

# *Geology for a changing world*

GEOLOGICAL SURVEY OF SWEDEN THEN, NOW AND TOMORROW



Cover photographs: Anders Damberg.

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## THE GEOLOGICAL SURVEY OF SWEDEN TODAY

The Geological Survey of Sweden (SGU) is the central government agency responsible for matters concerning bedrock, soil and groundwater. The agency falls under the Ministry of Enterprise, Energy and Communications.

Following new instructions from the Government in 2008, our activities focus on providing support in three core areas: supplying geological information, sustainable use of natural resources and knowledge development.

### Supplying geological information

As part of supplying geological information, SGU conducts needs-driven collection and collation of basic geological information, and administer and develop the information to meet society's need in an efficient and user-friendly way. The main areas of information for which SGU is responsible are supply of ores and minerals, planning and building, good quality groundwater, energy and climate, risks in society, environment and health, agriculture, forestry, fisheries, as well as nature conservation and tourism.

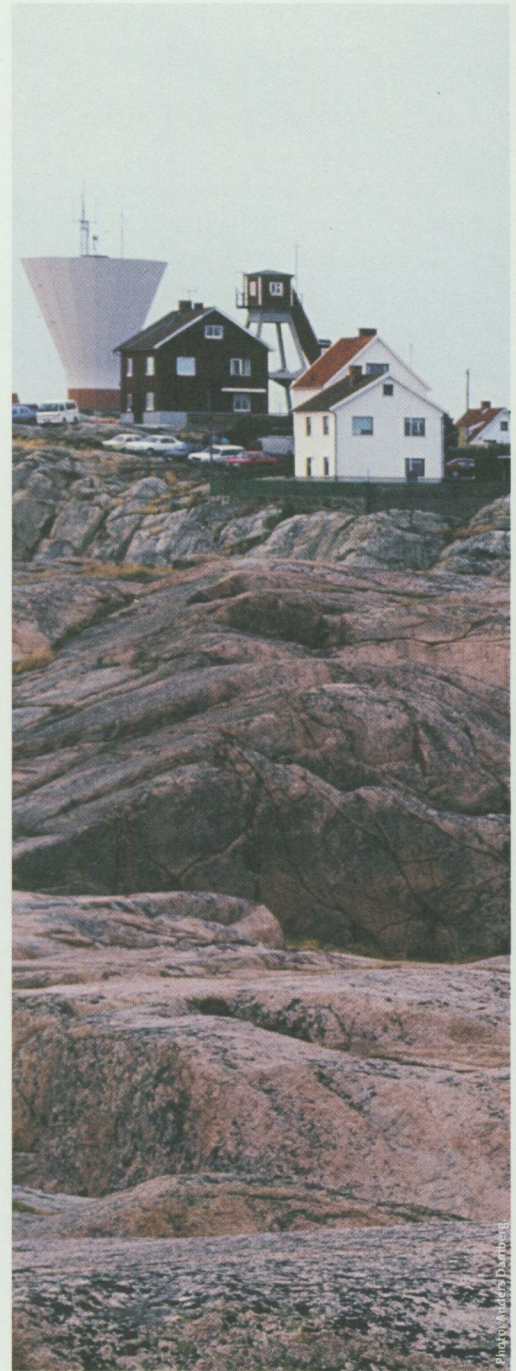
### Sustainable use of natural resources

SGU's contribution to the sustainable use of natural resources in Sweden is to deal with matters falling under the minerals legislation, monitor developments in the minerals sector and facilitate exploration.

The Swedish Parliament has adopted sixteen objectives relating to the quality of Sweden's environment, to be achieved by 2020. SGU is responsible for the objective concerning Good-Quality Groundwater and for the interim target for reduced use of natural gravel under the Good Built Environment objective. Furthermore, SGU helps to achieve the interim target for remediation of contaminated sites under the Non-Toxic Environment objective. SGU has also been charged with the task of managing Sweden's former emergency oil repositories and making them environmentally safe.

### Knowledge development

SGU works to develop knowledge by encouraging and financially supporting targeted basic research and applied geo-scientific research at universities and colleges. SGU also conducts its own research and development. The aim is to develop and introduce new knowledge and methods at SGU, and also to support and maintain a high level of geological expertise in Sweden.



SGU is responsible for matters concerning bedrock, soil and groundwater and our activities focus on providing support in three core areas: supplying geological information, sustainable use of natural resources and knowledge development.

## GEOLOGICAL INFORMATION FOR MUNICIPAL USE

One of SGU's most important tasks is to supply geological information to the various sectors of society. Municipalities are one key user group.

"Information from SGU gives us an overall picture of geological conditions and we use it in combination with more detailed information in most of the work we do, for example in detailed planning, comprehensive planning and planning applications," explains Karin Bergdahl, a geologist at Gothenburg city planning department.

In the late 1990s Gothenburg ordered a geological information package from SGU, comprising digital maps of soil strata, bedrock, rock quality, geochemistry and groundwater. The information has been integrated with the municipality's own GIS system and is available to all departments of the city administration.

