

# The Detailed Geological Map of Poland 1:50,000: the history, present and future

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The motto: *In each country on the whole world, the compilation and edition of the detailed geological maps, covers the whole territory is one among the major tasks and priorities of the national geological surveys and in Poland also legal obligation of the national geological administration (Pietras, 2001; Ber & Jezierski, 2004).*

**Abstract.** *The Detailed Geological Map of Poland in scale 1:50,000 (DGMP 1:50,000) is elaborated in Polish on the base of geological mapping, especially drilled boreholes to subQuaternary basement as well as geological and geophysical surveys and laboratory studies. The whole edition comprises 1069 sheets. The Detailed Geological Map of Poland in the scale 1:50,000 published from 1954 together with explanations, forms a compendium of geological knowledge of the area. It is a basic map which is being used for construction of all the other consecutive thematic maps of the country, either in detailed or in regional scales. The Map is supplemented with one or two geological sections, typical for the area: one of them (Quaternary deposits) is prepared in highly exaggerated vertical scale. Each sheet is provided with brochure text explanations, containing description of the geological structure of the area, logs of the more significant boreholes, geomorphological and subQuaternary basement sketches and the results of field and laboratory analyses.*

**Key words:** *Detailed Geological Map of Poland, geological mapping, boreholes, geological sections, geophysics*

The Polish Geological Institute (PGI) established in 1919, is now the national geological survey and the principal producer and editor of the geological maps in Poland. In the past decades the Polish Geological Institute's activity generally focused on the construction of multi-sheet serial maps, covering the whole territory of Poland. The most important map — the *Detailed Geological Map of Poland at the scale of 1 : 50,000 (DGMP 1:50,000)* — was fully compiled with the use of digital GIS technology (Fig. 1). It is a basic map being used for preparation of all the other consecutive thematic maps of the country, either in detailed or on regional scale.

*The Detailed Geological Map of Poland, 1 : 50,000 (DGMP 1 : 50,000)* is a unique map not only on a European scale but also on a world scale because: it has a uniform Instruction worked out prior to map preparation and modernized during its construction. In the European countries, departments of the national geological surveys responsible for geological cartography fix only an obligatory map legend, i.e., a list of legend items, and stratigraphic, lithologic and genetic symbols etc.; it is an exceptional case, maybe a little bit controversial, that in Poland this map has been produced not only by the Polish Geological Institute, universities and the Polish Academy of Sciences, but also by geological companies.

For the purpose of the map construction, besides mining technologies (drilling, excavation), also the best and the most precise research methods are used. The only criterion for their selection is the usefulness for solving geological problems. All these investigations and analyses are performed by highly qualified specialists from both the national geological survey and other scientific institutions (Ber, 1997).

## The history of the Map

In 1957, the Polish Geological Institute officially started to take part in the production of the *Detailed Geological Map of Poland, 1:50,000*, basing on the Instruction No 19 issued by the Chairman of the Central Office of Geology. Also in 1957, the first Instruction to the map (*Instrukcja w sprawie opracowania i wydania Szczegółowej mapy geologicznej Polski w skali 1 : 50,000*), was published. The

Instruction was based on the experiences gathered during the construction of the first 10 map sheets from the Małopolska Upland and the Sub-Carpathian region, printed in 1956 and later reprinted with modifications. It should be stressed that the first principles for the construction of detailed geological maps were prepared in 1954 on the base of the preliminary Instruction (*Tymczasowa instrukcja sporządzania zdjęcia geologicznego*), modified in 1975, 1991, 1996 and 2004. The map construction procedure was subsequently standardized by the principles defined in the Instruction of the Director of the Geological Institute issued in 1957. Those principles and the number of recommended enclosures to the map have not changed until now.

The ongoing map sheet projects are being prepared on the basis of the newest and modified version of the Instruction which was adjusted in 1996 (and improved in 2004) to the requirements of digital procedures.

Due to both a wide range of detailed, complex documentary works and the large number of map sheets to be performed (1069), the preparation of the *Detailed Geological Map of Poland, scale 1 : 50,000*, requires employing many highly qualified geologists-cartographers and spending much funds. Therefore, between 1956 and 1996 under fluctuating economic situation of the country and varying financial funds, only 550 map sheets were produced.

