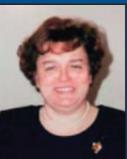




bimonthly No 5
JANUARY/
FEBRUARY 2004



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IN THIS ISSUE:

Presentations of the Polish Geological Institute, Centre of Excellence REA, the Polish Hydrogeological Survey, and PGI's research on the marine environment (southern Baltic Sea) and on geological problems of the Carpathians.

Publisher:

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<http://www.pgi.waw.pl>

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circulation 1000

ISSN 1731-7177

AT THE DOOR OF THE INTEGRATED EUROPEAN GEOSCIENCES



A scope of geosciences is much different at present than it has been even several years ago. We deal with new tasks or intensify our interest in several disciplines, whereas the others, most popular yesterday, have already declined. That is due to new demands of the society, including geoenvironmental and groundwater monitoring, sustainable development, security of energy and raw materials supply, climate change, soil protection, geohazards, and geothermal energy.

This 2004 year is very significant for the Polish Geological Institute, firstly because of its 85th anniversary since the establishment in 1919, and secondly and more important – because in May 2004 Poland is going to join the European Union.

We have been preparing for the latter for the last few years, among others by joining the EuroGeoSurveys (union of the national geological surveys of EU) in 2001 and by establishment of the Polish Geological Institute's *Centre of Excellence: Research on Abiotic Environment (REA)* which has been acknowledged by the European Commission in 2002. These undertakings forced a significant organisational transformation of the Institute's structure, fitting it to its role as the National Geological and Hydrogeological Surveys, and the top rank research institute in Poland. In 2003, our leading periodical: *the Geological Quarterly* was included into Science Citation Index of the Institute of Scientific Information in Philadelphia (USA).

These achievements added a lot of new strength into our role played in geosciences and in the Polish research, but first of all they resulted in considerable intensification of our bilateral and multilateral co-operation with many institutions in Europe, therefore enabling gradual integration of the Institute with the European Research Area. At present,

we participate in several EU projects, trying to be more and more effective in this field and regarding this activity as a most important task in our research.

We are not afraid of putting our feet in new fields of geosciences that are born almost every day. Such approach calls for new activities that pass across traditional boundaries, both in science and in practice.

I hope that this first issue of the English version of the REA *Informato(r) (Newsletter)* will be a small step forward to better mutual understanding and that it will facilitate good and profitable co-operation between geoscientists, not only in Europe but also overseas.

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POLISH GEOLOGICAL INSTITUTE; ITS PAST AND PRESENCE



The Polish Geological Institute was established in 1919 by virtue of the first Polish Parliament decision, soon after regaining the independence by Poland. She was to act as the Geological Survey of Poland whose main goal was to study the geological structure of Poland and to assess the mineral potential of the country, regarded as vital for the country's development.

Similar national geological surveys have already operated in all the developed countries at the time. The British Geological Survey, established in 1835, was the first survey in the world's history. The US Geological Survey was established in 1888. If it was not for the loss of independence and partition of Poland by Russia, Prussia, and Austria, Poland would have established her geological survey much earlier. The roots of this institution date back to 1782 when the last king of Poland, Stanisław August Poniatowski, established the Ore Committee and Cabinet of Natural History with tasks resembling those of the modern national geological surveys.

Between the two World Wars, the Institute systematically, although slowly, organised its structure, developed the knowledge on the geological structure and mineral resources of Poland, and provided the government with specialised advice. The Institute published first small scale geological and of natural resources maps of Poland, started construction of a detailed geological map of Poland in scale 1:100 000, and prospected for and explored of various mineral deposits. At the same time, the Institute constructed its headquarter in Warsaw and organised two regional branches: in the Upper Silesia, to study hard coal deposits, and in Borysław, currently situated in Ukrainian Fore-Carpathians, to support the developing Polish oil industry.

In 1939, a branch of the German Geological Survey was opened in the Institute in Warsaw, and several Institute's geologists were employed there. This could be regarded as recognition by Germans of the Institute's accomplishments. Many valuable geological documents and collections have been saved secretly by those Polish geologists. However, during the Warsaw Uprising in 1944, the Institute suffered heavy losses.

In the post War II era, the Institute's destroyed buildings were restored, and a new office was built in Warsaw. Moreover, a great number of new staff was employed, and several new regional branches were established. Knowledge of the geological structure of Poland, whose borders were then moved far to the west, rapidly developed and reached deeper and deeper inside the Earth. But the most impressive was the expansion of the prospecting for and exploration of mineral resources of Poland.