"The environmental health protection department often uses this information in relation to contaminated land, environmental protection and dispersal of hazardous substances. Other users are the property management department and Göteborg Vatten, the city's municipal water department," says Karin Bergdahl.

"Here at the city planning department we are just about to produce new stability maps for Gothenburg. In doing so, we will use SGU soil maps together with topographical information in a pilot study to select the areas we want to study in greater detail," she adds.

"And we use the SGU radon risk map almost every day. Members of the public often contact us with their concerns about radon."

The illustration shows an example of the way the soil map is used in Gothenburg's GIS system.

## SUPPLYING GEOLOGICAL INFORMATION

SGU collects and processes data on bedrock geology, Quaternary deposits on land and on the continental shelf, groundwater, as well as geophysical and geochemical data. SGU is increasingly focusing on supplying geological information to society at large, high quality information that is readily accessible.

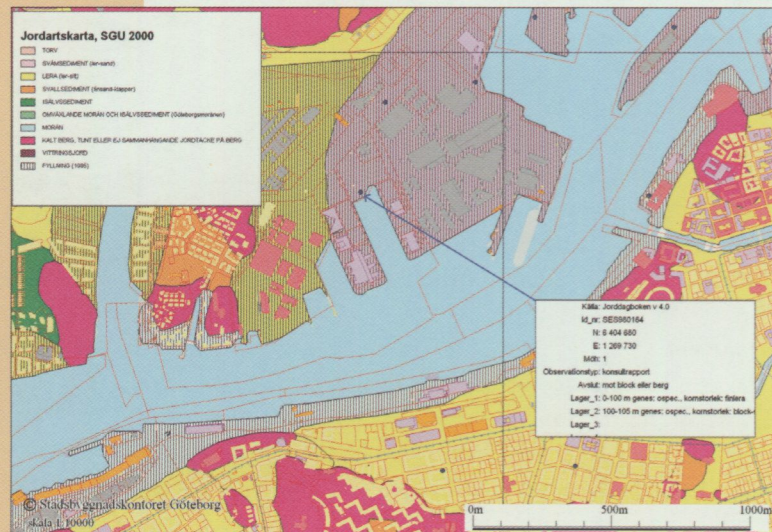
By the end of 2008 SGU will have regional digital geological information covering the whole of Sweden. More detailed information is available on densely populated areas and areas where there are potential ore deposits. This is achieved by extensive mapping and by digitising existing data.

### Databases, maps and publications

All the data collected from our surveys and documentation activities on land, in the air and at sea are added continuously to our databases. Data are also obtained in cooperation with other organizations. Geological information is presented in the form of databases, printed or print-on-demand maps and map descriptions.

The most commonly used map scales are 1:50 000, 1:100 000 and 1:250 000. An increasing amount of geological information is also made available on our web site.

SGU documents temporary exposures of bedrock and soil resulting from road construction and other infrastructure projects. For



example, data generated when wells are drilled and in groundwater studies are stored in the national Wells Archive, presently containing data on nearly 300 000 wells across the country. Groundwater documentation also includes monitoring groundwater levels and sampling for chemical groundwater analyses. SGU's geomagnetic observatories at Abisko in the Swedish mountains, and in the Fiby forest near Uppsala provide information on compass declination and daily variations in the Earth's magnetic field.

Our researchers publish scientific papers in SGU's fields of expertise and issue a number of reports each year, documenting the findings of various projects and studies.

SGU maintains the largest geo-scientific library in Sweden. The library, which is open to the public, currently contains 120 000 books, more than 50 000 maps, 250 geological journals (subscriptions) and access to Georef and Geobase databases.

SGU also provides an online reference database on the geology of Sweden, called GeoRegister, with references to published and unpublished documents. At present, GeoRegister contains reference to about 43 000 documents, approximately 60 per cent of which are unpublished. About 2 000 documents are added to the database annually. GeoRegister can be accessed at SGU's web site.

The Mineral Resources Information Office at Malå holds more than 3 700 km of drill core samples and thousands of reports and maps, which are available for use by exploration companies and researchers.

#### USE OF ARCHIVE MATERIAL SAVES MONEY

SGU receives and administers reports and material from various studies – conducted by SGU itself and by others. The material stored in the archives is in demand at SGU and among external users, and helps to save both time and money. One example is the National Drill Core Archive at Malå, where SGU makes available 3 700 km of drill cores from private and state-run exploration.

Another archive contains documentation of the peat surveys conducted in Sweden during the 19th century (maps, drawings, notes etc.). The oldest material from those surveys is essentially just as relevant today as it was when it was produced. SGU has helped a company called Södra Skogsenergi to find material in the archive as it plans peat extraction in new areas.

“The material we have received includes maps showing peat types, degree of humification and depth in a given area. A map of this kind alone saves us about 500 hours of fieldwork,” says Kjell Gustafsson of Södra Skogsenergi.