Since 1996, thanks to the efforts of the Polish Geological Institute, the significance of the *DGMP 1 : 50,000* for the country's economy was appreciated by the higher authorities and the financial funds have increased to that extent that they allowed for producing 412 map sheets. Moreover, it is now possible to finish the first edition of the Map by 2010 (Ber, 1977).

Until 1989, thematic sketches of mineral deposits and hydrogeological conditions (first aquifer) were also prepared for each map.

Until 1970, the project was performed by the Polish Geological Institute exclusively. Since 1970, along with the PGI as the main executor, also geological companies, universities, the Polish Academy of Sciences and other private companies have taken part in the mapping project.

Since 1994, an ESRI ArcInfo and Oracle digital database has been created for the *Detailed Geological Map of Poland, scale 1 : 50,000* (Gogołek, 1995; Gogołek et al., 1997).

The ongoing map sheet projects are being prepared on the basis of the newest and modified version of the Instruction adjusted to the requirements of digital procedures and issued in 2004.

Until 2003, the area of the *DGMP 1 : 50,000* did not cover the Sudetes which were mapped in 1955–1998 as the

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*Detailed Geological Map of the Sudetes, 1 : 25,000.* That map was partly constructed using old topographic bases and German materials and thus, partly being stratigraphically out of date, it requires either revision or mapping at a scale of 1 : 50,000 i.e. it must be adjusted to the scale of the *DGMP 1 : 50,000*. The revision and generalization of that map within the framework of the *DGMP 1 : 50,000* project began in 2004.

The edition project of the *Detailed Geological Map of Poland, 1 : 50,000*, started in 1957 and became the base for the preparation of other serial map projects such as the hydrogeological map and geological-economical map which contain a wealth of knowledge about mineral resources against the background of engineering geological and geoenvironmental issues.

Since its inception, the edition of the *Detailed Geological Map of Poland, 1 : 50,000*, provides geological information to the local geological surveys, scientific institutions and geological companies for purposes of exploration for mineral resources and water, as well as for engineering geological studies. This is, as mentioned above, the basic map containing primary information for thematic cartography (Ber, 1997, 2004; Ber & Podemski, 1997).

### The present and the future of the *DGMP 1:50,000*

The *Detailed Geological Map of Poland, 1 : 50,000*, is the principal geological multi-sheet serial map covering the whole territory of Poland. It has been developed on the basis of a geological project (Projekt prac geologicznych) as a result of detailed geological mapping at a scale of 1 : 25,000, including geological field works, exploratory drillings,

geophysical measurements (georesistivity or shallow reflection seismic and gravity data) and laboratory investigations.

The final effect of these operations is a complex geological monograph of a given area, including an author's fair copy of a basic geological map, scale 1 : 25,000, a geological cross-section, an explanatory text and thematic (geomorphological — Fig. 2, and geological — without Quaternary deposits) sketches at scale 1 : 100,000.

Map sheets, constructed to date, are now being prepared for printing using digital methods to be available on a CD-ROM (map) and on a floppy disc (explanatory text) or as a plotter print.

According to the data as of end 2004, the development of the *DGMP 1 : 50,000* project is at the following stage: 875 map sheets covering 81.85% of the whole territory of Poland have been constructed, 591 of them have already been printed, the construction of 75 map sheets is far advanced. Digitizing works, conducted since 1991, resulted in the printing of 19 maps of the *DGMP 1 : 50,000*.

Since 1990, the process of preparation of consecutive map sheets has considerably accelerated. During the period of 1990–2004, 412 maps were constructed (Fig. 3).

As mentioned above, 75 map sheets are currently under construction at various stages of preparation. In consequence, works within the *DGMP 1 : 50,000* project reached an unprecedented level.

Currently, along with the Polish Geological Institute, also geological companies, universities, the Polish Academy of Sciences and other private companies (a total of 21 entities) take part in the mapping project. The contribution

