3. THE ENVIRONMENTAL SITUATION IN THE UPPER VISTULA BASIN
(SOUTHERN POLAND)

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Abstract

This paper provides general information on the upper Vistula basin and its climate, geology, soil, flora and fauna diversity as well as the diversity of land use patterns and industrialization. The environmental problems of this extensive area are also discussed (air pollution, surface and underground water contamination, soil contamination, changes in the land surface relief and the extent of anthropogenic alterations of the vegetation and fauna). It also presents a few examples of environmental problems in the strongly industrialized region of Kraków (forest catchment, retention reservoir, urban environments). The extent of environmental deterioration in the upper Vistula basin is demonstrated based on biological indication methods (sensitive indicators applied: changes in species composition and abundance of lichens; accumulative indicators: concentrations of heavy metals in mosses, sulphur content in the needles of the pine Pinus sylvestris). Activities aimed at improving the condition environmental of the upper Vistula basin are also discussed.

Keywords: environment deterioration, air pollution, water contamination, forest damage, plant bioindicators, environmental protection, southern Poland

3.1. Introduction

Poland is a typical representative of Central and Eastern Europe countries, where extreme environmental deterioration has occurred in the last half-century. Poland is among the largest and most densely populated countries in Europe. In terms of size (312 000 km²) it is ranked ninth and its population (38 620 000) is eight in Europe [1] forty-nine administrative units called the voivodships. Most of these units are connected by the main river in Poland - the Vistula (Wisla). Its length is 1 047 km and the area of its basin 168 700 km², which corresponds to 54% of the total area of the country [1].

3.2. General information on the upper Vistula basin

The upper section of the Vistula River (up to the mouth of the San River) is 394 km long. The upper Vistula basin is the richest water resource in the country and covers an area of 50,732 km², which is approximately 30% of the total drainage area and 15% of the area of Poland (Figure 1) [2].

The right bank of the upper Vistula basin covers an area of 37,385 km², and the left bank is about three times smaller (12,934 km²). The right bank tributaries are generally large mountain rivers with sources in Carpathian mountain ranges. The left bank tributaries are much smaller and originate in the Malopolska Upland.

The upper Vistula basin is located within three major geographical units: the Carpathians (45% of the basin's area), the Sub-Carpathian Basins (approx. 35%) and the Malopolska Upland (approx. 25%) (Figure 2). It stretches over the areas of ten voivodships (Bielsko-Biała, Katowice, Kielce, Kraków, Nowy Sącz, Tarnów, Tarnobrzeg, Krosno, Rzeszów and Przemyśl) (Figure 3).

![Figure 1. Location of the upper Vistula basin. 1 - Vistula basin; 2 - upper Vistula basin [2]](image)