The period between the fifties and the mid-eighties of the twentieth century can be regarded as „the Golden Era of the Polish Geology”. Huge sums of money were allocated for the prospecting and exploration of mineral

deposits, which resulted in the discovery of numerous valuable deposits. The most important was a large copper deposit, rich also in silver, the largest in Europe and one of the largest in the world. Between others, several large sulphur deposits, hard coal deposits in the Lublin Coal Basin, numerous deposits of zinc and lead ores, of brown coal, of rock salts, and many deposits of industrial minerals have been discovered. Most of the discoveries were made by the PGI's specialists.

The prospecting for and discovery of various deposits helped to develop knowledge of geological structure of the country, including its deep geological structures where several natural gas and oil deposits have been found. It is enough to say that the knowledge of the geological structure of the country to the depth of 3 km is now thought to be good enough, and the evidenced geological information reaches in some places the depth of 5-7 km.

The Polish Geological Institute has heavily suffered from the rapid collapse of the country's economy at the end of the 1980s. Additionally, since 1990 the national mineral industry has been opened to investors from all over the world. At the same time, the State stopped financing exploration of mineral deposits, one of the basic fields of the Institute's activities.

However, very soon the activities of the Institute were directed to other important geological issues. First of all, construction of a *Detailed Geological Map of Poland in scale 1:50 000*, based mostly on surface observations

Institute's headquarter, constructed between the two World Wars





Institute – actual main entrance

and shallow drillings, was intensified. The Institute, supported by university teams and geological companies, has started an intensive geological mapping to enable fairly quick completion of this basic, complex map, comprised of more than 1000 sheets.

Further, research on groundwater was expanded and water-well networks, monitoring the quality of various groundwater aquifers, were developed both on national and local scale. Numerous monitoring points were also incorporated into the national environment monitoring system.

Finally, geochemical mapping directed into studies on the abiotic environment: soils, surface waters, and

their bottom sediments, was developed on a large scale. During the 1990s, the content of toxic metals and other harmful elements in soils and surface waters of Poland as the whole, and especially in the Upper Silesia as well as in the areas of large agglomerations, was examined. Thousands of chemical analyses were performed in a modernised Chemical Laboratory of the Institute. In the meantime, the Laboratory obtained the necessary certificates, becoming one of the best laboratories in the country and a highly valued partner of many foreign laboratories.

The Institute has also developed the research on pollution caused by the industrial derivatives of oil, and by the old pesticides repositories. After catastrophic floods of 1997 and of later years, it participated in the assessment of their environmental impacts. The Institute has also become a centre of landslides research in Poland, with special emphasis on the Carpathians. Also, studies of the Polish zone of the Baltic Sea bottom sediments and their mineral deposits has been intensified. Recently, still more attention is given to the causes of global climatic changes, including methane emission from the coal mines and coal dumps, not neglecting research of climatic changes during the former geological periods.

All these activities are being supported with a very modern computer technology, which standard is as good as that found in the national geological surveys in Europe and America.

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REA – CENTRE OF EXCELLENCE: RESEARCH ON ABIOTIC ENVIRONMENT

Excellence is a term rather unwillingly used in our culture.

If it is used, it usually has an undertone of irony.

*However, during the last years, the terms **centre of excellence** or **centre of competence** have been introduced to the European Union to mark the most distinguished research institutions.*

European Union allocates still higher percentage of her funds to the most promising research fields and, moreover, to the best research teams and institutions. That explains the appearance of the term *centres of excellence*, on which European Commission plans to build modern European Research Area.

In the latest 6th Framework Programme for Research, Technology and Demonstration, one of the Commission's most important instruments are to be *networks of excellence* for various research and technology fields.

In 1999, the European Commission opened calls for grants to streng-

then *centres of excellence* from the candidate countries. Unfortunately, only nine Polish research institutions have won the grants. At the end of 2001, the Commission repeated the call, to support the integration of the candidate countries *centres of excellence* with the European Research Area. This time, the Polish State Committee for Scientific Research has very strongly supported that idea announcing that those *centres*, which project proposals will be regarded as in scope with the call, will be included into the list (map) of the leading Polish research institution and will be given priority in granting public funds.