The information produced by SGU can be used in the preventive work done by local and regional authorities and other public authorities. One such use is as a basis for assessing the risk of a landslide in a given area. SGU plays an active part in this preventive work by gathering information on soil types, old landslide scars, ravines and other erosion phenomena. SGU's archives contain information gathered on erosion along watercourses. The agency is represented on the Government commission on landslide and landslip issues and takes part in studies and research into natural disasters.

SGU provides information about landslip and landslides on its web site and, together with other public agencies, is involved in operating a joint crisis information gateway at [www.krisinformation.se](http://www.krisinformation.se). SGU geologists are also brought in as experts when incidents occur and to document events.

## SUSTAINABLE USE OF NATURAL RESOURCES

SGU is engaged in the geological dimension of environmental issues. We take part in initiatives related to environmental protection and natural hazards. SGU also issues opinions on environmental concerns as a consultative body. A further task is to ensure that the underground facilities for Sweden's emergency repository of petroleum products are made environmentally safe.

When the Swedish Parliament laid down 15 national environmental objectives in the late 1990s, SGU was given sole responsibility for the Good-Quality Groundwater objective and for an interim target for gravel extraction under the Good Built Environment objective. The prime environmental objective is to hand on to the next generation a society in which the major environmental problems have been solved.

### Good-Quality Groundwater

Cooperation and consensus between the various actors who make an impact on ground water, i.e. local authorities, county administrative boards, other public authorities, companies and organizations, are essential to achieve the Good-Quality Groundwater objective. Our tasks include supporting the water authorities, which have overall responsibility for ensuring that the EC Water Framework Directive is implemented in Sweden.

Cooperation with the drilling companies' trade organizations has resulted in recommendations, guidelines and a scheme for certification of water and energy drillers. Together with the Swedish Environmental Protection Agency and the county administrative boards, SGU has identified geological formations that are of particular national and regional importance to Sweden's water supply. Together with the Swedish Environmental Protection Agency and the National Board of Housing, Building and Planning, we are also producing a digital water-planning manual for implementation of the Water Framework Directive.

SGU's evaluation of the progress made in 2007 towards achieving the environmental objectives proposes a new interim target for individual water supply systems. We have also proposed that municipalities and public authorities should improve their long-term water supply planning and the availability of information on groundwater quality.

### Reduced use of gravel

In Sweden, eskers are important reservoirs for groundwater. To protect existing and future groundwater resources, gravel extraction in



Photo: Carl-Fredrik Ahlström

Certification of drillers is essential to achieve the Good-Quality Groundwater environmental objective.

Sweden must not exceed 12 million tonnes per year and the percentage of reused material must total at least 15% of the ballast used. To achieve this, SGU works closely with the aggregate and concrete industries and county administrative board officials responsible for resource extraction.

The background material submitted by SGU for the 2007 evaluation of achievement of Sweden's environmental quality objectives proposes that the Government instruct SGU to complete the survey of Sweden's natural gravel deposits and bedrock, that the supply of materials be integrated in municipal comprehensive planning, and that the Road Administration and Rail Administration in particular discourage the use of natural gravel when inviting tenders for construction and maintenance works.

#### **Contaminated land**

A decision to wind down Sweden's oil stockpiles, which were part of the civil emergency planning programme, was taken in 1994. The petroleum products were stored in rock caverns. SGU is responsible for permanently closing down the remaining emergency oil repositories and making them environmentally safe. This has involved selling off the oil, disposing of the installations, equipment and land, and securing and monitoring the sites so as to minimize their environmental impact. A few sites remain to be made safe. The monitoring programme will continue for a considerable time after this has been done.

SGU also works on the remedial treatment of residues from mining operations in Adak, and offers advice on the treatment of contaminated land. In 2006, SGU assumed responsibility for surveying and determining liability for sites where defunct government organizations have carried on operations that may have left behind contamination.

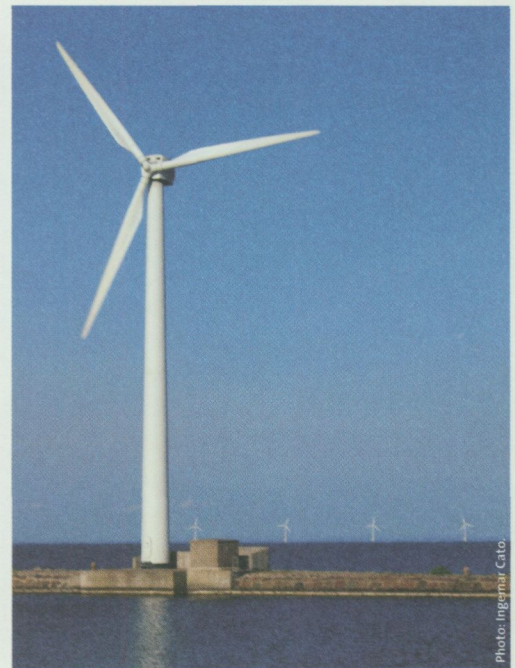
#### **SGU's role as an expert advisory body**

SGU is the Government's expert advisory body for analyses and statistics concerning the minerals market. Our task is to analyse production data as a basis for decision making in the public and private sectors.

