral commodities can go "out of fashion", one superseding another in commodity markets as knowledge and technology evolve.

In view of these circumstances the EU should draw up a forward raw minerals policy plan and pan-European knowledge of its natural mineral capital ("minerals in the ground"), in order not to at a competitive disadvantage in world markets. By comparison the USA drafted its own forward minerals policy plan and future vision for minerals in a major 1974 nationwide review. Several EU member countries have however recently conducted Technology Foresight plans which include a mineral supply vision and a similar vision is needed at the pan-European level.

Funding is needed for:

research into the comparative economics and real environmental benefit of developing alternative uses or substitutes for minerals used in engineering and construction, e.g. the substitution of clays for cast metals:

the design of artefacts which do not consist of intimate mixtures of materials or elements and which can therefore be readily separated and re-used.

In all of the above activities support should be given to the design and development of processes that are energy-efficient and have waste products that can be re-used or disposed of safely.

New research is needed on the chemical and physical characterisation of coals in order to keep pace with clean combustion technology being developed for modern power stations, especially with the current reduction in funding for European Coal and Steel Community activities.

More critical work is needed to standardise the definition of “complex” mineral commodities such as feldspar as there is frequent confusion over the different descriptions used by individual EU countries. It is important for industry to have standard definitions and specifications because such information can determine both the market and the end use of a mineral: for instance a feldspar material suitable for ceramics may not be so for glass manufacture. Much of this standardisation work could be carried out as concerted actions or preparatory measures by organisations which already carry out such work at national level.

3.3 Support for research infrastructures

Support is needed for the networking and optimum use at Community level of specialised databases, laboratories and facilities for measurements and tests.

The scope of the JRC Institute of Prospective Technology Studies and the JRC Institute of Space Applications should be widened to the geoscientific field in order to produce long-term predictive scenarios on topics such as natural disasters, geohazards and realistic future supply/demand scenarios for European resources of mineral, water and energy materials.

A forum on European Earth Resources should be set up with an open economical, style of operation (e.g. through e-mail discussion groups) with aims, objectives and deliverables made more accountable to the scientific community.

THE HORIZONTAL PROGRAMMES

4. CONFIRMING THE INTERNATIONAL ROLE OF COMMUNITY RESEARCH

EuroGeoSurveys endorses the proposals to directly involve participants from the Central and Eastern European countries and the Mediterranean, to improve RTD cooperation at European level through scientific cooperation projects relating to specific third countries or regions. Such actions should focus on priority needs expressed by recipient countries and because of the generic nature of much geoscience work might be addressed by actions already mentioned in this paper under any of the three Thematic Programmes. The many existing bilateral science and technology cooperation agreements with developing countries should be used to build up national institutions responsible for geoscience information.

5. INNOVATION

Industrial innovation should be encouraged on a European level through pan-European technology transfer activities and the integration of exploitation plans throughout the life-cycle of research projects.

One useful and cost-effective way to assist this process would be to fund the setting up public access “electronic shopping malls” on Internet sites managed under competitive, monitored contracts for fixed periods within specific theme areas (e.g. minerals, energy, water resources etc). Providers of technology or information could advertise their products, databases, requirements or events and exchange advice, help, ideas, data and information. The participants could be from government, industry (including SMEs) research institutes or academic bodies and the process could lead to the setting up of well-focused project consortia.

6. IMPROVING HUMAN POTENTIAL

Closer links should be developed between the Joint Research Centre and national and international organisations. Efforts should be made to attract a greater proportion of mature visiting scientists to the JRC, for example through the new EU RTD cooperation agreements with Canada, Australia and other countries in order for it to enhance its international standing.