

BIOMASS, NUTRIENTS AND POLLUTANT CONCENTRATIONS IN THE VEGETATION OF SOME WATERSHEDS

by

Krystyna GRODZIŃSKA, Stanisław BRANIEWSKI, Barbara GODZIK, Grażyna SZAREK, Elżbieta CHRZANOWSKA & Barbara PAWŁOWSKA

The Niepołomice Forest — a lowland watershed — being under chronic pressure from industrial emissions, was selected as a subject for research in the years 1976-1985. Emissions, nutrient flux and heavy metal accumulation were determined for producers, consumers and reducers. Simulation models of the forest function in long-term and medium level industrial pollution were constructed (1).

Till now, there has been no information on the functioning of forest ecosystems in upland and lowland territories of southern Poland, which too, are under the pressure of atmospheric pollution.

The studies carried out in submontane (the Ratanica Valley near Dobczyce) and upland (the Sąspowska Valley — the Ojców National Park) watersheds, aimed at defining the quantity of the biomass and the content of nutritive elements (N, P, K, Na, Mg, Ca) and pollutants (Cd, Pb, Ni, Zn, Mn, SO_x) in the vegetation of these watersheds and in the litter and soil.

Field studies were carried out in four forest areas, 0.5 ha. each. These were (1) a pine-beech forest in the Ratanica Valley with *Rubus hirtus* dominant in the undergrowth; (2) a pine-beech forest in the Ratanica Valley with *Vaccinium myrtillus* dominant in the undergrowth; (3) a poor beech-forest in the Sąspowska Valley; (4) a beech-fir-pine forest in the Sąspowska Valley.

The following were determined in each area:

- 1) floristic content
- 2) biomass of the stand, litter, undergrowth and organic matter
- 3) the amount of Cd, Pb, Ni, Zn, Mn, S, N, P, K, Na, and Ca in trees, shrubs, undergrowth, organic matter, litter and soil.

Results of biomass measurements in the Ratanica Valley were:

- 1) the pine-beech forest with *Rubus hirtus* -
standing crop — 320 t/ha.
undergrowth — 117 g/m²
organic matter — 37 g/m²
litter — (A₀L) — 200 g/m²
- 2) the pine-beech forest with *Vaccinium myrtillus* -
standing crop — 282 t/ha
organic matter — 36.6 g/m²
litter — 200 g/m².

The Sąspowska Valley biomass accumulation is markedly greater. In the beech forest it reaches 503 t/ha., in the beech-fir-pine forest — 437 t/ha., and the quantity of the litter biomass reaches, analogically — 438 and 120 g/m².

The major accumulation of heavy metals occurs in the layer of decaying litter (A0 H), while the biogenic elements are accumulated mainly in the undergrowth plants. The level of heavy metals and sulphur is higher in the materials from the Saspowska Valley than in those from the Ratanica Valley. Curiously enough, the level of pollutants in both watersheds is similar to the data obtained in the last few years in the Niepolomice Forest.

References

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