On average, we process 100 permit applications a year under the Continental Shelf Act, the Reindeer Husbandry Act, the Peat Extraction Act etc. We also issue an increasing number of opinions as a consultative body. SGU submitted 444 opinions to county administrative boards, government ministries and other public authorities in 2007. Examples of current issues in this area are new nature reserves, municipal comprehensive plans, infrastructure projects etc.



The underground oil storage facility in Jönköping, southern Sweden.



SGU processes permit applications under the Continental Shelf Act, e.g. for wind power plants.



Photo: Leif Billström

#### MINERAL RESOURCES INFORMATION OFFICE

The Mineral Resources Information Office is a branch office of SGU located at Malå, Västerbotten County. Its purpose is to keep and provide data to support and facilitate exploration in Sweden.

The archives in Malå contain all the material produced in connection with previous state-funded exploration. That material covers all aspects of modern exploration, including exploration reports, low altitude airborne geophysical data, ground geophysical data and geochemical data. The Swedish National Drill Core Archive is also located in Malå – a collection of more than 3700 km of drill cores from all over Sweden. The Drill Core Archive is growing rapidly, and in 2007, Maud Olofsson, the Swedish Minister for Enterprise and Energy, opened a 1000 m<sup>2</sup> extension to the building.

A major project is now under way to digitise archive material such as maps and reports, so as to improve the level of service and availability offered to exploration companies. Services available at Malå are:

- Searches in databases and archives for exploration and scientific reports, geological maps, geophysical and geochemical data, boulders and drill cores etc.
- Loans and copies of required material and information.
- Facilities for core logging, core cutting and temporary offices.

#### RESEARCH AND DEVELOPMENT

The main aim of research and development at SGU is to assimilate new knowledge and new methods in the agency's activities. Some research of this kind is conducted in-house; SGU funds other relevant research at Swedish universities.

Cooperation with university researchers is of central importance to SGU. Our staff has continuous contact of this kind and SGU has funded geological research on issues of importance to society with the sum of approximately SEK 5 million a year since 1990.

SGU has a long-term goal of systematically increasing knowledge in the field of geological science in Sweden. In-house, SGU supports projects designed to generate new processes, methods and systems, or to solve geological problems, and gives priority to interdisciplinary research. Projects on sustainable use of Sweden's mineral and groundwater resources are highly relevant.

Projects in progress in 2008 include a development project for industry minerals, ballast materials and quarrying. Another project aims to define the extent of water-bearing strata in southern Sweden and the Baltic Sea so as to ascertain the scope for geothermal energy extraction and carbon dioxide and energy storage. One project is helping to place historical climate change in relation to that occurring now. That project is examining possible regional changes in growth in peat soils following the last ice age. Growth rates may affect the balance of greenhouse gases in the atmosphere and global climate.

SGU is also studying natural radioactivity and metals posing a health hazard in groundwater. A correlation has been found between the nature of the bedrock and harmful concentrations of elements such as uranium, radon and arsenic.

Inhomogeneous limestones in southern Sweden have horizons that have been found to be extremely difficult to work. This has made it difficult to estimate costs for major land development or construction projects. In order to support contractors in their work to improve the process of submitting tenders, SGU has examined the physical properties of these limestones. SGU has also developed statistical methods of using trace elements to classify Swedish intrusive rocks that are otherwise difficult to separate.

To predict the risk of landslip, SGU has developed an algorithm based on the soils in an area and the topography. By using a large number of observations of the "highest coastline" (i.e. the highest sea level reached during the latest ice age), SGU has also developed a mathematical model that gives a more reliable measure of the rate at which the ice sheet melted and land elevation occurred. Our geolo-

gists have also succeeded in tracing major prehistoric earth tremors and faulting related to ice sheet melting by the landslides that the tremor triggered. One key use for knowledge of this kind is in planning construction of nuclear waste repositories.

In the field of geophysics, SGU and Uppsala University have jointly developed a new portable electromagnetic instrument that uses the radiomagnetic-telluric method to survey folding and rift zones. The instrument is so sensitive that it may ultimately replace the current VLF technology.

#### EU-funded R&D

SGU's own research includes cooperation with national and international organizations.

The EU partly funds projects such as BALANCE, in which SGU has developed tools and instruments for sustainable use of the Baltic Sea, Kattegat and Skaggerak, with twenty other organizations in eight countries, and eWater, where SGU and sixteen other organizations in fourteen countries are creating a gateway for cross-border coordination of groundwater data. The gateway will contribute to the implementation of the Groundwater Directive. It will also contribute to the INSPIRE Directive (Infrastructure for Spatial Information in Europe), as will OneGeology, a new R&D project.

Compliance with the EC Water Framework Directive requires that groundwater status can be evaluated. SGU has developed models to chemically characterize aquifers and their catchments. SGU has also combined its groundwater database with the Swedish University of Agricultural Sciences (SLU) pesticides database, and initiated a project with SLU on joint data.