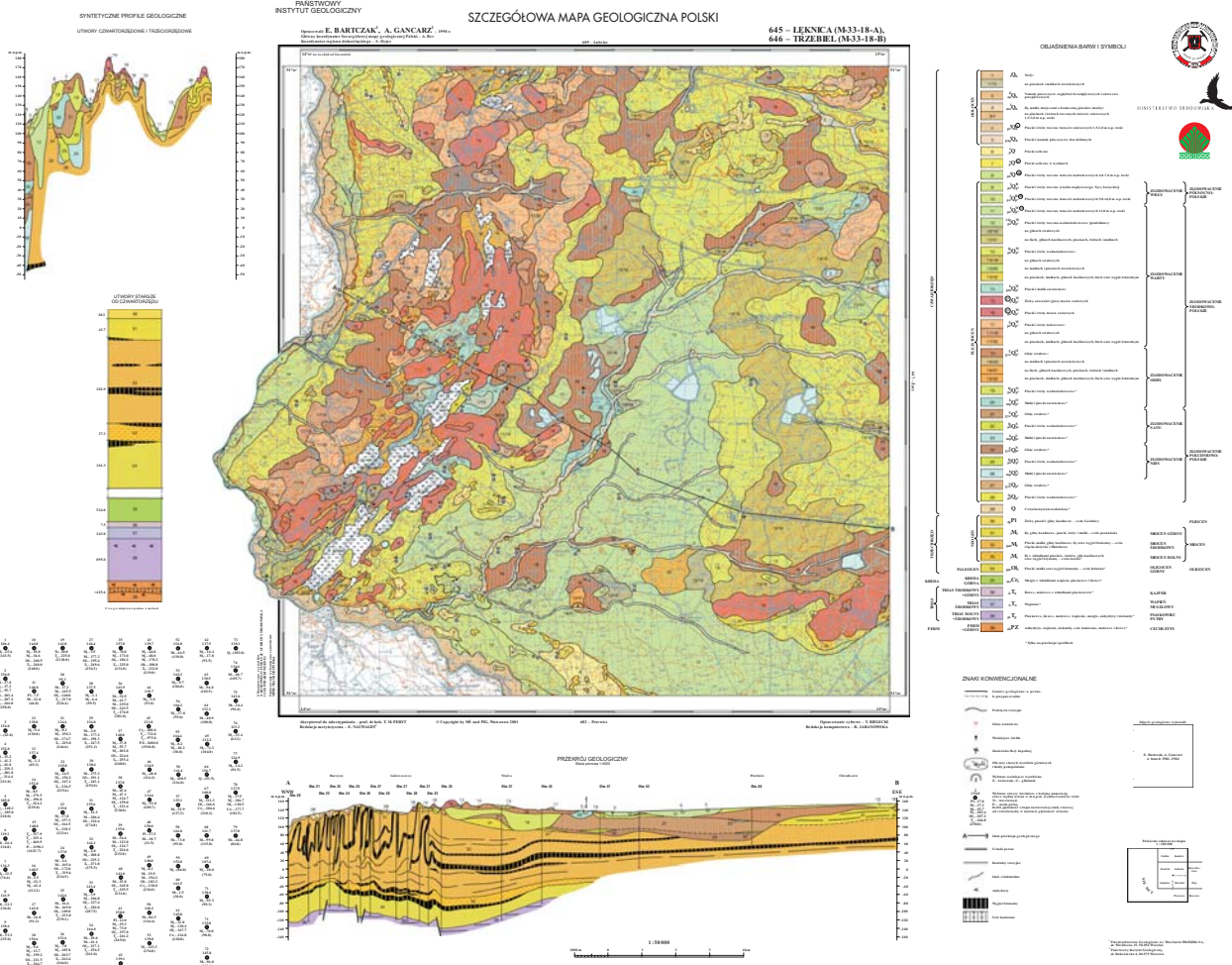
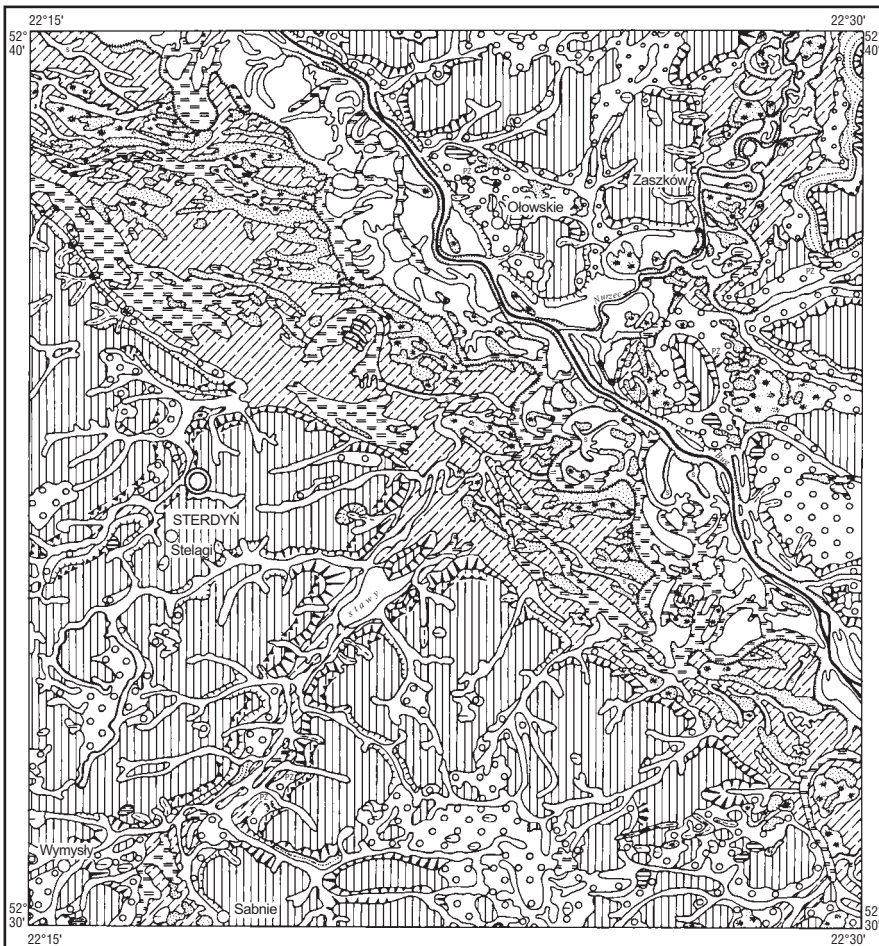


