Summary

Protection of groundwater in Poland

The scientific monograph entitled *Protection of groundwater in Poland* is an attempt to summarize the problems of anthropogenic threats and the protection of groundwater in Poland. It is based on many years of research by the author and collaborators, initially at the Institute of Environmental Management in Poznań, and then in the Department of Hydrogeology and Water Protection at Adam Mickiewicz University in Poznań.

The monograph comprises 25 chapters covering issues of anthropogenic threats and contamination of groundwater, the migration of pollutants and the problems of protecting these waters. The substantive issues in this area are illustrated with examples presenting research findings.

The first two chapters (2 and 3) present the natural and economic importance of groundwater. The natural significance is illustrated in particular on the basis of long-term trends in the impact of polluted groundwater flowing from agricultural areas on surface waters.

Chapters 4 to 9 contain definitions of the basic concepts in the field of anthropogenic threats and protection of groundwater, as well as a historical outline of this issue in Poland. The quality of groundwater conditioned by natural factors and methods of assessing anthropogenic pollution of these waters is also discussed. Using examples from regional studies, the influence of such factors as land use and the degree of vulnerability of aquifers on the level of groundwater pollution is also presented, and the values of the natural hydrochemical background for the main indicators of anthropogenic pollution are determined.

An extensive Chapter 10 is devoted to issues regarding the impact of waste on groundwater, taking into account the duration of these impacts. It presents the impacts of landfills and a critical assessment of current regulations and practices in the design,

operation and reclamation of landfills. Great attention is also paid to the impact of transportation routes and liquid fuel storage and distribution facilities on groundwater. In this regard, the results of many years of research at the fuel base are presented. This part of the monograph also contains the results of current research on pesticides and pharmaceuticals on the bank infiltration groundwater captures.

The entire Chapter 14 covers the influence of the sulphide oxidation process on the chemistry of groundwater and surface waters. The chapter draws on the results of many years of research on the Zawada grounwater capture for Zielona Góra, where this phenomenon led to catastrophic changes in water quality. Long-term observations of this groundwater capture made it possible to quantify the development of the process and stabilization of chemistry after several years of exploitation of the groundwater capture.

The 7 subchapters of Chapter 15 look at the problems of pollution migration. Following the general characteristics of the migration processes, examples of the migration of nitrogen compounds, colloids and suspensios to the bank infiltration groundwater capture, as well as the migration of colored waters reflected on the mathematical model are presented. Attention is also given to the migration of petroleum substances and the methodology of research into the soil and water environment contaminated with these substances. Moreover, there is a discussion of the causes and effects of pollution migration to deep aquifers resulting from technical defects of wells and hydrogeological wells.

Chapter 16 discusses the problems of protecting groundwater captures and presents a critical assessment of legal and administrative solutions for the protection of these captures in Poland.

Chapter 17 presents the problems of protecting the main groundwater reservoirs. The benefits of developing a map of the main reservoirs in Poland are indicated and the need to establish legal protection of reservoirs is emphasized here.

Chapter 18 discusses the main problems of groundwater protection in individual sectors of the national economy. The need to protect groundwater in transportation is illustrated in Chapter 19 with an example of protective measures taken at the crossing of the A2 motorway through the area of the Dębina water capture in Poznań.

Chapter 20 contains a critical assessment of groundwater protection issues in environmental impact reports and spatial development plans. In particular, the need for greater involvement from specialists in the field of groundwater protection in developing these documents is indicated.

Chapter 21 discusses the methods of non-reservoir storage of troublesome liquid waste in the geological strata, based on many years of foreign experience, while Chapter 22 discusses the methods of technical support for the self-purification of groundwater. In particular, the use of in-situ oxidation processes for the elimination of iron, manganese and organic pollutants, as well as redox processes for denitrification of nitrates are discussed here.

Chapter 23 contains the basic principles of quantitative protection of groundwater resources, and Chapter 24 contains the concept of evaluating these waters as the basis for their rational use and protection.

Chapter 25 summarizes the issues of groundwater protection in Poland. It presents the causes and effects of pollution and puts forward a number of postulates regarding action that should be taken to ensure the proper protection of groundwater.

An appendix to the content of the monograph is in the form of an example of preparing hydrogeological documentation for a protection zone for a rural groundwater capture.

The monograph also contains an expansive list of literature sources and materials utilized, as well as explanations of the abbreviations (acronyms) used.