#### BALANCE – BALTIC SEA MANAGEMENT

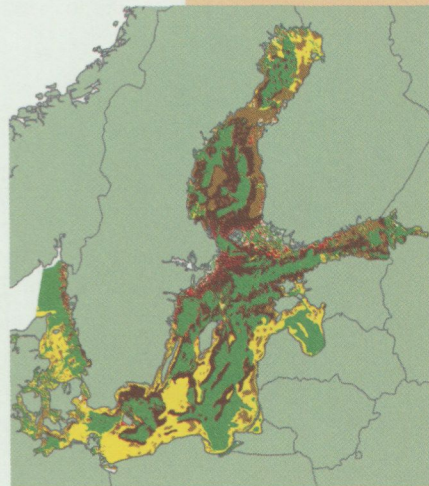
Under the EU-funded INTERREG project BALANCE, SGU has helped to gather, make available and harmonize existing knowledge about the marine environment, and to use that knowledge to develop methods to identify marine areas worthy of protection. One feature of the project has been the development of "blue corridors", a marine counterpart of green corridors on land, i.e. corridors linking protected areas to each other.

SGU has been working to ensure that different types of geological information from different suppliers and different countries can be used together. One of the results is a map of the marine geology of the Skaggerak, Kattegat and Baltic Sea, in which geological information and terminology used in different countries have been harmonized.

This map has then been used to produce maps of the marine landscape. The properties of the substrate are often key factors affecting the occurrence and quantity of benthic fauna and flora.

SGU has also been engaged in harmonizing marine geological data with a European standard for classification of substrates and habitats (EUNIS – European Nature Information System), and has drawn up guidelines for international protocols and standards for examination methods in various sectors.

The map shows the sedimentation classes adopted jointly by the countries participating in BALANCE.



## THE INTERNATIONAL DIMENSION

The EU plays a central part in SGU's international commitments. Current EU topics include supply of mineral resources, groundwater protection and soils. SGU has contributed to the Mining Waste and Groundwater Directives. The agency also takes part in other joint international projects, which often involve setting common standards.

### Supply of mineral resources

SGU is a member of the Raw Materials Supply Group, which is the EU Commission forum for information and dialogue on raw materials for member states and industry. Here, SGU is developing indicators for sustainable development in the minerals industry. SGU also represents Sweden in the International Lead and Zinc Study Group and the International Nickel Study Group, and collaborates with the International Copper Study Group.

### High-quality international databases

By participating in EuroGeoSurveys, SGU helps to meet the requirements laid down by the EC INSPIRE Directive, whose purpose is to assure the availability of harmonized and quality-assured data in the EU. Topics concerning SGU are geology, land and soil issues, energy resources and mineral deposits.

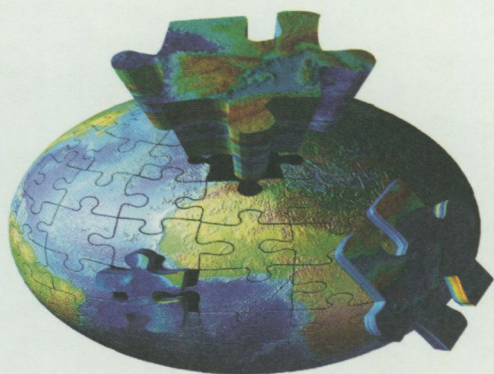
In the same spirit, SGU participates in the efforts being made by the International Union of Geological Sciences to develop standards for the online exchange of geological data, such as those under the EU-funded R&D project OneGeology, a distributed geological map database covering the whole world on a scale of 1:1 million.

SGU also participates in the UNESCO Commission for the Geological Map of the World for coordination, design and publication of small-scale thematic maps across the world.

In our efforts to create cross-border databases, we are working with Finland, Norway and Russia on the Fennoscandian Ore Deposit Database, with the Baltic countries, Finland, Norway and Russia on Northern Europe Geochemistry (for environmental protection and exploration) and with Canada, Denmark, Finland, Norway, Germany, Russia and the US on the Atlas of Geological Maps of Circumpolar Arctic (containing data on bedrock geology and geophysical data).

### Marine joint projects

SGU contributes to the EGS (European Geophysical Society) online database EU-SEASED, which contains data on hydroacoustic moni-



SGU participates in OneGeology, an international project to create dynamic geological map data of the world available via the web.



toring, marine sediment samples and marine drilling. SGU also takes part in the development of a European map of marine sediments and concentrations of toxic contaminants in them. SGU has provided information on the chemical status of marine sediments in the Swedish economic zone to OSPAR (Commission for the Protection of the Marine Environment of the North-East Atlantic) and HELCOM (Baltic Marine Environment Protection Commission). SGU has also contributed to HELCOM's draft guidelines for dredging and open-water disposal of dredged materials.

SGU also participates in efforts being made by the International Council for the Exploration of the Sea to understand the effects of extracting mineral resources from the seabed, and to examine the dispersal and accumulation of toxic contaminants in marine sediments.