The Polish Geological Institute, one of the leading research institutions in Poland, decided in 2001 to establish a *centre of excellence* within its structure and apply for a European Commission grant. Following the requirements of the Commission, the Institute selected within its organisation research teams and projects consisted with the European Union 5th Framework Programme priorities (groundwater problems, geo-environmental problems of the coast and bottom sediments of the Polish zone of Baltic Sea, natural and man-caused hazards, global climatic and environmental changes), and organised them

in the **Centre of Excellence: Research on Abiotic Environment REA.**

The REA Centre consists of five Working Groups devoted to the above mentioned research fields. The most important Centre's task concerns first of all initiation and co-ordination of the environmental research and development activities of the Institute. The Centre's tasks cover also evaluation of the present state of the environment in Poland, definition of the environmental risks, and the policy of the heavily contaminated sites remediation. The research programme covers both the land areas and coastal and marine areas in Poland.

The fields of study of the Centre also include groundwater: their quantity, quality, and sustainable management, geological factors of the catastrophic results of natural hazards (floods), landslides, etc., and hazards caused by the human impact on the environment. As far as the global and regional climatic changes are concerned,



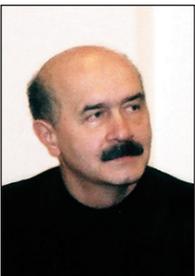
the research programme covers also changes of landscape and environment, with special emphasis on the palaeoclimate and palaeoenvironment problems, one of the Institute's specialities.

The Centre consolidates and extends co-operation with research institutions in Poland and abroad, and especially from the European Union countries. Its actions are supported by its Advisory Board, consisting of prominent specialists from the Institute and other Polish research institutes, and from abroad, mainly from European Union countries.

The Polish Geological Institute Centre of Excellence REA filed in January 2002 its programme proposal in response to the above mentioned European Commission's call, and won a three years contract for its integration with the European Research Area. The contract entered now into its second year with activities reported on the internet (<http://www.pgi.gov.pl/rea>).

M. Podemski

POLISH HYDROGEOLOGICAL SURVEY



The Polish Hydrogeological Survey was established in 2001 and the Polish Geological Institute has been entrusted its functions.

The main objectives of the Polish Hydrogeological Survey include proper management of groundwater resources, intended mainly for people's consumption and constituting over 50% of water supply for Poland's population, and the protection of groundwater in Poland.



The main tasks of the Polish Hydrogeological Survey cover identification of groundwater aquifers, calculation of their reserves, monitoring and protection of their quality, and sustainable management in order to assure rational utilisation

of groundwater by the society and industry. Systematic observations, analyses and forecasts, dissemination of knowledge, and information on the state and risks to groundwater resources are very helpful for implementation of the policy of sustainable development of the country. These activities, carried out by five thematic groups: groundwater monitoring, groundwater resources, forecasts and analyses, methods of research, and hydrogeological databases, are rooted in the ecological policy of the country.

1. The groundwater monitoring group is responsible for organisation of systematic measurements, for observation and inspection of water levels and groundwater quality in hydrogeological stations and observation sites, and for development of the national network of stationary observatories. The group oversees also some regional groundwater monitoring networks.

2. The groundwater reserves group's activities include estimation of groundwater reserves and ensuring the proper relationships between groundwater, surface water, and ecosystems. To other important tasks belong: updating of the estimation of the national groundwater reserves within the following classes: rechargeable (replenished through infiltration), available (ready for use), and prospective (probable); ensuring the quantity, structure, and location of groundwater intakes; and collecting information necessary for preparation of water management balances, that is for estimating the need for water and the possibility of satisfying it with the use of the known groundwater resources.

3. The forecasts and analyses group estimates the current hydrogeological situation (availability of groundwater) in the country. Moreover, the group prepares forecasts and issues warnings of changes in quantity and quality of the resources or of any risks to groundwater. The reports are delivered to representatives of the state administration.

4. The group on research methods co-ordinates work connected with the development of the research methods and preparation of guide-books, instructions, and methodical recommendations.

5. The hydrogeological databases group is the „heart” and the most precious treasure of the Polish Hydrogeological Survey. The group collects, archives, processes and provides access to hydrogeological information, and especially to the information on the quality and quantity of groundwater and groundwater level variations. All digital, descriptive and interpretative data is stored in five main computer databases.