Fig. 1. Sheet of the *Detailed Geological Map of Poland* in scale 1 : 50,000, after Bartczak & Gancarz, 1995



Objaśnienia do Szczegółowej mapy geologicznej Polski 1:50 000  
Ark. Sterdyń (455)

Tablica I

**SZKIC GEOMORFOLOGICZNY**

Skala 1:100 000



Opracował: K. WROTEK

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of subcontractors accounts for 60%, 40% of the edition is performed at the PGI.

It was an important fact in 1995 when the Polish Geological Institute was entrusted with the duty to play the role of the main contractor, along with the role of the general coordinator of the project.

The Polish Geological Institute coordinates the entire mapping project throughout the country, as its statutory duty. The Institute appointed a coordination team and the General Coordinator of the *DGMP 1 : 50,000*. Eight regional coordinators and six coordinators for special investigations (in lithology, petrology and geophysics), publication and digitizing conduct consultative and advisory activity covering the whole mapping procedure ranging from planning work to the final submission of the author's version to the Commission for Cartographic Elaborates at the Ministry of the Environment.

The coordination team is a supervisory body both controlling the compliance with the methodical requirements and ensuring the high scientific merit according to the Instruction requirements and the present state of geological knowledge.

An important role in the process of assessment and receipt of the final reports is played both by the Commission for Cartographic Elaborates at the Ministry of the Environment and by the editorial board of the Publication Department of the PGI. The production process of a single map sheet lasts 3–3.5 years.

The currently ongoing mapping work is financed by the National Fund for Environmental Protection and Water Management.

It should be stressed that since 1991 there have been practically no limits in the amount of funds available for the continuation of the *DGMP 1 : 50,000* project, and the expenditures for the project development reached an unprecedented level.

75 map sheets from the Polish Lowlands and the 32 so-called Sudetic sheets whose processing relies on updating and generalization of the *Detailed Geological Map of the Sudetes 1 : 25,000*, have still to complete the first edition of the *DGMP 1 : 50,000*. It allows for estimating that the whole edition

←  
**Fig. 2.** Enclosure of the *Detailed Geological Map of Poland* in scale 1 : 50,000 Sterdyń sheet Geomorphological sketch in scale 1 : 100,000, after K. Wrotek, 2002