#### **Risk management and health issues**

SGU's presidency of the International Medical Geology Association and its leadership of Earth and Health in the UN International Year of Planet Earth enable us to drive the rapid global development of medical geology. The health of over five billion people is affected by heavy metals, arsenic, radon, volcanic gases, dust storms, iodine and fluorine in the environment.

#### **International commissions**

SGU accepts a wide variety of international commitments. In 2007 we were engaged by the Swedish exploration company International Gold Exploration in a training project lasting several years at the Angolan state-owned Endiama diamond company.

Over the last five years SGU has also taken part in projects to support development of the minerals sector in Ghana and Mozambique, funded by the World Bank. SGU has also developed a radon risk map for Estonia and accepted engagements in Denmark, Norway, Tanzania, Uganda and Ukraine.

Ocean Surveyor, SGU's survey vessel. SGU takes part in the development of a European map of marine sediments and concentrations of toxic contaminants in them.

#### **SGU TRAINS ANGOLAN GEOLOGISTS AND GEOPHYSICISTS**

Angola's state-owned diamond company Endiama (Empresa Nacional de Diamantes de Angola E.P.) owns nearly half of all diamond mines or exploration franchises in Angola and is also the licensing authority. The Swedish exploration company International Gold Exploration (IGE) has an exploration franchise contract in Angola, which includes training to improve the skills of Endiama technicians and improve the efficiency of exploration and extraction of Angola's diamond deposits. SGU is conducting the training courses on behalf of IGE.

The Programme runs for three to five years and started in Luanda in Angola in May 2007. Sixteen Endiama employees underwent six weeks of training at SGU's headquarters in Uppsala, and were able to learn more about processing geographical data and the Swedish minerals sector.

The photograph was taken during a study visit to the Aitik mine in northern Sweden.



Photo: Christer Eriksson



Photo: SGU.

The well reputed SGU geologist Felix Tegengren and his assistants prospecting for ores in the Tärna region of the Swedish mountains in 1917.

## THE GEOLOGICAL SURVEY OF SWEDEN – 150 YEARS

Since its formation in 1858, SGU's task has been to examine, describe and present Sweden's geology to meet the need for geological information and knowledge. The agency's activities have expanded as technology and knowledge have developed and the importance of geology in society has changed. Some milestones are presented here.

### 1858

Swedish industrialization is gathering pace. Expanding industry demands ores, minerals and dimension stone for building. Agriculture is crying out for marl, a calciferous clay that can be used for soil improvement. With a staff of four SGU is charged with the task of surveying Swedish soil types and bedrock.

### 1862

SGU publishes its first map: Westerås, scale 1:50 000. The map shows both bedrock and soils.

### 1876

A librarian position is established at SGU. SGU's library is today by far Sweden's largest library of geo-scientific literature.



SGU published its first map, Westerås, in 1862.

**1914**

SGU broadens its approach to include applied geology. Its brief now includes studies to produce the geological information demanded by other organizations.

**1917**

SGU begins prospecting for ore following a shortage of metals and pyrite during the First World War. SGU also begins a comprehensive survey of peat deposits in southern Sweden.

**1928**

SGU's first major geophysics project begins: a magnetic survey of the Swedish mainland with the objective of mapping the strength and orientation of the magnetic field.

**1951**

A survey of peat deposits for civil emergency purposes begins at the instigation of the National Board for Economic Defence. Further surveys are made in the 1970s and 1980s in an effort to secure the energy supply.

**1952**

Springs and the characteristics of spring water are described already on SGU's early maps. A hydrologist was employed in 1952. This marks the beginning of SGU's hydrogeological activities, including documentation of groundwater occurrences.

**1955**

SGU conducts trial airborne geophysical surveys. Regular air surveys begin in the 1960s and SGU establishes a unique geophysical database.



SGU's airborne geophysics measurements are performed at an altitude of 60 meters. Data give information on bedrock structures at surface and depth.



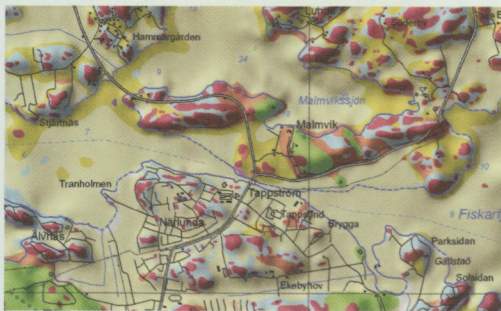
Geologist  
Edvard Erdman,  
1898.

Photo: SGU.



Photo: SGU

SGU's marine geologists map marine sediments and their concentrations of toxic contaminants. Sometimes their cameras catch the sea life, as in this portrait of a sculpin at 30 m depth at Knolls Grund, north of Öland, Baltic Sea.



The map of Quaternary deposits in and around lake Mälaren is voted Map of the year in 2006 and 2008.

**1966**

The National Wells Archive is established to make use of the geological information obtained from well drilling. In 2008, the archive contains data on the construction, depth, water capacity, groundwater level, geographical location, soil depth and strata sequence of just over 310 000 wells.