The HYDRO bank is the most important database containing information on almost all prospecting and exploration water wells drilled so far within the area of Poland.

Database of the *Hydrogeological Map of Poland* is a computer map compiled in the sheet form, in the scale of 1:50 000. It contains information on major and minor usable potable groundwater levels, and extended hydrogeological interpretation of an aquifer being the most important source of water in a given region. The description includes extension and the depth of the main groundwater horizons, their quality, thickness, electrical conductivity, reserves, potential risks, and potential productivity of a typical water well.

The SOH database contains results of research and measurements from the stationary groundwater observation networks, carried out since the beginning of the 1970s. The information stored in this database are published in *Rocznik Hydrogeologiczny* (Hydrogeological Annual Report) and *Kwartalnik Informacyjny* (Information Quarterly).

Database of national groundwater quality monitoring (MONBADA) contains results of chemical and physical analyses of sweet groundwater. Results of these observations, carried out during the last 12 years, are published in a series of *Biblioteka Monitoringu Środowiska* (Environmental Monitoring Library), under the heading *Stan jakości wód podziemnych na podstawie badań monitoringowych* (Groundwater quality status in the light of monitoring studies).



A water monitoring station; Cretaceous aquifer; south-eastern Poland

The next database: *Główne Zbiorniki Wód Podziemnych* (the Main Groundwater Aquifers), containing information on main groundwater basins and providing the essential hydrogeological parameters of 160 main basins, was created in 2003.

The most important information contained in these hydrogeological databases can be found at the Polish Geological Institute’s website (<http://www.pgi.gov.pl/hydro> and <http://www.pgi.gov.pl/soh>).

Performing tasks assigned by the State, the Polish Hydrogeological Survey co-operates with many hydrogeological companies, and with the Polish Hydrological-Meteorological Survey run by the Institute of Meteorology and Water Management in Warsaw. In 2004, the Polish Hydrogeological Survey will also cover monitoring of cross-border groundwater aquifers.

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ABIOTIC ENVIRONMENT TREASURES OF THE BALTIC SEA – the Polish Geological Institute’s special interest



Poland, situated by the Baltic Sea, is a marine country. An over 500 km long coastline and the Polish zone of the Baltic Sea, covering the area of 30 533 square km, which accounts for 10% of the entire Poland’s territory, open opportunity for the country’s development; on the other hand, they may represent hazards to the country. They also impose serious international obligations on Poland.

The Polish Geological Institute is deeply interested in mineral resources existing below the sea floor and in its coast. On the other hand, the increased coast erosion as well as sea water infiltration into the groundwater aquifers threaten natural resources of the Polish zone of Baltic Sea. The studies are directed at the sustainable exploitation of mineral resources of the sea bottom, at the proper utilisation of offshore areas, and in turn they should

prevent the negative impact of the human activity on the Baltic Sea and its coast environment.

Most activities of the Polish Geological Institute focus on the study of the geological structure of the southern part of the Baltic Sea: its bottom deposits and its basement. Such studies enabled the researchers to assess what, if any, mineral resources occur in the Baltic Sea, and which of them could be utilised. To ensure that these tasks



Marine erosion of the southern Baltic Sea coast

are performed, in 1968 the Institute opened the Marine Geology Branch with the seat in Sopot (presently in Gdańsk-Oliwa).

Since 1971, the Branch has regularly taken part in research cruises on the southern Baltic Sea. Geophysical and geological research, as well as underwater drilling, were conducted onboard Polish vessels, chartered primarily from *Polskie Ratownictwo Okrętowe* (the Polish Ship Rescue), and from the Navy (hydrographic ship *Kopernik*). The Branch was using also underwater vehicles.

From the beginning of its operation, the Branch has also profited from foreign technology; for example, its scientists conducted research onboard a vessel *Akademik Aleksy Kryłow* of the Research Institute of Ships Construction from Sankt Petersburg in Russia, and its underwater vehicle *Bravo*, and onboard German vessels: *Alexander von Humboldt* and *Professor Albrecht Penck*.

Research conducted for many years enabled preparation of numerous publications, essential for the knowledge on the Polish part of the Baltic Sea geology and its mineral resources, often rewarded by the Minister of Environment. These publications (and rewards) include: *Geological Map of the Baltic Sea Bottom 1:200 000* (1994), *Geochemical Atlas of the Southern Baltic Sea 1:500 000* (1995), *Geological Map of the Baltic Sea Bottom (without Quaternary formations) 1:500 000* (2000), *Geochemical Map of the Southern Baltic Sea 1:500 000* and many others.