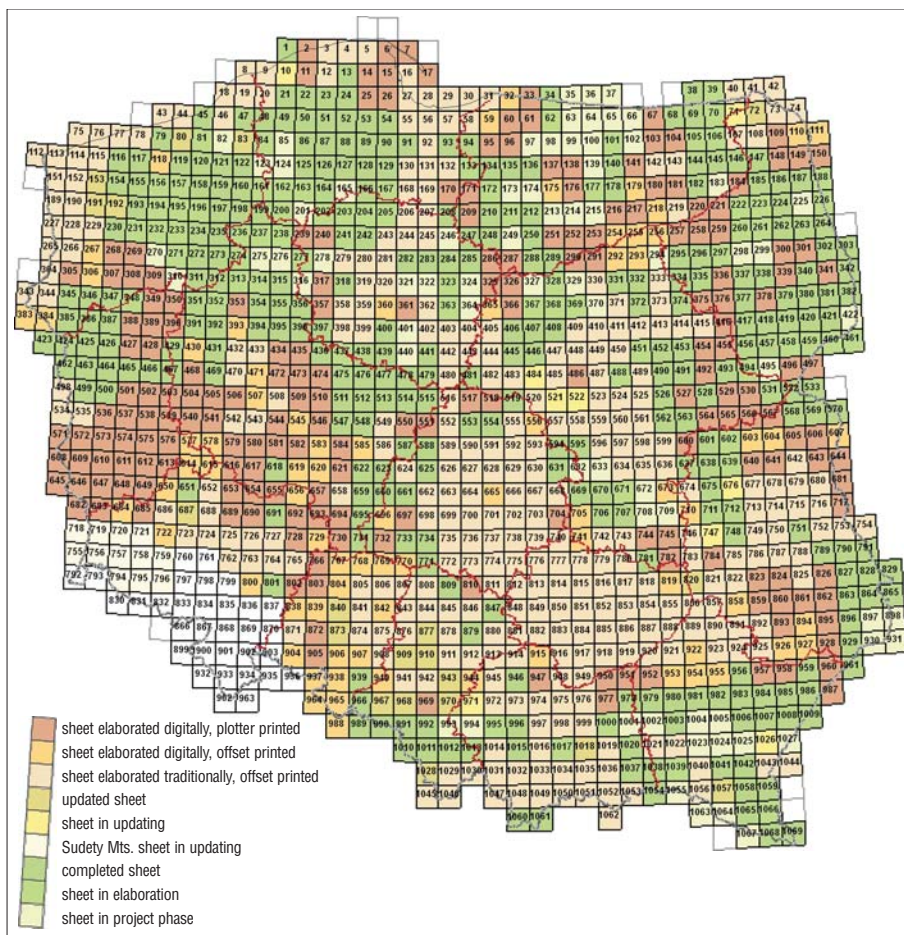


Fig. 3. Index of *The 1:50,000 Detailed Geological Map of Poland*, the state for January 1, 2005 (after Gogołek, 2005)

will be completed by 2010, and the development of the project can be covered by only one contract (2006–2010).

The predicted completion date in 2010 for the whole *DGMP 1 : 50,000* edition (i.e. 1069 map sheets) is not going to be the final point. Still during the first edition and especially after its completion, the old *DGMP 1 : 50,000* map sheets constructed in 1960–1980 should be revised and updated.

### Conclusions

The formal completion of the *DGMP 1 : 50,000* edition ranks Poland among those few countries in the world which can be proud of covering the whole territory with a detailed geological mapping. This could be done due to large financial funds and as a result of taking into account by the Government's and Institute's authorities a number of postulates proposed by geologists-cartographers during the project development:

- since 1998, mapping and printing-preparation work was performed on a standardized topographic base ready for digitizing;

- a uniform system of cartographic database, developed as glossaries and codes included in the Instructions (1996, 2004), was created;

- in-office and field computer techniques and computer programs for data collecting and processing were introduced (GPS devices, notebooks etc.);

- the Methodology for the *Detailed Geological Map of Poland* (L. Marks & A. Ber, eds), including the newest methods of cartographic investigations, was published in 1999;

— the financial settlement system was slightly simplified, but it was unable to introduce the lump sum system (like, for example, in Germany) because of VAT on exploratory drilling. Another success was the international cooperation with the geological survey of Brandenburg Land (LGRB), that resulted in a joint construction of the first cross-border map sheets of Seelow/Kostrzyn and Słubice upon Odra, with bilaterally coordinated legend items, symbols and stratigraphy of Quaternary and sub-Quaternary deposits.

The *DGMP 1:50,000* project has been developing for 51 years not only thanks to the support of the Government's and Institute's authorities, but also owing to the efforts and skills of a large number of highly qualified geologists-cartographers whose names are given in individual map sheets, of general coordinators, and of regional coordinators.

Special appreciation should be expressed for the efforts of the scientific editors. Anonymous editions of the consecutive Instructions and the principles of digitalization were prepared at the Polish Geological Institute.

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