EKOLOGIA POLSKA (Ekol. pol.)	41	3–4	285–287	1993

WATERSHED PROCESSES AND VEGETATION IN THE REGION OF CHRONIC ATMOSPHERIC POLLUTION (CARPATHIAN FOOTHILLS, S. POLAND)

PREFACE

Studies on the matter cycling in forest watersheds have been done for more than fifty years (Likens et al. 1977, Persson 1980, Swank and Crossley 1987, Hornung et al. 1990). Originally they were conducted far from industrial centres; they provided information about the natural circulation of nutrients in forest ecosystems. When atmospheric pollution became an acknowledged threat, ecologists became interested in its effect on biogeochemical cycles. Attention was paid first to forests exposed to heavy industrial emissions (Ulrich and Pankrath 1983, Grodziński et al. 1984, Hauhs 1989). However, when forest declined in increasingly greater areas of Europe and North America an interest developed in studying the effects of low-level, continuous pollution. During the last fifteen years most of the research on the cycling of both nutrients and pollutants has been focused on forest watersheds (Andersson and Olsson 1985, Bellot and Escarre 1988).

The watershed of Ratanica stream, located in the Carpathian Foothills (49°51' N; 20°02' E) about forty kilometres south of Cracow, has been exposed to significant amounts of pollution for more than fifty years. Ratanica stream, which is a right-bank tributary of the Raba river, flows into the large (ca. 10 km^2) water retention reservoir of Dobczyce. It was built in 1987 to supply drinking water to the city of Cracow, with a population approaching one million.

With respect to geology, soils, hydrology and vegetation, the Ratanica stream watershed is typical of the Carpathian foothills. Its upper part, 88 hectares or 30% of the watershed, is covered by mixed beech-pine forests, and the lower part by meadows and intensively fertilized fields. The watershed is rather densely populated, with farm houses situated mainly in the lower part of the valley. The entire watershed covers 241.5 ha.

The forested part of the watershed has been the main object of studies by teams of biologists, foresters and soil scientists. Hydrologists and atmospheric chemists have studied about seventy square kilometres around the reservoir, including dozens of watersheds with farms or farms and forests. The studies have focussed on the

functioning of a forest ecosystem chronically stressed by industrial pollution, and have estimated how water quality of small watersheds feeding the Dobczyce reservoir is affected. The research results presented in this volume also provide useful information about the water quality and water management of this region.

Five years of research (1986–1990) produced dozens of papers; only a few of them are presented in this volume of "Ekologia polska". The first three (Manecki and Tarkowski, Miczyński and Zawora, Turzański and Bik) characterize the types and amounts of pollution entering the watershed with wet and dry deposition; then the water balance of Ratanica stream (Suliński and Kucza) and the forest and non-forest vegetation in the Ratanica watershed (Różański et al.) are treated. Other papers provide data on the chemical composition of the forest plants (Szarek et al.), the dynamics of organic matter and pollutants, decomposition of forest litter (Laskowski et al.), and the balance of nutrients, organic matter and pollutants in the Ratanica watershed (Wojtan and Galas). There is information on the input of chemical substances from catchments into the reservoir (Pawlik-Dobrowolski et al.).

The studies were carried out by a research team of workers from various academic institutions in Cracow (Jagiellonian University, Agricultural University, Technical University, Academy of Mining and Metallurgy), and by the Polish Academy of Sciences. The work was done within a project entitled "The functioning of forest ecosystems continuously affected by industry" (CPBP 04.09.05), coordinated by the Institute of Ecology, Polish Academy of Sciences, and financed by the Polish Academy of Sciences.

The investigations were initiated by the late Professor Władysław Grodziński, who created several important projects and completed interdisciplinary ecosystem studies in previous years (Grodziński et al. 1984). Professor Grodziński coordinated the Ratanica studies for the first three years (1986–1988); after that time the work was directed by Professor Krystyna Grodzińska. Professor Władysław Grodziński had an enormous influence on the shape of this undertaking. He set it in motion, and his ideas and inspiration enabled us to continue the investigations after his untimely death. Although his name does not appear among the authors of these papers, his creativity is reflected in all of them. The editors and contributors dedicate this volume to his memory.

REFERENCES

1. Andersson F., Olsson B. (Eds.) 1985 – Lake Gärdsjön – An acid forest lake and its catchment – Ecol. Bull. (Stockholm) 37: 1–336.
2. Bellot J., Escarre A. 1988 – Balances de nutrients en pequenas cuencas de encinar. II Quimismo de la precipitacion y aportes de origen atmosferico – Mediterr. ser. Biol. 10: 63–85.
3. Grodziński W., Weiner J., Maycock P. F. (Eds.) 1984 – Forest ecosystems in industrial regions – Ecol. Stud. 49: 1–277.
4. Hauhs M. 1989 – Lange Bramke: AAN ecosystem study of a forested watershed (In: Acidic precipitation. Vol. 1 (care studies), Eds. D. C. Adriano, M. Havas) – Springer Verlag, New York-Berlin-Heidelberg, London,Paris-Tokyo, 275–305.

5. Hornung M., Roda F., Langan S. J. (Eds.) 1990 – A review of small catchment studies in Western Europe producing hydrochemical budgets – Air Pollution Research Report 28, Commission of the European Communities, Brussels, 186 pp.
6. Likens G. E., Borman F. H., Pierce R. S., Eaton J. S., Johnson N. H. 1977 – Biogeochemistry of forested ecosystem – Springer Verlag, New York-Heidelberg-Berlin, 146 pp.
7. Persson T. (Ed.) 1980 – Structure and function of northern coniferous forests – an ecosystem study – Ecol. Bull. (Stockholm) 32: 1–609.
8. Swank W. T., Crossley A. (Eds.) 1987 – Forest hydrology and ecology at Coweeta – Ecol. Stud. 66: 1–469.
9. Ulrich B., Pankrath J. (Eds.) 1983 – Effects of accumulation of air pollutants in forest ecosystems – D. Reidel, Dordrecht.

Krystyna Grodzińska, January Weiner