**1967**

The first separate map of Sweden's bedrock is published. The combined bedrock and soil maps are discontinued. The maps contained too much information to provide a readily accessible overview.

**1969**

Responsibility for geomagnetic documentation is transferred from the Swedish Maritime Administration to SGU.

**1970**

A marine geology project in Öresund to map the availability of natural gravel on the seabed marks the beginning of SGU's permanent marine geology activities.

**1972**

SGU publishes the first dedicated hydrogeological map.

**1978**

An act of Parliament passed in 1971 decrees that SGU is to be split into two. One part moves to Luleå in the north; the other moves into SGU's present facility in Uppsala.

**1979**

SGU takes part in a Government commission on radon and is engaged to conduct research into ground radon.

**1982**

A large part of SGU is hived off and turned into a state-owned company: SGAB (Sveriges Geologiska AB). SGAB conducts exploration on behalf of the Swedish state. However, in 1991 the Government decides that all exploration by the state is to be discontinued. The workforce of over 800 people is halved as a result.

**1984**

The first geochemical maps are published. SGU is given responsibility for compiling statistics on gravel, sand and aggregate production and resources.

**1988**

A Landslides Commission is created to coordinate research, communicate knowledge and information, and produce instructions about landslip and landslides. SGU is a member of the Commission. Its work is concluded in 1996. Another commission with responsibility for these issues is appointed in 2002. Once again, SGU is involved.

**1989–1990**

The Government gives SGU the role of sectoral body responsible for supporting applied geological research and targeted basic geoscientific research.

**1993**

The Mineral Resources Information Office in Malå opens, although SGU has conducted activities here since 1937, with some interruptions. Among other things the office is charged with the task of administering the National Drill Core Archive, containing information and drill cores from state-run as well as private exploration. All in all, there are over 3700 kilometres of drill core here (2008).

**1998**

The National Oil Repository moves to SGU, which has the requisite know-how and is given responsibility for implementing the decision taken by the Government in the early 1990s to close down Sweden's underground oil storage facilities and to ensure they do not pose an environmental risk.

**2000**

The Swedish Parliament has adopted national environmental quality objectives, and SGU is given responsibility for the Good-Quality Groundwater environmental objective, as well as an interim target for natural gravel under the Good Built Environment objective.

**2005**

SGU becomes the first government agency in Sweden to implement a certified management system for quality, occupational health and safety, and the environment.

**2008**

SGU celebrates 150 years serving society. You will find more information about us on our web site: [www.sgu.se](http://www.sgu.se).



Geologist  
Anna Hedenström,  
2008.

Photo: Karl-Erik Alnavik.

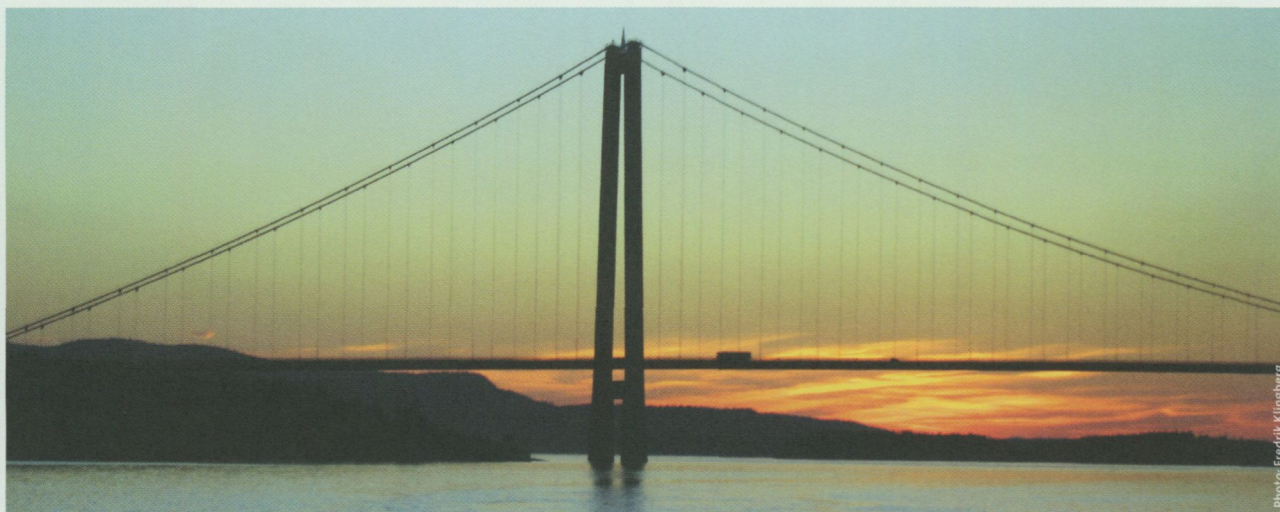


Photo: Fredrik Klingberg

Supply of geological information, a core activity of SGU, is essential in planning and building, as for infrastructure projects such as the High Coast Bridge, province of Ångermanland, northern Sweden.

