

## Geological mapping in Latvia: from useful minerals and structures to georesources

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Traditional geological mapping in Latvia was initiated in the 1930s. Basic geological mapping, however, started just after the Second World War and thus provides a very simplified picture about geological structures and landscape-forming deposits, widespread useful minerals, and some data on hydrogeology. In 1957, systematic geological mapping at a scale of 1:200 000 was initiated; finalizing the geological structure mapping of 25 years. In 1974, mapping started at a scale of 1:50 000. It was interrupted by 1992, but still covers close to 1/3 of the Latvian territory.

During the last 15 years geological mapping has been carried out in restricted local areas, mostly in relation to environmental protection or land development activities. Therefore this process is very disperse spatially, limited in the study subject and depth (up to 10–25 m). But in the meantime traditional geological data and products have become historical data, not to be evaluated without corresponding extensive field studies. In view of this, the transformation of the geological maps to a modern geographical topographic base, application of a unified legend, translation into the local language, and adaptation to GIS technologies finalize the former stage of geological mapping in Latvia. It should be stressed that the quality of these historical data is high and they serve as the base for any geological study all over the country, but still this information is outdated.

Recent mapping activities are related to international programmes of soil geochemical cartography, studies of state-protected geological and geomorphological objects and sites, and increasing studies of raw materials for building industry and construction works. The weakest point for most of the least-mentioned investigations is the quality of data, limited spatial coverage, and insufficient topographic adjustment, which has resulted

in falling behind with generalization of new geological data.

Contrary to topographic service and mapping, whose development has substantial motivation and support, the corresponding geological studies are very limited because the knowledge of the core subject of traditional geological mapping – useful minerals and structures – is satisfactory at least for the coming decades. This is hampering the development of detailed geological mapping, but, potentially, there are several alternatives.

In Latvia, according to the Civil Law, property rights on subsoil resources belong to the landowner. There are only some restrictions on the access and extraction of mineral resources – groundwater and hydrocarbons have been declared as resources of state importance. Besides, the state is the largest landlord of the country and municipalities operate on behalf of the state within fixed territories. However, the state as the government as well as the largest landlord, does not initiate any inventory of its own properties – georesources in a broad sense, including the mapping. Potentially, it should be recognized as one of the basic areas for geological studies in the future.

Another point of view takes into account that the value of traditional raw materials in financial terms is falling because of international trade expansion and development of globalization. This substantially reduces space for traditional geological studies that have already served society with resources for several hundred years to come. Currently most of these studies are being replaced by a broad range of environmental studies, monitoring observations, and a number of politically initiated surveys. The majority of these studies support society needs and the willingness to replace visions by data and knowledge. These are regional and physical planning exercises for medium- and long-term develop-

ment. However, modern plans are not so much based on and correspondingly interested in raw materials and similar resources as a basis for development, at least in “developed” northern countries.

Planning and development issues include a broad knowledge of conditions, obstacles, modern and forthcoming processes in measurable units, contrary to traditional geological observations. However, there are no sufficient basic studies supporting this knowledge to serve society asking not so much for resources, minerals, and reserves as for georesources in general. This means that the role of geology changes substantially from providing services of resources to supplying the knowledge of how to support, transform or change natural conditions to satisfy the needs of society in a particular

site, area or region, entitled as professional knowledge and management.

Therefore traditional geological mapping and search for useful minerals and structures can form an overall frame which should be fulfilled by a new, but not just updated, knowledge termed as georesources. This term is extraordinarily spacious and has many definitions with only a few common characteristics – spatial area, geological structure, and human knowledge. Other dimensions are still under discussion and a number of case studies are required for fundamental understanding of the core subject. In this respect historical data of detailed geological mappings can serve not only as output data but also as the subject of research, design, and models for data presentation.