In the meantime (1982-1990), several deposits of aggregates (sands and gravels) were discovered and explored: on the Słupsk Shoal, in the Koszalin Bay, and on the Southern Middle Shoal, with total reserves of 160 million ton.

Harmful effects of the human activity, threatening both the abiotic and biotic nature of the Baltic Sea, are widely known. Bottom deposits store information on the effects of human activity. They accumulate soil cultivation product (pesticides, fertilisers, etc.) and other toxic substances (e.g. heavy metals) produced by industry and large agglomerations and, carried by rivers to the sea. The sea is also polluted by the oil derivatives from land and from oil spills. Studies of the sea pollution, and first of all its prevention, and the Baltic Sea nature remediation, have recently become the most important tasks of the Polish Geological Institute.

To deal with geological problems of the Baltic Sea coastal zone, the Institute opened in 1964 a special unit in Szczecin, initially as the Coast Geology Laboratory, and since 1995, as the Pomeranian Branch. The Branch spe-

cialises in research on the geological structure of the coast, among others on the coastline changes or on the geological characteristics of cliffs. It also prospected for gravels in the coastal zone and for heavy minerals in the sea bottom and in the beach sands of the Southern Baltic Sea.

One of the most important tasks assigned to the PGI's Pomeranian Branch was the potable water supply for the Wolin and Uznam Islands from the groundwater intakes. During the last few years, the Pomeranian Branch studied also, together with the Marine Geology Branch, geological structure of the inland and offshore areas, and geodynamic coastal processes, constructing a detailed *Geodynamic Map of the Polish Coastal Zone in scale 1:10 000*.

In order to conduct modern research on the Polish zone of the Baltic Sea and on its coast, the Polish Geological Institute is closely co-operating with several research institutions of other Baltic countries. The fact of conducting research from Russian and German vessels has already been mentioned. Together with other countries, the Institute studied the composition of bottom sediments, and Quaternary formations of the Western Baltic Sea (maps in scale 1:500 000 were prepared with German research institutions), bottom sediments of the central Baltic Sea (map in scale 1:500 000 has been prepared jointly with Lithuania and Sweden), geological structure and composition of sediments of the Gdańsk Bay and of the Vistula Sandbar – with Russia, Great Britain, and The Netherlands, Pomeranian Bay with Germany, and many others.

Researchers from the Institute developed their skills also on world oceans participating in the international studies on Manganese concretions from the Pacific Ocean within the frame of INTERMORGE, or in a research cruise on the Caribbean Sea with the Dutch. For many years, the Polish Geological Institute specialists participated in numerous international sea research programs as well as in research programs on the youngest geological formations.



Underwater vehicle Bravo

This co-operation was carried out within the frame of the Council for Mutual Economic Assistance (CMEA); through the International Council for the Exploration of the Sea (ICES), International Union of Geological Sciences (IUGS), Helsinki Commission (HELCOM), International Union for Quaternary Research (INQUA), and within the European Union programs: INCO-COPERNICUS, PHARE and the 5th Framework Programme.

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THE CARPATHIANS – BEAUTIFUL AND DANGEROUS

Research of the Carpathian Branch of the Polish Geological Institute



The Polish Carpathian Mts. are part of an extensive mountain chain situated in the Central Europe and extended as about 1300 km long arc between Danube river gorge near Bratislava, at Austria and Slovakia border, and „the Iron Gate” at Romania and Serbia border. The Polish part of the Carpathians covers about 19 600 square km, which accounts for about 6.3% of the entire Poland’s territory.



The Polish Geological Institute unit responsible for geological and hydrogeological research on the Polish Carpathians and the Fore Carpathian Trough is the Carpathian Branch of the Institute. Many years’ research of the Carpathian Branch resulted in the construction of the Carpathian sheets of the *Detailed Geological Map of Poland 1:50 000* and of the *Geological Map of Poland 1:200 000*. Especially important were geological studies supporting the oil and gas exploration. They have resulted, between others, in definition of a new geostructural unit in the Carpathians (Obidowa-Słopnice Unit). In this unit, gas and oil deposits have been discovered by the Polish oil industry.