*Opposite page:* SGU takes part in the yearly Swedish Geology Day, founded to spread knowledge and understanding about geology to the public, especially the younger generations.

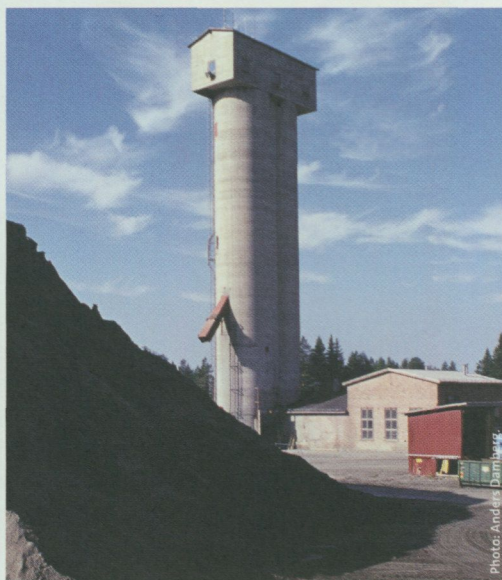


Photo: Anders Damberg

One of SGU's core activities is to contribute to the sustainable use of natural resources.

## THE FUTURE

In December 2007 the Government set new objectives for SGU. Depending on the kind of information in question, these objectives are to have been achieved between 2012 and 2016. During this period SGU will be even more vigorous in its efforts to ensure that geological information is readily available to those who need it.

SGU has always had long-term objectives based on the current needs of society and on current knowledge and methods. General geological information is now available for the whole of Sweden. Parts of the most densely populated areas and those offering most exploration potential have been mapped in greater detail.

### Core activities

As of 2008 SGU engages in three core activities: one is the supply of geological information, one concerns the sustainable use of natural resources, and one is the development of geo-scientific knowledge. Surveys of bedrock, soil and groundwater will be more needs-driven in future. SGU will be more committed to information development and a more customer-friendly supply of the large quantity of geological information that is already available in our databases.

Priority will be given to developing SGU's basic data system and information to meet the standards expected of public administration in relation to electronic services for private enterprise, public authorities and the general public. Progress will be achieved in cooperation with other public agencies producing information and will take into



Photo: Carl Erik Almqvist

Mapping is essential to understanding geology. This esker, crossing Lake Ruokojärvi, is located in the province of Norrbotten, northern Sweden.



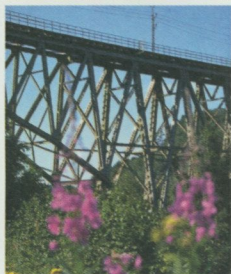
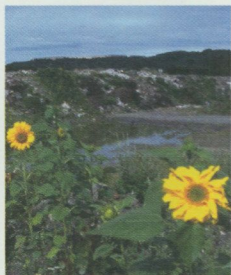
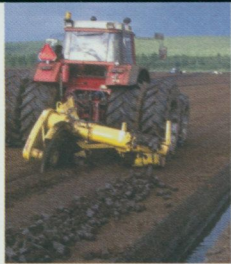
account the technical and legal aspects of supplying geographical information in the information society of the future.

As a public agency, SGU will continue to press for sustainable use of natural resources by influencing actors in society. An increasingly important task is to contribute to developments in the minerals sector. Efforts to achieve the environmental quality objectives for groundwater, natural gravel, aggregate and contaminated sites also have high priority. Skills development at SGU will continue by way of research and development activities designed to improve SGU's own knowledge, and also to provide support and funding for research conducted at universities and colleges. Cooperation with other stakeholders in research and development projects, particularly within the EU, will be increasingly important. There is also potential for developing international contract operations, particularly in the minerals and environmental sectors.

#### **A service oriented organization**

Geologists will be working both in the field and at the office, performing the duties of a public agency and working on development. They will be serving customers and using new technical aids, a trend that has already begun. The SGU of the future is a knowledge-intensive and service oriented organization, which, in partnership with the world around us, will be developing the information that society needs.

SGU's activities will result in more efficient use of geological information. This will in turn result in increased benefits to society and help to achieve sustainable use of Sweden's natural resources – for growth, increased employment and a good quality environment.



The Geological Survey of Sweden was founded in 1858, to examine, describe and present Sweden's bedrock and soils. Our task was to meet the expanding industry's need for ores and minerals, and to support agriculture, facing the great challenge of supporting a fast growing population.

During 150 years SGU has been under constant change. What started as a survey of bedrock and soils has developed to a diversified operation, also embracing groundwater and seafloor mapping. New methods have opened for new ways to widen the knowledge about the world of geology, always to serve the changing society.

Today, SGU's activities focus on providing support in three core areas: supplying geological information, sustainable use of natural resources and knowledge development. The SGU of today and tomorrow is a service oriented, knowledge-intensive organization which, in partnership with the surrounding world, develops the information that society needs.

**SGU**  
Sveriges geologiska undersökning  
Geological Survey of Sweden