Environmental protection is also an important part of the Carpathian Branch activities. These include construction of the Carpathian sheets of the *Geological-Economic Map of Poland 1:50 000*. During the last few years, the researchers’ attention has been drawn to the mining activity impact on the Carpathian environment. A possible disposal of communal waste into the old mining open pits was analysed, between others.

The most important geoenvironmental tasks, performed by the Carpathian Branch recently, cover the landslides hazards in the Carpathians, as the dangerous landslide and surface debris flow phenomena occur at the still larger scale since heavy rainfalls in 1997. Landslides became a source of considerable anxiety of the Carpathian inhab-

itants, especially those whose houses have been located on or in the vicinity of landslide-prone slopes. Specialists of the Carpathian Branch have repeatedly witnessed human tragedy caused by the damage of the buildings. Recently, a dendrochronologic method which, through the study of the trees annual rings, allows for the identification of land masses movements in the past with accuracy to a year, has been applied to the research on the climatic changes favourable for landslides origin.

Another important field of the Branch studies is groundwater from the Carpathian area, especially mineral and thermal waters. The most significant achievements include the discovery and exploration of mineral waters in the areas of Polańczyk, Rymanów Zdrój, Poręba Wielka, Rabka, Jaworze, and Ustronie, and thermal waters in the Podhale Lowland, where the best

conditions for geothermal heating were recognised and utilised. Currently, these thermal waters are heating a considerable part of the Podhale region.

The most important hydrogeological publications compiled by the PGI’s Carpathian Branch include the Carpathian part of the *Hydrogeological Map of Poland* in scales 1:300 000, 1:200 000, and 1:50 000, the Carpathian part of the *Map of Main Groundwater Aquifers* in scale 1:500 000, the *Hydrogeological Atlas of Poland* (the Carpathian area), and the *Geological Atlas of the Western Outer Carpathians and their Foreland*, published in 1988 – 1989 in co-operation with the Slovak Geological Survey in Bratislava.

For many years, the Carpathian Branch participated in several international research projects. One of the most recent is ALARM, a project funded by the European Union within the 5th Framework Programme,

The Carpathians; landslide activated in 2001



and directed to the landslide risk assessment, and limitation of the landslide effects in the mountain areas. But the Institute's Carpathian Branch especially values the traditional close co-operation with Poland's closest neighbours: the Czech Republic, Slovakia, and Ukraine. The Polish areas, especially the Carpathians, bordering

these countries, have similar geological and environmental problems and it is much easier to control and deal with them with the support of the international community.

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INTRODUCING THE ENGLISH VERSION of the Polish Geological Institute's Centre of Excellence REA *Informer*

We wish to introduce the first English issue of the bimonthly Informator /Newsletter/ of the Polish Geological Institute's Centre of Excellence REA, Warsaw, Poland. This is the fifth consecutive number of Informator, published in Polish, and addressed to high schools, universities, government and local administration officers, industry, and general public interested in the protection and management of abiotic environment in Poland.

The *Informer* is co-financed by the European Union project EVKI-CT-2002-80006 REA: Support of the integration of the Polish Geological Institute's Centre of Excellence: Research on Abiotic Environment, with the European Research Area.

The *Informer* presents research results and accomplishments of the Polish Geological Institute in the domains of groundwater in general, of the Polish Baltic Sea coast zone, natural and human induced hazards, as well as of phenomena caused by global changes of the climate and natural environment.

Since 2001, the research mentioned above has been co-ordinated

by the Polish Geological Institute's Centre of Excellence REA. The Institute's and its Centre achievements won the European Commission's recognition expressed in granting finances for a project for integration of the Centre in the European Research Area. *Informer* is the first Institute's popular science periodical designed for non-specialists and general public, people who might have never dealt with the Institute's activities before.

It is planned that once a year an English issue of *Informer*, directed to readers from other countries, will be published. In this first English number, the Polish Geological Institute's

history, general tasks and main activities are presented, with special emphasis on its Centre of Excellence REA achievements. Further, we discuss the first three organisational units of the Institute, which activities were presented in the already published Polish editions of *Informer* (No 2 – 4). Those are: the Polish Hydrogeological Survey devoted to groundwater problems, the PGI Marine Geology Branch, specialised in the Polish Baltic Sea coast zone geology and abiotic environment, and the PGI Carpathian Branch, studying the nature, origin risks of the natural hazards (predominantly – landslides).

Editors

